Posters and Protesters: Onsite Participation and Facebook Activity in the Yellow Vests Movement in France

New Media & Society
Vol.(Num.):1–??

DOI: 10.1177/ToBeAssigned
www.sagepub.com/
SAGE

Jean-Philippe Cointet[1] and Caterina Froio[2] and Pedro Ramaciotti Morales[12]
(authors listed alphabetically)

Abstract

Does social media incite protest movements, how? We examine the oft-debated relation between social media activity and protest, considering the Yellow Vest movement in France (Gilets Jaunes, YVs). We use time-series and cross-sectional data of Facebook activity and onsite events over the period of a year. The results show that the relationship between social media activity and onsite protests is not constant nor one-sided, but it is mutual and it changes over the course of the collective action. Specifically, the creation of Facebook groups impacts the outbreak of protests, and in turn, the success of the first nationwide gathering fosters the creation of new groups online. In addition, Facebook content that pertains to the frames and logistics of protests affects mobilization efforts.

Keywords

Social network analysis, social media, political participation, collective action, protest, contentious politics, social movements, Facebook, Yellow Vests, France.

Introduction

The relationship between online and offline mobilization is a contested one. For decades, scholars have been concerned with understanding whether social media activism facilitates or harms offline political participation (see Shirky (2008) and Morozov (2011)). Following studies that demonstrate the correlation between internet use and different forms of political participation (Bennett and Segerberg 2012; Anduiza et al. 2014), we track how Facebook activity relates to onsite protests over the course of collective action. We consider the grassroots protest by the Yellow Vests in France (YVs, *Gilets Jaunes*) as a case study. The protests emerged from an online petition against the rise of fuel taxes in May 2018, eventually spread over hundreds of roundabouts by November 2018 and rapidly turned into a sustained social movement, which mobilized thousands of people in the streets on a regular basis, for over a year.

Although the movement aimed primarily at taking action in physical spaces, it also considerably invested in social media, particularly on Facebook Boyer et al. (2020). Our paper contributes to the scholarship on social media activism and protest by disentangling the connection between Facebook communication and onsite events during collective action. We use novel temporal and geographic data of Facebook and onsite activity to assess the interplay between the different types of social media activity and onsite protests of the YVs, distinguishing successive periods of activity between May 2018 and July 2019.

The protest of the Yellow Vests

Named after the high-visibility yellow jackets worn by the activists, the YVs made their first appearance in May 2018 following a petition on *change.org* "To lower fuel prices" launched by Priscilla Ludosky, an online cosmetics saleswoman. A few months later Éric Drouet, a truck driver,used Facebook to call for a demonstration on November 17, 2019 against the rising fuel prices. Priscilla Ludosky invited him to sign her petition and the two then joined forces. The petition and the call to protest on Saturday November 17 were hugely successful: by the beginning of November, the petition had gained 750,000 signatures. A series of weekly grassroots protests (called *Actes* by the YVs) started on November 17, 2018 (*Acte I*), rallying hundreds of thousands in France. After three weeks of demonstrations, President Emmanuel Macron suggested holding a series of national discussions (*Grand Débat National*); eventually he backtracked the decision to increase the fuel taxes that had first triggered discontent. Still, demonstrations continued across the country for over a year.

The context of the protest was shaped by cleavages that have long scored the socio-political landscape in France. One of the main sources of persistent economic distress concerned income inequality and redistribution (Garbinti et al. 2018). Yet, another element has been discontent with political elites that pre-dates the movement (Grossman and Sauger 2017).

This is exemplified by the fact that, at the end of 2018, more than 70 percent of French citizens did not trust either President Macron or Prime Minister Edouard Philippe (TNS Sofres 2020).

[1] médialab, Sciences Po
[2] Centre d'Études Européennes, Sciences Po

Corresponding author:
Pedro Ramaciotti Morales
Email: pedro.ramaciottimorales@sciencespo.fr

This type of expression of societal unrest related to economic distress and dissatisfaction with political elites was already demonstrated in France and in other countries (notably Italy, Spain, Greece, and Turkey,(Della Porta 2015)). However, compared to these cases, the YVs lacked two main characteristics which are considered crucial for successful collective action (Della Porta and Diani 2020, p.134:160): on the one hand, previous experience and/or links with formal political and social organizations; on the other hand, a coordination of demands beyond a sort of 'minimal' platform, i.e. a master frame (Snow and Benford 1992).

