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Opinion leadership in parliamentary Twitter networks: A matter of layers of interaction?

Rosa Borge Bravo  and Marc Esteve Del Valle 

ABSTRACT

This article seeks to test whether Twitter is contributing to the appearance of new opinion leaders or empowering already visible political leaders. The study is based on a data set spanning from January 1, 2013 to March 31, 2014 that covers all *relationships* (4,516), *retweets* (6,045) and *mentions* (19,507) of Catalan parliamentarians. The data sustains that having a parliamentary position increases the probability of being an opinion leader of the following–follower and mention networks, but not so much of the retweet network. Although Twitter parliamentary networks reproduce leaderships “as usual,” the most central opinion leaders in the retweet network are not official party leaders. Twitter activity, not official leadership, is a stronger predictor of centrality for both retweets and mentions received.

KEYWORDS

Catalonia; communication flows; layers of interaction; networks; opinion leaders; parliamentarians; Twitter

The progress of political communication in electoral politics, political parties, and parliaments has been historically intertwined with technological changes. Social media are transforming political communications and consequently those of the members of parliaments, but in which direction? Who currently holds the leading role in terms of communication and political influence in this new context? Older media settings and traditional elites are still powerful when it comes to shaping politics, but digital communication has provided non-elites, new actors, and rank-and-file citizens with opportunities to influence the form and content of public discourse (Chadwick, 2013) and to renew old parties and build new ones (Chadwick & Stromer-Galley, 2016). Therefore, studying how MPs communicate on Twitter within parliament has become relevant to understanding the technological changes shaping our popular sovereignty chambers and affecting party leadership and hierarchy.

This article applies statistical analysis and social network methods to offer plausible answers to the following question: Are new opinion leaders appearing in these new communication flows or, on the contrary, is Twitter empowering

already established party leaderships? To do this, we gathered all the Catalan parliamentarians’ relations—following/follower (4,516), retweets (6,045) and mentions (19,507)—in the period from January 1, 2013 to March 31, 2014. We decided to analyze these three networks due to the fact that politicians strategically use these layers of interaction in different ways (Grant, Moon, & Grant, 2010; Xu, Sang, Blasiola, & Park, 2014; Yoon & Park, 2012). We have chosen the Catalan Parliament because 85% of its members have Twitter accounts, so there is enough variation to ascertain the rise of new opinion leaders. Also, the analysis of the Catalan Parliament is an opportunity to extend this kind of study to Southern Europe and to multiparty and parliamentary systems, in a field very much dominated by studies applied to the U.S. political system or to Anglo-Saxon countries.

The paper is organized as follows: We first analyze related work on opinion leaders or influentials on Twitter. The standard measures of influence used in the literature are the number of followers, retweets, and mentions received, and some studies show that they are used diversely and have different functions. Thus, the profile

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and characteristics of the politicians with greater numbers of followers is more traditional and visible than those who are more retweeted and mentioned. We used this literature review as the basis of our hypotheses. We then introduce the case of Catalonia, specifically, the technological and political context and the type of electoral and party system in which Catalan parliamentarians operate. Next, we explain the details of the data collection (compilations of parliamentarians' Twitter APIs), construction of variables (six explanatory dimensions will be analyzed), and research techniques applied (multivariate regression analysis and network analysis of following/follower relations, retweets, and mentions). Afterward, we present the analysis and findings of the article, and discuss their implications. Finally, we conclude the article. The results give a mixed picture: official political leadership increases the possibility of being central in the three layers, but the highest mention and, even more so, retweet activity is performed by MPs who are very active on Twitter and do not hold official parliamentary or party positions.

Theoretical background and hypotheses

Twitter enhances relationship building and allows individual citizens to make, contribute, filter, and share content; therefore, it gives personalized communication flows the potential to attain levels hitherto unreachable in politics. All of these characteristics enable direct contact between the public and party representatives or among politicians themselves without the control of the party hierarchies (Gustafsson, 2012; Golbeck et al., 2010; Margetts, 2001; Thamm & Bleier, 2013). Digital media practices are challenging hierarchical party organizations, and new leaders backed by digitally enabled activist networks are coming on the scene, such as Howard Dean or Ron Paul, and more recently, Bernie Sanders or Jeremy Corbyn (Chadwick & Stromer-Galley, 2016). Clearly all these embedded features of Twitter are affecting "politics as usual" (Margolis & Resnick, 2000), but to what extent are they inducing changes in the control of communication by the official hierarchy and paving the way for new opinion leaders?

Opinion leaders in Twitter networks

The traditional view of influence argues that a minority of individuals who have some particular characteristics are extremely compelling in spreading ideas to others. These individuals are defined as opinion leaders in the two-step flow theory (Katz & Lazarsfeld, 1955). The rationale of the theory is that the influence of mass media first reaches opinion leaders and then they transmit the information to others (Katz, 1957; Katz & Lazarsfeld, 1955). Diffusion studies have identified some characteristics of opinion leaders, which include innovative behavior, vast social connections, and a high degree of civic involvement and media consumption (Keller & Berry, 2003; Rogers, 2003; Vishwanath & Barnett, 2011).

The original opinion leader concept can be applied to communication flows on social media even more soundly because, in this context, opinion leaders are ingrained as nodes in the network that defines the medium (Karlsen, 2015). Opinion leaders are strategically placed transmitters that pass information and influence on to the more passive and not-so-central members of the network (Karlsen, 2015; Keller & Berry, 2003). However, they are not an elite leading in every field: recent studies show that they are experts focused on one field, not several, and that they belong to different socioeconomic levels (Karlsen, 2015, p. 4).

On Twitter some research has been conducted on revealing who the network opinion leaders are and their characteristics. Some authors have employed network measures to find out the influentials on Twitter; that is, actors holding a higher number of links and interactions within a network could be considered as opinion leaders in that specific network. The most frequent measures of influence are the number of followees and followers (following-followers network), and the number of retweets received and mentions received. For example, research carried out by Hsu and Park (2012) on communication relationships among members of the Korean National Assembly revealed that several politicians in the network were far more popular than the others in terms of the number of followers they have. González-Bailón and Wang (2016) discovered in the case of protest movements that there are actors

and people forming an elite of brokers that have more followers and are mentioned and retweeted more often. Dubois and Gaffney's (2014) analysis of the Twitter communities of the major Canadian parties discovered that the number of followers (indegree¹) identified traditional political elites as influentials. In their study of Twitter-based opinion leadership in the Wisconsin recall election, Xu et al. (2014) found that users' high centrality was positively related to the number of retweets received. Last, Vaccari and Valeriani (2013) studied 10 Italian politicians' followers throughout an electoral campaign, and Karlsen and Enjolras (2016) analyzed the number of mentions Norwegian electoral candidates received during the campaign. Their results are interesting since, in the case of Italy, the number of followers a politician had was not an indicator of his/her influence because the most followed politicians had the least active and followed users (Vaccari & Valeriani, 2013, p. 1). For the Norwegian case, candidates who tweeted frequently were more likely to be mentioned, but only half of the most mentioned candidates had a strong party position (Karlsen & Enjolras, 2016, pp. 350–351).

However, some research has compared these three different measures of influence (number of followers, retweets, and mentions) and showed that these measures could rank influentials differently. For example, in studies including the entire Twitter site, Kwak, Lee, Park, and Moon (2010) and Cha, Haddadi, Benevenuto, and Gummadi (2010) reported that users who have a high indegree are not necessarily successful in terms of spawning retweets or being mentioned. For Cha et al. (2010), indegree alone reveals very little about the influence of a user. It seems that a high number of followers is an indicator of popularity, but the number of retweets and mentions is a better indicator of the influence a politician has (Karlsen & Enjolras, 2016). On the contrary, Suh, Hong, and Pirolli (2010) found that the number of followees and followers is strongly predictive of retweet probability. In this line, Grant et al. (2010) pointed out in their study of Australian politicians that there are two factors influencing the number of times a politician would be retweeted: his/her number of followers and their conversational activity on Twitter, specifically,

their frequency of mentioning others. In any case, it seems that parliamentarians are behaving strategically in the use of Twitter's layers. They use retweets, mentions, and followings differently depending on their power position in the party and their conception of social media as a tool for increasing their own influence and autonomy within that party, which is what Karlsen & Enjolras (2016, p. 339) have termed "individualized social media campaigning style."²

Regarding the characteristics of the influentials, few studies have attempted to study the profile of the opinion leaders on Twitter, and they have mainly analyzed the concentration of followers. Dubois and Gaffney (2014) discovered that for the main parties' Twitter communities in Canada, the highest indegrees were concentrated among the traditional political elite (media outlets, journalists, and politicians). In the case of the environmental movement in Milan, Diani (2003) found that having a clear public profile and access to the national media, a long tradition of campaigning and access to political institutions were also related to a high indegree. Vaccari and Valeriani (2013) detected that the more active and popular of Italian politicians' followers turned out to be famous sportspeople, pop culture celebrities, famous journalists, or high-profile politicians. Therefore, following metrics usually identify traditionally important and highly visible political or social players (Dubois & Gaffney, 2014; Vaccari & Valeriani, 2013). Regarding other individual factors influencing the centrality positions on Twitter, some studies in South Korea (Shuh et al., 2010; Hutto et al., 2010; Young & Park, 2012), the U.S. (Xu et al., 2014), and Norway (Karlsen & Enjolras, 2016) have deployed multivariate regression analyses to ascertain the importance of individual factors such as geographical location, age, gender, party membership, position on the party list, campaigning style, left-right ideology, Internet behavior, and activity on Twitter.

On the contrary, there are many more studies on the socio-demographic, political, and Internet profile of the members of parliament that adopt Twitter, most of them focused on the U.S. Congress. Lassen and Brown (2011) found that while socio-demographic factors did matter, Internet usage and the number of years the

members had been in the U.S. Congress had no influence. However, Chi and Yang (2010) found that socio-demographic factors had no effect on Twitter adoption by U.S. parliamentarians. In this same regard, Williams and Gulati (2010) stated that party membership and campaign resources are drivers of Twitter adoption. Also, Larsson & Kalsnes' (2014) study of the activity of Norway and Swedish parliamentarians on Twitter concluded that the most active MPs tended to be younger, non-incumbents and outside the political hotspots.

Hypotheses

Our study will take into account the socio-demographic, political, and Internet factors that affect the centrality position in political networks and, specifically, in parliamentary Twitter networks. As we have reported, part of the literature shows that the traditional political elites are leading these networks. However, other studies conclude that it is not the same people that concentrate at the same time the highest number of followers, retweets, and mentions. That is, having a large number of followers does not imply being the most retweeted or mentioned, and the politicians leading in number of followers are well-known and possibly close to the party hierarchy. In that sense, the following hypotheses are proposed:

Hypothesis 1. Communication flows of the Catalan parliamentarians' following-follower, retweet, and mention Twitter networks are empowering highly visible political leaders, that is, MPs, with relevant parliamentarian positions.

Hypothesis 2. The centrality of the political leaders is different along the following-follower, retweet, and mention Twitter networks, with the following-follower network as the most clearly led by political leaders.