In fact, participants in the YVs' demonstrations had little experience in politics (Guerra et al. 2019; Agrikoliansky et al. 2018) since most of them were first-time protesters, with little interest in political affairs (see (Bedock et al. 2019)). Furthermore, although the movement gained the support of voters who had previously voted for far-right and far-left parties (Yann et al. 2019), it rejected any formal alliance, and lacked links, with existing political parties. Instead, the YVs formed their own lists for the 2019 EP elections, which brought little success.

Furthermore, the YVs could not reach a consensus on a common platform; they only had a narrow set of shared demands to lower fuel taxes and increase the accountability of political representatives. In this context, the various sections of the movement followed very heterogeneous agendas. Some pleaded for the rejection of inequalities, displaying continuity with the traditional demands of the French political left. Others, instead, voiced openly neoliberal stances, supporting free market policies and deregulation, and some demands even veered closely towards radical right-wing topics such as closed borders (Guerra et al. 2019).

Although exhibiting some specific traits, the YVs also share some characteristics with other "movements of crisis" (Della Porta et al. 2016) -like the *Indignados* and Occupy Wall Street (OWS)- that have appeared outside France in the last decade, notably in terms of the important role of social media, and in particular Facebook (Boyer et al. 2020). The controversy started online with Priscillia Ludosky's petition (receiving nearly one million signatures before the outbreak of onsite protests) and Ghislain Coutard's video that called on protesters to wear a yellow safety vest as symbol of discontent (it garnered 5 million views on Youtube). Meanwhile, online calls to protest multiplied on Facebook (Boyer et al. 2020) just as the onsite protests were blooming. What remains to be addressed, however, is the interdependence between online activity and onsite protests during the course of collective action.

State of the art: social media and protest activity

Research on social media activism and protest, or "connective action" (e.g.Bennett and Segerberg (2012); González-Bailón and Wang (2016)) provides some answers to the puzzling link between the YVs' Facebook activities and onsite protests. The literature questioning the relationship between the online and offline dimension of collective action is rapidly expanding(Harlow 2012; Lim 2012; Tufekci and Wilson 2012), still the debate remains open between two competing camps: while some consider that social media generates novel forms of political participation and organization (Howard et al. 2011; Anduiza et al. 2014), others contend that digital activism has a limited reach, as aggrieved populations do not have access to (or do not confine their grievances) connected devices (Schradie 2018; Morozov 2011). In addition, other scholars highlight the fragility of the "social media effect" over time (Abul-Fottouh and Fetner 2018).

Nevertheless, scholars have found that social media activity has acquired growing importance in contentious politics (Valenzuela 2013; Lim 2013). Evidence from several protest movements, including the Arab Spring (Lim 2012; Tufekci and Wilson 2012), OWS (Barberá et al. 2015), Black Lives Matter (Gallagher et al. 2018) and from far-right mobilization (Stier et al. 2017) suggest that social media platforms have become part and parcel of contemporary social movements (Earl 2018) along with the more classical tools for collective action (Van de Donk et al. 2004). What this stream of research is still missing is a more rigorous account of the mutual impact between online communication and offline protests (Jost et al. 2018; Enjolras et al. 2013) using data from both online and onsite activity. In fact, while growing evidence suggests that social media activity is conducive to protest participation, the study of the interactions between the two has mainly been the object of sample-based quantitative content analyses (Froio and Ganesh 2019), mass surveys (Anduiza et al. 2014) or in-depth ethnographic observations and interviews (Gerbaudo 2017; Felicetti and della Porta 2018).

Other scholars have been more interested in researching the type of communicative behaviours on social media that pave the way for offline protests, like using hashtags (Pavan 2015), visual content (Klein 2020), or social media for news consumption (Bastos et al. 2015). Recently, other scholars have tried to expand existing approaches by measuring the influence of social media communication on physical protests. Jungherr and Jürgens (2013) show that deviations in social media use are linked to changes in user behavior that are triggered by offline events. Other research on the OWS movement confirmed the association between Facebook activism and offline protestsSuh et al. (2017). Another study by Harlow (2012) shows that Facebook communication played a major role in anti-government protests in Guatemala in 2009, even though the protests quickly became self-sustained. Bastos et al. (2015) use online activity to predict offline dynamics and find that while this is effective for the case of the OWS movement, it is not for the *Indignados* and the vinegar protests in Brazil.