The Catalan Parliament and Twitter

The Catalan Parliament and its representatives have taken advantage of social media as shown

by the ratio of Catalan parliamentarians with Twitter profiles in 2014 (85%), greater than in the Spanish Central Parliament (43%) (Sanz, 2012), the German Bundestag (31.61%) (Thamm & Bleier, 2013) and the UK House of Commons (72.3%) (Heaven, 2013). It is also important to note the early adoption of networking sites by the Catalan Parliament. In fact, since 2009, the Catalan Parliament has initiated some projects called "Parliament 2.0" and Escó 136,³ consisting of a Web site on which Catalan citizenry can take part in the elaboration of laws, and has adapted to the new participatory role of social media users, opening a YouTube channel, a Facebook page, and a Twitter profile.

The extension of Twitter among Catalan parliamentarians is in consonance with a society where the use of the Internet, social media, and smartphones is widespread: 80% of Catalan citizens are Internet users; 68% of these Internet users take part in social media; and 97% of Catalan households have a smartphone (Fundación Telefónica, 2014, p. 138). Moreover, a significant number of Catalan citizens use the Internet (28%) and social networks (20%) to obtain political information (CEO⁴ first wave April 2014).

Furthermore, Catalonia is witnessing a particular and exceptional political context characterized by demands for a referendum on independence⁵ as well as widespread protests⁶ against austerity measures. In this conflictive political arena, social media play an important role in political communication and mobilization.

Several studies have already shown that social media are contributing to an equalization of opportunities for political communication among Catalan parties, since new, fringe, and medium-size parties belonging to very varied political positions achieve greater online interaction and participation than larger and more institutionalized parties (Balcells & Cardenal, 2013; Borge, R., & Esteve, M., 2017). Nevertheless, the proportional electoral system rooted in blocked party lists and large provincial districts does not promote the autonomy of the candidates but rather the party hierarchy's control over political power. Thus, MPs' social media practices are driven by a tension between campaigning for the party and following official party lines or developing a more

individualized style that conveys their own reputation and power (Karlsen & Enjorras, 2016).

Regarding the party and ideological composition of the Catalan Parliament, after the election on November 25, 2012, the Catalan party system was fragmented into a wide variety of fringe and medium-size parties: CiU (the ruling Catalan nationalist center-right party with 50 seats), ERC (a left wing and Catalan nationalist party with 21 seats), PSC (a socialist party federated with the Spanish Socialist Party, with 20 seats), PP (Popular Party, a right-wing Spanish nationalist party with 19 seats), Cs (“Citizens,” new centrist party against Catalan nationalism, with 9 seats), ICV-EUiA (green-socialist party with 13 seats) and CUP (an extreme left-wing Catalan nationalist coalition with 3 seats). Indeed, the Catalan party system is distributed along two main ideological cleavages: left/right-wing and Catalan nationalist/non-Catalan nationalist.

Methods

In order to test our hypotheses, we first manually compiled a list containing usernames of the members of the Catalan Parliament on Twitter. There were 116 Catalan parliamentarians with Twitter accounts (85% of the total number). Twitter API was queried to gather all the relations, retweets, and mentions of the Catalan parliamentarians from January 1, 2013 to March 31, 2014, allowing us to quantitatively determine the direction of Twitter communication flows among Catalan representatives.

Once the directions of the communication flows on the Catalan Twitter network were known, we determined which parliamentarians were occupying a centrality position in the three types of Twitter networks, that is, who were the opinion leaders of these networks. The centrality position was measured by collecting the total number of parliamentarians following another parliamentarian and the total number of retweets and mentions a parliamentarian received from the other MPs. Then, regression analyses were carried out (based on our own database⁷) to ascertain the individual attributes of the Catalan parliamentarians who were opinion leaders in the following–follower, retweet, and mention Twitter networks.

Multiple regression analyses were then run on the 116 Catalan Parliament members who had Twitter accounts. Our independent variables in the model included six dimensions⁸ that could explain the centrality in parliamentary networks and that have been inspired by the literature shown in previous sections: 1—Socio-demographic characteristics (age, gender, education); 2—Internet behavior (having a blog or Facebook account) and Twitter activity (total number of tweets; total number of retweets sent; total number of retweets received; total number of mentions sent; total number of mentions received); 3—Relational variables: indegree (number of parliamentary followers a parliamentarian Twitter holds) and outdegree (number of parliamentarians each parliamentarian is following on Twitter); 4—Ideological cleavages: left (ERC, PSC, ICV-EUiA, and CUP), right (CiU, PP and Cs), and Catalan nationalists (CiU, ERC, and CUP) and non-Catalan nationalists (PSC, ICV-EUiA, PP, and Cs); 5—parliamentary activity (number of legislative commissions in which they participate, number of interventions in these commissions and in plenary sessions and number of legislatures a parliamentarian has attended in Parliament (up to three: 2006, 2010, 2012)); 6—political responsibility in Parliament (role in the parliamentary group and Parliament and role in parliamentary commissions), in the party (party president), or as mayors, when that was the case.

Last, we carried out a network analysis to find the centrality position of Catalan parliamentarians’ in the following–follower, retweet, and mention networks, not based on the quantity of retweets and mentions that they received⁹ (which corresponds to the dependent variables in the regression analysis), but on the total number of parliamentarians that were following, retweeting, or mentioning a particular parliamentarian. This analysis focused on the number of different parliamentarians retweeting or mentioning another as a way to detect the parliamentarians whose popularity was spread among different parliamentarians and not dependent on the gross volume of retweets and mentions, which is frequently affected by a few very active parliamentarians giving support to their peers.

Analysis and discussion

The network leaderships of the Catalan parliamentarians' following–follower, retweet, and mention Twitter networks were analyzed from a double perspective: On the one hand, we ascertained the influence of political, socio-demographic and Internet characteristics on being the most followed, retweeted, and mentioned parliamentarians by carrying out regression analysis. To our knowledge, this is the first time that this complete set of explanatory variables of the profile of Twitter users has been applied to parliamentary Twitter networks. On the other hand, we applied network analysis methods to determine who was at the center of these networks and whether or not they were official party or parliamentary leaders.

We carried out OLS multiple regression analyses to reveal the characteristics of the opinion leaders of the Catalan parliamentarians' Twitter network. To do so, first we checked normality assumptions for all the variables. Regarding the three dependent variables, while the distribution of the indegree variable or number of followers was normal ($\bar{x}=39$; $SD = 15.6$; asymmetry = 0.3; kurtosis = -0.4) the distribution of the other two dependent variables, mentions received ($\bar{x}=179.6$; $SD = 276$; asymmetry = 3.6 and kurtosis = 14.5) and retweets received ($\bar{x}=54.7$; $SD = 67$; asymmetry = 2.6 and kurtosis = 8.3) was skewed toward the lowest value of the distribution, since a small number of parliamentarians concentrate most of the mentions and retweets, as is usual among political Twitter networks (Grant et al., 2010; Karlsen & Enjolras, 2016; Xu et al. 2014) and in other Internet uses (Farrell & Drezner, 2007; Hogan, 2008). This meant that few parliamentarians had a high centrality in these two networks. We therefore transformed these two variables into two normal distributions by performing square-root transformation for the retweets received and logarithmic transformation for the mentions received, as they were the best normality transformations for these two positively skewed variables. Afterward, for the sake of comparison, we converted the three already transformed variables into a scale from 0 to 1.

With regard to the explanatory variables, we computed several square-root transformations in order to achieve a normal distribution of the variables related to Twitter activities (total number of

tweets, total number of retweets sent, and total number of mentions sent) that were positively skewed toward the lowest values.

Second, in order to prevent collinearity, we examined the associations and correlations between the explanatory variables, obtaining the Pearson's r correlations matrix of all the numerical variables and the χ^2 and Cramer's V measures of association between the categorical variables and the rest. The two bunches of explanatory variables that highly correlated or associated between each other were the Twitter activities and the parliamentary activities. In addition, Twitter activity variables were highly correlated (between 0.2 to 0.7 Pearson's r), so we decided to perform a factor analysis to find out whether these variables conformed one dimension that could be included as a summary variable in the multiple regressions. We carried out three different factor analyses, because this summary variable could be formed by a different grouping of variables depending on whether the variable to be explained was the number of followers (indegree), the retweets received, or the mentions received. For the first case, when the indegree was the dependent variable, we performed the factor analysis with the five Twitter activities (number of tweets, retweets sent, mentions sent, retweets received, and mentions received). The five Twitter activities loaded heavily (factor loadings above 0.66) in the first factor; that was the only one with an eigenvalue greater than 1 and that explained 96% of the variance. For the second model, when the dependent variable was the retweets received, we withdrew this variable and ran the factor analysis with the remaining four variables. For the third model, when the dependent variable was the mentions received, we likewise withdrew this variable in the factor analysis. In the two cases, the four Twitter activities loaded heavily (factor loadings above 0.64) in the corresponding first factors, which are the only ones with an eigenvalue greater than 1 and that explained almost 100% of the variance. Consequently, the different Twitter activities clearly conformed a single dimension.

With relation to parliamentary activities (number of legislative commissions in which a parliamentarian participates, and number of interventions in these commissions and in the plenary sessions), the Pearson's correlations between them were ≥ 0.3 . Also, interventions in the plenary were correlated with

Twitter activities (Pearson's r of 0.3) and were associated with having a parliamentary position (Kendall's tau-b of 0.38).¹⁰ The number of commissions a parliamentarian belongs to overlapped with the number of interventions in the commissions. Thus, we decided to keep in our model only the number of interventions in the commissions as an explanatory variable.

After all these transformations, we carried out three OLS multiple regression analyses to find the parliamentary characteristics triggering a centrality position in the following-follower, retweet, and mention networks.

The results of the three regression analyses were statistically significant, with an adjusted R -squared of 0.41 in the case of the following-follower network, 0.57 in the retweet network, and 0.58 in the mention network. We tested for multicollinearity by computing the variance inflation factor (VIF) that quantified how much the variance of the estimated regression coefficients was inflated because of correlation with another explanatory variable. In the three regression analyses, the VIFs were around 1 and never exceeded 1.6, so there was no correlation between the predictors.

The results presented in Table 1 show that holding a parliamentary position increases the number of followers, retweets, and mentions received, as stated in hypothesis 1. That is, visible political leaders with

parliamentarian appointments could be considered the opinion leaders of the following, retweet, and mention networks. In fact, the mean of followers (51), retweets (110), and mentions (559) received by MPs with a parliamentary position is much higher than in the case of the MPs without this appointment (37, 47, and 127, respectively).

On the other hand, having an important presence on Twitter (Twitter factor) activates the number of retweets and mentions received but does not have an influence on the number of followers a parliamentarian has. This is an interesting finding because it could indicate that the number of followers a parliamentarian has depends on the official visibility of the parliamentarian but not on his/her activity on Twitter, such as the total number of tweets posted or the number of tweets and mentions sent or received. In fact, the magnitude of the standard errors and the different levels of significance of the regression coefficients of the parliamentarian position indicate that holding a parliamentarian position is more influential in the case of the number of followers and mentions received than in the number of retweets received.

In order to show more clearly the relation between the three indicators of centrality in the Twitter network (number of followers, retweets, and mentions received) and the two relevant explanatory variables commented above (Twitter

Table 1. OLS Multiple Regression on Indegree, Retweets and Mentions Received in the Catalan Parliamentarian's Twitter Network.