The results from surveys of participants in demonstrations support these findings. In their study of the Egyptian revolution, Tufekci and Wilson Tufekci and Wilson (2012) demonstrated that interpersonal exchanges through Facebook functioned as a crucial source of information. Further evidence comes from the 2014 Hong Kong Umbrella movement (Lee and Chan 2016), the *Indignados* movement (Anduiza et al. 2014), as well as from a study on political participation among the youth in Chile, which also confirm that higher online participation is associated with participation in offline demonstrations (Valenzuela et al.

2018). To the best of our knowledge, only one study has looked at the interplay between online activity and onsite protests in the case of the YVs.

This paper follows and expands on these accounts by considering the case of the YVs and by using longitudinal and cross-sectional analyses for Facebook communication, its content, and offline protests. The article poses the question: did the YVs street protest precede/follow, or coexist with proportional online activity and communication on Facebook and what type of communication content drives these patterns at different phases of mobilization?

Research expectations

Emerging research suggests that social media is becoming central for dynamics of protest. Still, the specific mechanisms linking online activity and onsite protest during the course of collective action remains largely overlooked. To explore this relationship, we consider the case of the YVs, and compare Facebook activity to onsite protests. On the one hand, we expect to find a spatial relationship between the creation of Facebook groups prior to the outbreak of the movement (at *Acte I*), and the number of protests across France. On the other hand, we anticipate that the content of Facebook communication predicts the turnout at the ensuing protests organized by the YVs (*Acte I* to *Acte XXXIII* in our data). Both hypotheses are built on research suggesting that online activity and offline protests are interrelated, because online communities can generate networks and content (Castells 2015) that contribute to form collective identities (Van Zomeren et al. 2008) and sustain collective action (Earl 2018).

Specifically, the first expectation rests on the idea that social media provides complementary spaces where individuals can participate in and organise protests efficiently. If social movements invest primarily in physical activities, social media can be particularly important for groups lacking infrastructures or links to formal organizations, political parties and unions, as is the YVs' case (Guerra et al. 2019). If "Facebook politics" do not directly translate into political participation (Gustafsson 2012), Facebook pages can still serve as communicative channels where supporters meet and share information about a protest and its organization (Grömping and Sinpeng 2018). Once Facebook groups are activated or Facebook events are created, they can attract potential supporters, and may become politicized as a result of the connections participants make between their everyday lives and broader political and social issues of the day (Graham et al. 2015). Accordingly, we expect that:

(H1): online activity can impact the outbreak of onsite protests.

Social media communication can serve different functions (Harlow 2012) and two of these functions seem particularly relevant. First, does Facebook content contribute to forming a movement's collective identity, by concentrating on the core issues of the movement? Second, to what extent does Facebook content include information about the coordination, organization or logistics of protests?

In regards to the first aspect, scholars emphasize the consequences of using new communication technologies for collective identity formation in social movements. Activists' production of social media content interactively contributes to inform the claims on behalf of which people mobilize (Treré 2015), reinforcing group identification as a powerful motivational push to protest (Van Zomeren et al. 2008). In this sense, Facebook groups can either convey coherent messages about shared issues around which the group mobilizes as a whole, or can expose the diversified agendas, grievances and forms of dissent that may coexist within a single movement. When the messages shared via social media are coherent, online communication can contribute to protests by motivating individuals and aligning their agendas (Grömping and Sinpeng 2018), thus reinforcing the "master frames" deployed by social movements in their campaigns (Snow and Benford 1992).

With regards to the second type of content, the successful coordination of collective action is instead crucially dependent on whether or not participants possess knowledge on how to organize and sustain collective action, and if they have formal ties with more experienced activists and groups (Clarke and Kocak 2020). In this respect, social media activism may facilitate the exchange of information between more experienced activists and their novice counterparts, including the knowledge of how people mobilize and coordinate, or news about transportation and police repression (Van Laer 2010). Personal communication technologies and virtual networks can therefore complement some of the functions of formal political organizations (Bennett and Segerberg 2012): as sources of "social power" (Castells 2015), they allow to 'self-organize without central or 'lead' organizational actors, using technologies as important organizational agents' (Bennett and Segerberg 2012, p. 17).