	Indegree	Retweets Received	Mentions Received
Gender	0.02 (0.03)	-0.06*(0.03)	-0.00(0.02)
Age	0.003 (0.002)	0.0004 (0.002)	-0.00 (0.00)
Education	-0.02 (0.02)	-0.02 (0.02)	-0.02 (0.02)
Blog	0.07* (0.04)	0.04 (0.03)	0.02 (0.03)
Facebook	-0.02 (0.04)	-0.03 (0.03)	-0.01 (0.03)
Indegree		0.001 (0.001)	0.001* (0.001)
Outdegree	0.01*** (0.005)	0.001 (0.001)	-0.001 (0.001)
Twitter5	0.03 (0.02)		
Twitter4(noR)		0.15*** (0.02)	
Twitter4(noM)			0.11*** (0.01)
Left-right	-0.06 (0.04)	0.02 (0.03)	-0.03 (0.03)
CatNat-nonCa	0.003 (0.03)	0.02 (0.03)	-0.01 (0.02)
Incumbency	-0.03 (0.02)	-0.03 (0.02)	0.0008 (0.02)
IntervComiss	-0.0001 (0.0002)	-0.00004 (0.0002)	0.0002 (0.0001)
ParliamPositio	0.18** (0.06)	0.10* (0.05)	0.12** (0.04)
ComissPositio	-0.02 (0.04)	-0.05 (0.03)	-0.05 (0.03)
PolitPosition	-0.01 (0.04)	0.01 (0.04)	0.06 (0.03)
Constant	0.20 (0.14)	0.40*** (0.12)	0.59*** (0.10)
Adjusted R^2	0.41	0.57	0.58
N	116	116	116

Note. Standard errors in parentheses.
 $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

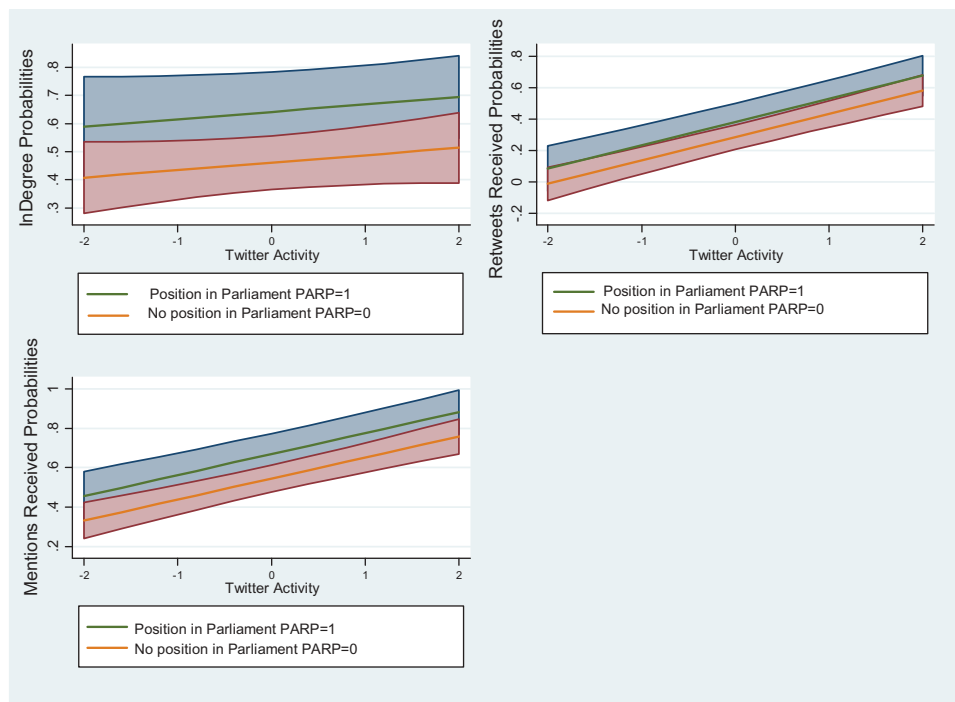


Figure 1. Predicted probabilities of the dependent variables by Twitter activities and official position in Parliament.

activities and parliamentary position), we next display three graphs in [Figure 1](#) showing the predicted probabilities of being followed, retweeted, and mentioned (Y axis) by the different levels of Twitter activity¹¹ (X axis) for MPs with a parliamentary position (green line) and without (orange line).¹² The graphs show that the slope of the lines is steeper in the case of the retweets and mentions received, demonstrating that the impact of holding a parliamentary position is more important for the probability of getting followers, whereas the Twitter activity is more influential in the case of the retweets and mentions received.

Although the MPs without a parliamentary appointment always have less probability of having followers or being retweeted or mentioned, the MPs with a parliamentary position have an 18% greater probability of having followers and a 12% greater probability of being mentioned, whereas the increment in retweets is around 8%. This fact corroborates what we pointed out initially, that is, the retweets received are less determined by having a parliamentary position than in the case of being mentioned and, above all, having followers.

In addition, [Table 1](#) shows other relevant differences regarding the predictors of the three central positions in the Catalan parliamentarians' Twitter

network that reveal the different profile of the leaders in these three layers. In the case of the indegree or number of followers a parliamentary holds, having a blog and following other parliamentarians increases the number of followers, whereas being a female parliamentarian decreases the retweets received, and the number of followers increases the mentions received.

To sum up, the results reveal that parliamentary official leadership is determinant of the centrality role in the following–follower and mention networks, and the retweet network, although to a lesser extent. This confirms our second hypothesis. The official leaders of the parties and of the Parliament are also the opinion leaders of the Twitter networks, probably due to their higher popularity and vast Twitter connections, as also happens in other political networks (Dubois & Gaffney, 2014) and processes of communication and diffusion (Rogers, 2003; Vishwanath & Barnett, 2011).