We consequently anticipate that a link exists between the content of the material shared via Facebook pages and the size of the onsite YVs protests, i.e. the number of participants. Specifically, we expect that:

*(H2): the **content of Facebook communication** can impact onsite protest.*

- *(H2a): online communication flows about the identity and **motivational frames of the movement** can impact onsite protests,*
- *(H2b): online communication flows about the **logistic coordination of onsite gatherings** can impact onsite protests.*

Research design and data

Data collection

Our datasets (DS) measure the intensity and content of online activity during the course of collective action, summarised in . Table 1

DS1: Blockades and gatherings during the Acte I

(DS1) consists of cross-sectional data about the number of roadblocks and gatherings during the first YV protest, *Acte I* (which took place on November 17, 2018). The information

Table 1. Data Overview .

Type of data	Dataset	Domain	Content	Source
Cross-sectional (*Acte I*)	DS1	Onsite	Geographic location of 785 blockades and gatherings organized for *Acte I*	Organizers' website www.blocage17novembre.fr
	DS2	Facebook	134 groups and 286 Facebook events used for coordination of onsite protest of *Acte I*	Organizers' website www.blocage17novembre.fr
Longitudinal (*Actes I* to *XXIII*)	DS3	Onsite	Country-wide number of participants per *Acte*	Figures of the Ministry of Internal Affairs
	DS4	Facebook	Nearly 10M posts of the 892 most active YV public groups	Facebook via Crowdtangle's API

was retrieved from the website www.blocage17novembre.fr* which was central in the coordination of *Acte I* (Boyer et al. 2020; Algan et al. 2019).

In the weeks preceding *Acte I*, the website allowed users to signal protest events as geo-located points on a map interface. DS1 includes 785 geo-located gatherings †.

DS2: Facebook groups and events used to organize Acte I

On this website (www.blocage17novembre.com) users could also signal Facebook groups and events that served to help with coordination among protesters. Protesters would then be linked to an existing protest signaled on the map interface (identified in DS1) which was also geo-located. The data includes 134 Facebook groups and 286 Facebook events that were used by the YVs to share information about the time and place, and other instructions for onsite protests. For example, one Facebook event called for a mobilization starting at 7 a.m. on November 17, 2018, with a meeting point in the parking lot of a supermarket. The event page also includes instructions for carpooling. While these groups and events in DS2 have the same source as the data on the gathering points from DS1, one crucial difference (more below) is that there is a wide variance between the number of Facebook groups and events per gathering point: 350 gatherings do not have any associated Facebook coordination element, while some have several associated Facebook groups and events. In addition, in the next section, they will be used to calculate the geographical density of Facebook organizational content for such as groups and events.

DS3: Country-wide number of participants in weekly protest (Actes)

To analyze the interplay between online and offline activity over the course of collective action after *Acte I*, we collected longitudinal data on the size (number of participants) of each weekly demonstration (held each Saturday). We measured the number of participants using figures from the French Ministry of Internal Affairs reported in the press ‡. Data ranges from *Acte I* (November 17, 2018) to *Acte XXXIII* (June 29, 2019), which was the last recorded measurement (at 5800 protesters), due to decreasing protest participation. While this source choice can be criticized for lacking the rigor of classic protest event analysis approaches (Hutter 2014), this is the only available source measuring the YVs' protest size in a systematic and continuous way over time. § As Figure 1 shows, the period includes thirty-three

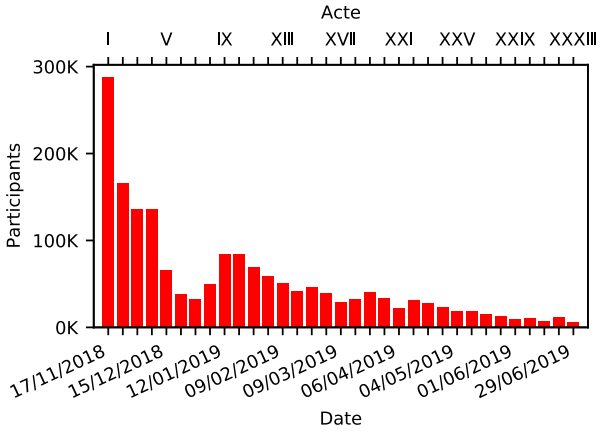

Figure 1. Number of country-wide protesters per *Acts* – Source: French Ministry of Internal Affairs.

weekly demonstrations that have been attended, on average, by 52,000 participants per demonstration.