However, we also found, in line with results from Yoon and Park (2012) for the Korean parliamentarians, that, although the following–follower and mention networks (and to a lesser extent the retweet one) are subjected to partisan pressures, the parliamentarians' strategies in these two networks are different. That is, the number of a

parliamentarian's followers (indegree) is highly determined by the number of parliamentarians followed (outdegree is a significant predictor), but in the case of the mentions received, one of the most important predictors is the Twitter activity in which a parliamentarian engages. Reciprocal relationships and hierarchical influences seem to have a strong effect in the case of the number of followers a parliamentarian has, but a high level of Twitter activity has more influence on the mentions and retweets received. These results also corroborate those found by Grant et al. (2010) in the case of the Australian politicians and by Karlsen and Enjolras (2016) for the Norwegian case, as it seems that Catalan MPs who tweet more and engage in conversational tweeting are more likely to be retweeted. In addition, as Cha et al. (2010) noted for the whole Twittersphere and Vaccari and Valeriani (2013) for the case of Italian politicians, the number of followers does not indicate influence in the rest of the communication flows since it is not necessarily linked to receiving the highest number of retweets or mentions.

Our regression models show that, although communication flows of Catalan parliamentarians' Twitter networks are empowering political leaders (with a parliamentarian position), the Twitter activity has an independent and relevant effect on the centrality in the mention and retweet network. Therefore, we are witnessing another example of "politics as usual" (Margolis & Resnick, 2000) that could amplify the control of the official hierarchy of the party. However, at the same time, the retweet and mention networks are led by the MPs that are very active on Twitter and could possibly use these layers to increase their reputation and autonomy within the party (Karlsen & Enjolras, 2016), regardless of whether or not they hold parliamentary posts.

For a deeper understanding of these findings, we extracted the total number of different parliamentarians following, retweeting, and mentioning a specific representative and the ones with the highest degree in these three layers, and applied network representations. First we show the graphical representation of the mention centrality in [Figure 2](#).

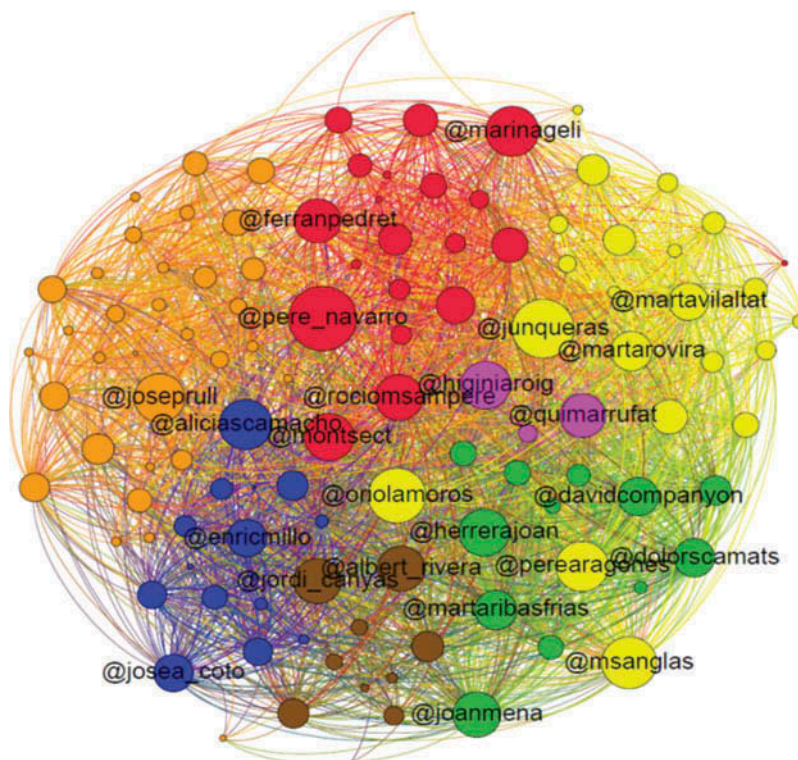


Figure 2. The mention centrality of the Catalan parliamentarians' Twitter network (January 1st 2013—March 31, 2014).

The nodes of the network are the 116 deputies with Twitter accounts and those with labels are the 20% of parliamentarians with a higher Mention degree. The size of the nodes is equivalent to their mention centrality in the network. The color of the nodes is equivalent to the political party that they belong to: orange (CIU), yellow (ERC), red (PSC), blue (PP), green (ICV), brown (Cs) and violet (CUP).