DS4: Online activity of the most active YV groups on Facebook

To account for online activity on Facebook, we retrieved data from public groups associated with the YVs¶. For this, we selected the most active groups in two steps. First, we requested all Facebook groups that had ever used "Gilets Jaunes" (using Crowdtangle's API) in any of its variants (singular, plural, upper- and lower-case). We identified 21,047 public groups. We then manually examined the 1,000 most active groups,and excluded those that just reported on the "Gilets jaunes" without engaging in the movement (e.g. media outlets). We found 892 most active YV public Facebook groups. For each, we extracted all of their posts, from October 1st, 2017 to July 30, 2019 (up to 9.755.214 posts). As groups often are named after places (i.e., "*Les*

*Later renamed to www.gilets-jaunes.com .

†This data produced by the YVs themselves, may overestimate the actual number of protests, however it is the only data available, since there is still a lack of official figures. The data also offers a unique account of the geographic distribution of the YVs' protests across regions in France

‡See Wikipedia for a list of these sources .

§We identified two other sources: figures provided by movement's organizers (*Le Nombre Jaune*), and by the Police Union (*La Police en Colère*). However, none of them covers all the *Actes*. In addition, when data is available in all three sources, they differ in the volume of participants per *Acte*, but not in their increasing/decreasing, and peak trends, which is central for our analyses.

¶Data is GDPR compliant

Gilets Jaunes de Nimes"), we were able to associate 532 (60 percent) of the groups with a department in France. For each post, the data also includes the number of reactions: comments, likes, and shares. Figure 2 shows the number of posts and post reactions in DS4.

Figure 2 suggests that most groups were created around the *Acte I*; since then the majority of the groups have published posts on a daily basis. In addition, posts and reactions are concentrated in the immediate follow-up of *Acte I*, decreasing afterwards. If there are groups predating November 2018 in DS4 (60 groups by October 15, 2018), it is because they existed before the movement, but then became affiliated with it.

It is crucial to differentiate the dataset DS4 (the most active Facebook groups) from the groups in dataset DS2 The 892 groups from DS4 provide insight into the online exchanges within the movement over a one year period, while the groups and events from DS2 were used to organize *Acte I* at the very onset of the movement. They contain weak volumes of communication, and play a mostly logistical role, in the organization of gatherings.

Text analysis

The posts from the 892 most active Facebook groups in DS4 include text that we use for a content analysis of the communication flows from within the movement. We analyze the extent to which the YVs' Facebook groups discuss different topics, referring to the identity and motivational frames of the movement, and to the organization and logistics of onsite protests as well as how the mixture of these topics evolves over time. To classify the Facebook posts into content categories related to our hypotheses, we created five categories for the different types of content : 1) logistics (the how, where, and when to protest), 2) the YV movement (the identity of the movement itself), 3) precariousness and life conditions (economic difficulties and inequalities), 4) Referendum and RIC[‖] and 5) fuel tax. We perform a term extraction (of up to 4-grams) and measure the term frequency in posts, and we manually inspect the most used terms (used in at least 400 posts) to classify them into these five categories. Using this classification of terms, we can link the posts from DS4 to these five categories, resulting in a multi-classification: posts can be linked to none, and up to five categories[**].

In connection with H2a (communication about the identity and frames of the movement and their impact protests) and H2b (communication about the logistics of the movement impact protests), we further organize these categories in two main groups related to our theory:

- **Organizational content:** (category 1) discusses how people mobilize, i.e. the logistics and coordination of offline protests. [††] For example, one posts reads: *"Unlimited strike starting on December 5th. We have to block everything!"*.
- **Motivational content:** (categories 2, 3, 4 & 5) discusses why people mobilize, i.e. the collective identity of the movement itself and the frames accompanying offline protests. Posts of this sort can either refer to the movement itself or to its claims. For example: *"This is far from being the end of our YV mobilization"*.

While the platform of the YVs is far from homogeneous, scholars have identified some flagship issues (Yann et al. 2019) related to the identity of the movement, emphasizing the rejection of political representation and the economy (taxation, costs of living, and precariousness).

Modelling online-offline dynamics

To evaluate H1 (online activity can impact outbreak of onsite protest), we measure the spatial correlations between the aggregated count of online and offline activity at the departmental level. We will test whether the density of Facebook groups and events contributing to the organization of protests (DS2) correlates to the actual number of onsite demonstrations (DS1).

To assess H2 (the content of online communication can impact onsite protest), we compute a time-series of the volume of communication according to different types of content (differentiating motivational, identitarian, and organizational). We compute the time-series using the posts from dataset DS4 and we use the Granger causality test to assess their usefulness in estimating the number of people attending each *Acte* with data from DS3.

Results

The phases of mobilization

A first look at the data shown in Figure 2 depicts a complex dynamic between the online and offline domains. Prior to *Acte I*, 60 of the groups that would become part of the 892 most active YV Facebook groups already existed. In the weeks before the outbreak of *Acte I*, Facebook activity increases: new groups are created and exchanges intensify. Users plan gatherings on www.blocage17novembre.fr, marking protest sites and creating Facebook groups and events with detailed information. Ultimately, *Acte I* is a success, bringing hundreds of thousands of people to the streets. Following *Acte I*, online activity changes: group creation accelerates, and the volume of the communication flows within the groups sees a sharp increase. Weekly protests ensue, but participation steadily declines during the first two months, contrary to what is happening online (see Figure 1). Around *Acte IX* and *Acte X*, onsite protests increase and online activity continues to rise: groups that would become part of the 892 most active are still being created, and the volume of communication flows remains almost unchanged. But after *Acte X*, onsite participation declines again along with online activity. Almost all of the 892 most active Facebook groups have already been

[‖] RIC (*Référendum d'Initiative Citoyenne*) is the demand to consult citizenry by referendum to propose/ abrogate laws. It is considered as one of the core demands of the YVs.

[**] See Appendix for a list of the terms that define each category, and examples.

[††] These posts may refer to *when* and *where* gatherings will occur (using phrases such as "next Saturday", "road-block", "protest") and/or *how* they will unfold.

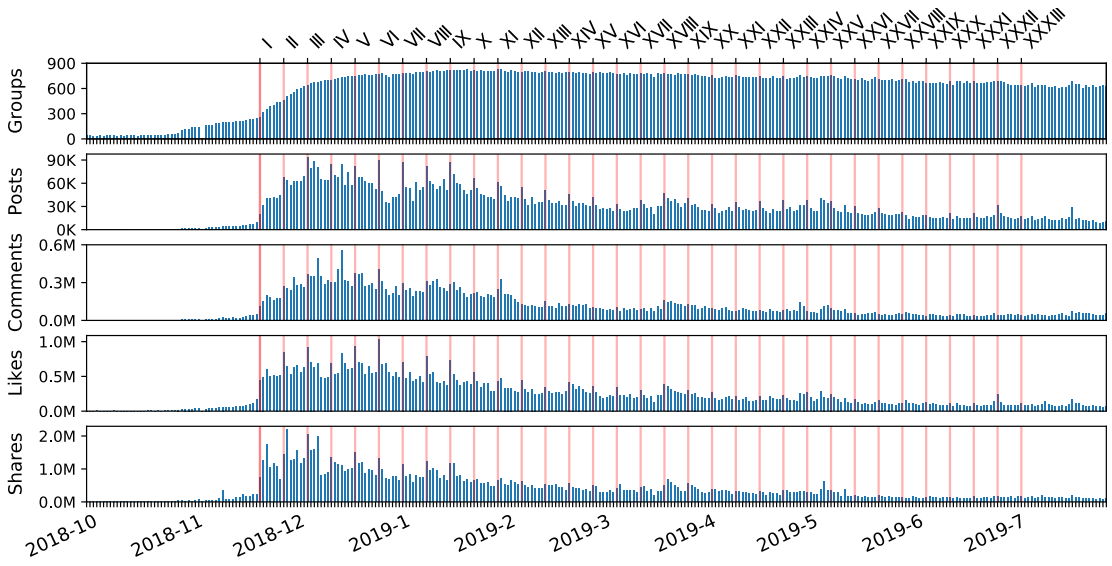

Figure 2. Facebook activity of the YVs – Daily number of active groups (a group is assumed to be active if it produces at least one post during the day), the number of posts published by them, and post reactions.

created, but their daily presence, as well as their volume of communication begins to diminish.

Overall, a first analysis of the data suggests that there are at least four different phases in the YVs' mobilization (dormant, emerging, expanding, declining/sustaining).