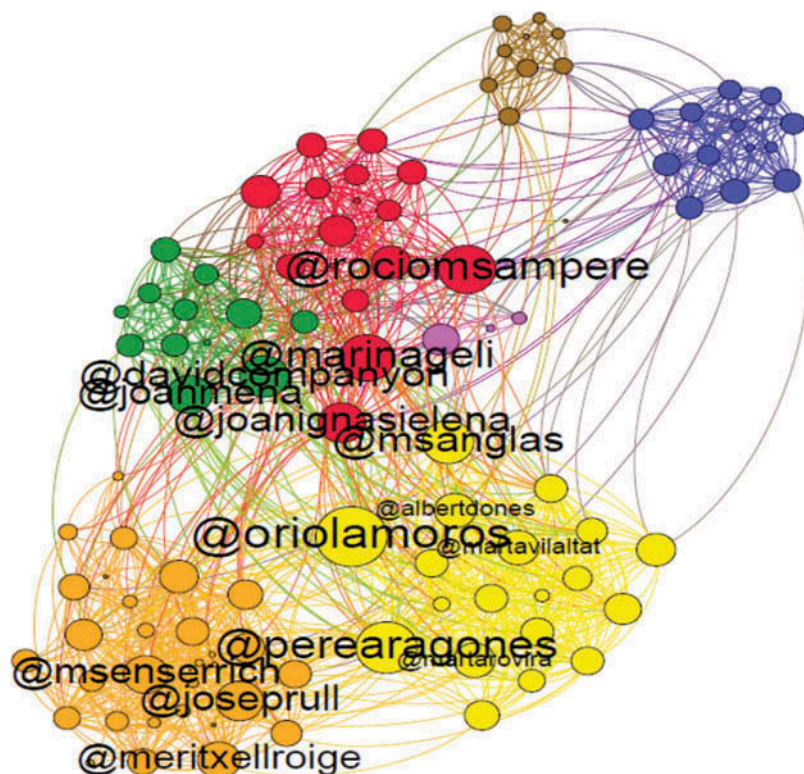


Figure 3. The retweet centrality position of the Catalan parliamentarians' Twitter Network (January 1st 2013—March 31 2014). The nodes of the network are the 116 deputies with Twitter accounts and those with labels the 10% of parliamentarians with higher retweet centrality. The size of the nodes is equivalent to their retweet centrality in the network. The color of the nodes is equivalent to the political party they belong to: orange (CIU), yellow (ERC), red (PSC), blue (PP), green (ICV), brown (Cs) and violet (CUP).

Among the 20% of parliamentarians with the highest degree of mentions, 14.78% hold a parliamentary position, while the other 85.72% do not, eight of them being party leaders.¹³ With respect to the retweet centrality, the network graph in [Figure 3](#) shows that, from among the 21 parliamentarians with a highest retweet centrality, only one holds a parliamentary position and she is also a party leader: Marta Rovira, Secretary General of ERC (@martarovira). These numbers are in sharp contrast with the percentage of parliamentarians holding the highest number of followers: among the 21 representatives with the highest indegree, 42.85% hold a parliamentary position (five are party leaders¹⁴) while the other 57.15% do not.

The results obtained by doing this network analysis corroborate and detail the findings of the regression analyses and our second hypothesis. New opinion leaders, who do not hold a parliamentary position and are not party leaders, concentrate the highest number of mentions and retweets from different parliamentarians. And the

retweet network is the least dominated by party hierarchies.

Conclusions

This article shows that Twitter plays a double role: it empowers party leaderships, but it also opens the door for the appearance of new opinion leaders who do not hold relevant parliamentary positions but who are very active on Twitter. Hence, social media practices might be a source of renewal for party organizations and party leaderships (Chadwick & Stromer-Galley, 2016).

The regression models and the statistics presented indicate that highly visible political leaders (party leaders and MPs with parliamentary positions) are the most followed, retweeted, and mentioned. These results are in line with those found in previous studies (Dubois & Gaffney, 2014; Hsu & Park, 2012) that pointed to the role played by political leadership as a factor behind opinion leadership in Twitter networks. Nevertheless, having an important presence on Twitter (number of tweets, retweets, and mentions

sent) activates the number of retweets and mentions received as found in other studies (Grant et al., 2010; Karlsen & Enjolras, 2016), but does not have an influence on the number of followers. In that sense, the number of followers a parliamentarian has depends on the official visibility of the parliamentarian, but not on his or her activity on Twitter (Yoon & Park, 2012). In addition, the regression analyses reveal that having a parliamentarian appointment is comparatively less important in the case of retweets received, being a stronger predictor for the mentions received and, above all, for the number of followers.

On the other hand, the network analysis of the total number of parliamentarians following, retweeting, and mentioning another MP have pointed out that, among the parliamentarians with the highest level in the three layers, the number of parliamentarian appointments and party leaders is very different: only one in the case of the retweets received, 15% in the case of the mentions received, and 43% in terms of the following-follower network. As happens in other countries, the opinion leaders in the mention and retweet networks do not constitute the top politicians (Karlsen & Enjolras, 2016; Yoon & Park, 2012).

In summary, there is a different rationale behind MPs' following, retweeting, and mentioning activity. The following-follower network appears to be influenced more by reciprocal relationships and official hierarchies, but the Twitter activity better predicts the mentions and retweets received, and this last layer of interaction is the least controlled by the party officials. The MPs gathering the most followers are not the same as the ones drawing the highest number of retweets and mentions.

Could our research be extended to other contexts? We conceive parliamentarians' online communications, taking into account the diverse influence of the party system and electoral rules (Chadwick, 2013; Chadwick & Stromer-Galley, 2016; Karlsen & Enjolras, 2016), as comparable entities across countries. Consequently, our argument could be applicable to all kinds of political systems. Indeed, as we have explained, different aspects of our results have also been corroborated in other countries such as Korea, Canada, Norway, or Australia. Moreover, the statistical and network analyses used in the research may also be replicated in other studies.

Notwithstanding, a number of complementary issues remain to be tested: (a) It is reasonable to assume that there are other factors shaping the parliamentarians' communication flows in the parliamentary Twitter network. For instance, common work in legislative commissions, seating arrangements, or belonging to the same electoral district could lead to friendship and acquaintance ties ending in high reciprocity in their retweets, mentions, and followings (Lassen & Brown, 2011). (b) It may be useful to study the content of the tweets in order to better ascertain the level of political acquiescence to the traditional leaders (Yoon & Park, 2012). (c) A better understanding of the importance of opinion leaders on Twitter should address how followers are sharing, distributing, and commenting on opinion leaders' tweets. That is, to become an opinion leader in social media networks, the audience one can reach directly is important, but so is the audience that can be reached indirectly through one's primary audience (Vaccari & Valeriani, 2013, p. 5). (d) Finally, more studies expanding upon the time span of our article and carrying out comparative analysis between parliamentarians of different and similar political systems could add powerful insights.

In conclusion, this research implies that Twitter is opening a new online political arena in parliaments that has its own communication logics and strategies. As with other social media, in order to see if Twitter is diminishing the traditional dominance of political leaders, it is necessary to compare the different layers or networks of interaction. Parliamentarians seem to behave strategically in this techno-mediated sphere, making different use of the layer of Twitter in which they are maneuvering.