These four phases (or stages) (S1-4, shown in Figure 3) will drive the statistical analyses used to test our hypotheses

In the rest of the paper, we define the four phases as follows:

S1: Before October 23, 2018[‡‡], at the start of calls on Facebook to protest;
S2: From October 23 to November 17, 2018 (*Acte I*), at the outbreak of onsite protest;
S3: November 17, 2018 (*Acte I*) to January 19, 2019 (*Acte X*), at the point of maximum daily presence of the 892 most active groups;
S4: After January 19, 2019 (*Acte X*).

Online activity and the outbreak of onsite protest: Act I

This section focuses on the online activity preceding the outbreak of onsite protest in *Acte I* and its relation to the spatial distribution of the outbreak. The calls to join demonstrations, launched on Facebook in mid-October 2018, were replicated in several Facebook groups and events. In DS2, we count 134 groups and 286 events on Facebook that were used to set up 785 onsite protests. We examine how the spatial distribution of these groups and events on Facebook relates to the distribution of gatherings. To assess the strength of this spatial relation, we compute the Pearson correlation of the number of Facebook groups and events in DS2 and the number of gatherings in DS1 per department, and per 1.000 inhabitants. The results, displayed in Figure 4, show that spatial correlation between groups and events from DS2 and protest locations from DS1 stands at 0.716 (p-value$<$0.001). This hints to the presence of Facebook groups and events specifically intended for organization (from DS2). These were created mostly during stage S2, and had a plausible impact on the outbreak of onsite protest, in line with H1.

Two examples from Figure 4 help further illustrate these patterns.

Lot-et-Garonne had 0,012 groups and events per 1000 inhabitants, almost twice of those in *Haute-Garonne*, with 0,005 groups and events per 1000 inhabitants. In *Acte I*, *Lot-et-Garonne* had 0,018 blockades per 1000 inhabitants, almost three times the number of blockades in *Haute-Garonne*, with 0,0065 per 1000 inhabitants. The few exchanges in these groups and event include precise and practical information on how, where, and when to conduct mobilizations on *Acte I*, supporting H2b (organizational content can impact onsite protest).

The consequences of Act I

The success of *Acte I* marked the beginning of weekly demonstrations (see Figure 1). But this success was also accompanied by new online activity and users' exchanges on the identity and claims of the movement. This is most clearly seen in the accelerated dynamics of group creation on Facebook, as shown in Figure Figure 3 when comparing stages S2 and S3.

The birth of these new groups is, however, not spatially explained by previous online activity, nor by onsite protests during *Acte I*. The spatial correlation (at the departmental level, and per 1,000 inhabitants) between the number of gatherings of *Acte I*, and highly active groups (from DS4) created during stage S3 (after *Acte I*) is weak (ρ =0.26,

[‡‡]This date is also recognized in several accounts, e.g. Sénecat (2019), of the beginning of calls on Facebook to protest on November 17, 2018.

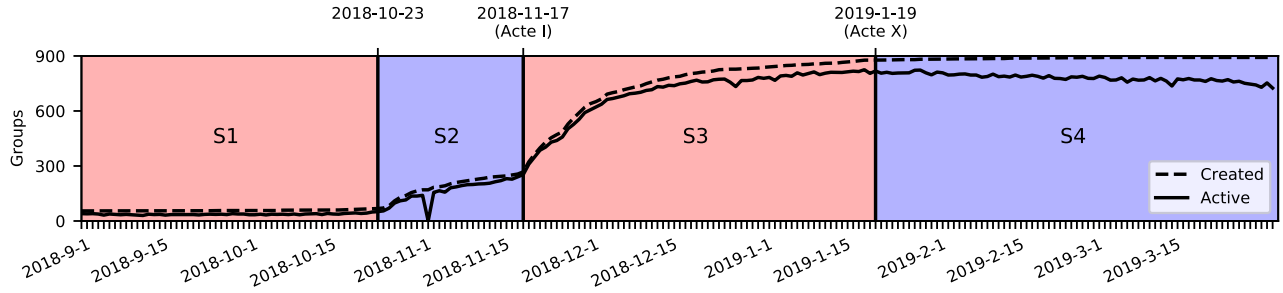

Figure 3. Cumulative and active number of the identified 892 most active Facebook groups by date. Four stages of the movement correspond to different dynamics of group creation.