Notes

1. In social network analysis, indegree is the technical name for the number of relations directed to a node.
2. Combining Twitter and survey data, Karlsen and Enjolras (2016, p. 338) found out that there are two main styles of social media campaigning: A party-centered style and an individualized style. The individualized style increased activity on Twitter (measured by number of tweets) but diminished the influence on Twitter (that is, number of mentions).
3. Seat 136, as the Parliament seats 135 members. Citizens' comments and suggestions are transferred to the authorities in charge of drawing up Catalan

legislation and they will be annexed to the law initiative. See <http://www.parlament.cat/web/participacio/esco-136>.

4. CEO is a Catalan governmental center for public opinion studies.
5. According to CEO figures (June, 2014), 45.2% of survey respondents were in favor of Catalan Independence ($N = 2,000$).
6. In 2013 there were 6,000 demonstrations in Catalonia. See <http://www.lavanguardia.com/encatala/20131117/54394193564/manifestacions-catalunya.html>.
7. We extracted the data about the characteristics of the MPs in January 2014 from the Catalan Parliament Web site (<http://www.parlament.cat/web/index.html>) and from the information publicly available on the Internet. Most of the characteristics did not vary throughout the year.
8. See the [appendix](#) for codification and description of the variables.
9. In the case of the following–follower network the centrality position will always be measured by the number of parliamentarians following a particular parliamentarian.
10. Parliamentarian position is a dichotomous variable. In order to know the possible association between this and the continuous variable “Interventions in the Plenary,” we recoded the latter into an ordinal variable, and we calculated the Kendall’s tau-b and the χ^2 . The 78% of the MPs with a parliamentarian position have participated more than 50 times in the plenary, whereas only 28% of the MPs without this role have taken part more than 50 times. Kendall’s tau-b = 0.38; $\chi^2 = 28.21$ (Pr = 0.000).
11. The scale of Twitter activities consists of units of standard deviations or z scores and ranges from $2 SD < \mu$ to $2 SD > \mu$. The different Twitter activities form one principal factor, and the score of each parliamentarian in this Twitter activity factor is a linear composite formed by standardizing each variable to zero mean and unit variance.
12. To obtain the predicted probabilities, the continuous variables are set to their means. The rest of the variables are fixed to the values: blog = 0, Facebook = 0, political position = 0; gender = 1 (woman); “left–right” cleavage = 0 (left-wing party); “Catalan nationalist–non-Catalan nationalist” cleavage = 1 (Catalan nationalist party). We have tried different profile combinations for the dichotomous variables but the predicted probabilities are very similar.
13. Albert Rivera (@albert_rivera), Dolors Camats (@dolorscamats), Joan Herrera (@herrerajoan), Pere Navarro (@pere_navarro), David Fernández (@higiniarioig), Alicia Sánchez-Camacho (@aliciascamacho), Oriol Junqueras (@junqueras), and Marta Rovira (@martarovira).
14. Oriol Junqueras (@junqueras), Dolors Camats (@dolorscamats), Joan Herrera (@herrerajoan), Pere Navarro (@pere_navarro), and David Fernández (@higiniarioig).

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Appendix

	Codification and range
Dependent variables	
Indegree	Number of followers a parliamentarian's Twitter holds. Ranges from 6 to 77.
Total retweets received	Originally ranges from 0 to 361. Square root transformation and recoded into 0 to 1.
Total mentions received	Originally ranges from 0 to 1,274. Logarithmic transformation and recoded into 0 to 1.
Explanatory variables	
Gender	0 = Male; 1 = Female
Age	28 to 66 years old
Level of education	1 = Less than a bachelor's degree; 2 = Bachelor's degree; 3 = Master's degree or PhD
Blog	1 = yes; 0 = no
Facebook	1 = yes; 0 = no
Total tweets (1)	From 0 to 3,244.
Total mentions sent (2)	From 0 to 773.
Total mentions received (3)	From 0 to 1,274.
Total retweets sent (4)	From 0 to 227.
Total retweets received (5)	From 0 to 361.
Twitter 5 activities	Factor scores from $-2 SD$ to $2 SD$
Twitter 4 activities, without RTreceived	Factor scores from $-2 SD$ to $2 SD$
Twitter 4 activities, without MTreceived	Factor scores from $-2 SD$ to $2 SD$
Incumbency (2006, 2010, or 2012 legislatures)	1 = One legislature 2 = Two legislatures 3 = Three legislatures
Number of commissions in which the parliamentarian participates	From 0 to 16 commissions
Number of interventions in commissions	From 0 to 445
Number of interventions in the plenary	From 0 to 262
Political position in Parliament and the parliamentary group	1—Spokesperson of the parliamentary group 2—President of the parliamentary group 3—Parliament secretary or vice president of the Parliament 4—President of the Parliament Recoded 0–1 (0 = no position; 1 = 1 to 4)
Political position in parliamentary commissions	1—Secretary 2—Vice-President 3—President Recoded 0–1 (0 = no position; 1 = 1 to 3)
Political position in the political party	1—Local mayor 2—President of the party Recoded 0–1 (0 = no position; 1 = 1 to 2)
Indegree	Number of followers a parliamentarian's Twitter holds. Ranges from 6 to 77.
Outdegree	Number of parliamentarian Twitter accounts each parliamentarian is following. Ranges from 0 to 115.
Left–Right	Left = ERC, CUP, ICV, PSC. Right = CiU, PP and Cs. Recoded 1 = Right, 0 = Left
Catalan nationalist and non-Catalan nationalist	Catalan nationalist = CiU, ERC, CUP. Non-Catalan nationalist = ICV, PP, Cs. Recoded 1 = Yes, 0 = No