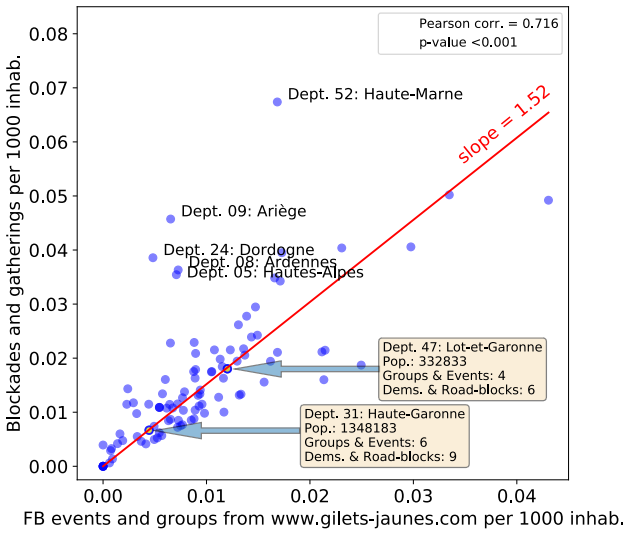

Figure 4. Correlation between Facebook activity and protest outbreak on Acte I – scatter plot of the number of Facebook groups and events created, and the number of demonstrations, per department, and per number of inhabitants. Outliers are labelled, two department with low regression residuals are shown in yellow as examples.

p-value<0.01). Furthermore, the creation of groups during stage S3 is also not explained by the the creation of groups previous to *Acte I*, during stage S2 (ρ =0.084, p-value<0.5). Simply put, it is not the creation of groups before *Acte I*, or the number onsite protests that explains where new groups were created after *Acte I*. It is probably the visibility of mobilizations in *Acte I* across France that fomented the creation of new Facebook groups, where there were no previous protests or online platforms. Arguably, the creation of these new groups after November 17, 2018, might respond to the hopes of promoting and organizing new demonstrations and thus repeating the success of *Acte I*, or it might be related to the interest in adhering to a now identifiable collective actor: the YV movement.

The content of Facebook communication

We now turn to our dataset of the 892 most active YV Facebook groups (DS4) to investigate the content of online communications and its relation to onsite protests. For each week, from September 2018 to August 2019, and for each one of the category topics, we compute: the percentage of active groups (groups that published posts discussing any topic during that week), of posts published, and of reactions (comments, likes and shares) that said posts received. Using the five topic categories (movements logistics, YV movement, precariousness & life conditions, RIC, and fuel tax), we calculate weekly indicators of the attention given online to these topics. Attention given to the varying online action of each topic is displayed in Figure 5.

A cross-sectional analysis of the geographical distribution of this online activity shows weak correlation with the spatial distribution of onsite protests on *Acte I*. The number of gatherings correlates poorly with the number of active groups ($\rho = 0.56$, $p < 0.001$), the number of posts published ($\rho = 0.54$, $p < 0.001$), and with the reactions given to them during the week before (for all types of reaction $\rho < 0.42$, $p < 0.001$). The spatial correlation between the volume of posts among the 5 different topics and the number of blockades per inhabitant and department is also low (for all topics $\rho < 0.57$, with $p < 0.001$); the correlation with reactions to posts per topic is even lower. Read together with the spatial correlation of groups and events from dataset DS2 used specifically for coordination, these results provide some insight into how the YVs organized themselves online. Groups and events with practical information about gatherings (but a low volume of posts, and thus low internal debate) does correlate spatially with blockades, while communication on groups with a high volume of exchanges (even about the logistics of mobilization) correlates poorly with blockades.

The results from Figure 5 suggest, however, that there is a sequence of topics that do receive attention over time. In the months preceding *Acte I*, groups produce Facebook content related to the coordination and organization of protests, and, to a lesser extent, about a few core demands of the YVs: to lower the "fuel tax" and issues related to "precariousness and life conditions". But during stage S2 the Facebook groups focus their attention more closely on "movement logistics", in anticipation of the protests of *Acte I*. It is also only during stage S2 that Facebook groups start giving considerable attention to the identity of the 'YV movement' itself; without, however, eliciting reactions from users. Users' reactions to activity are mainly elicited at first

Facebook groups from www.blocage17novembre.com (DS2) contain a small volume of posts, and little information about the movement's frames, therefore most of them are excluded from the content analysis.

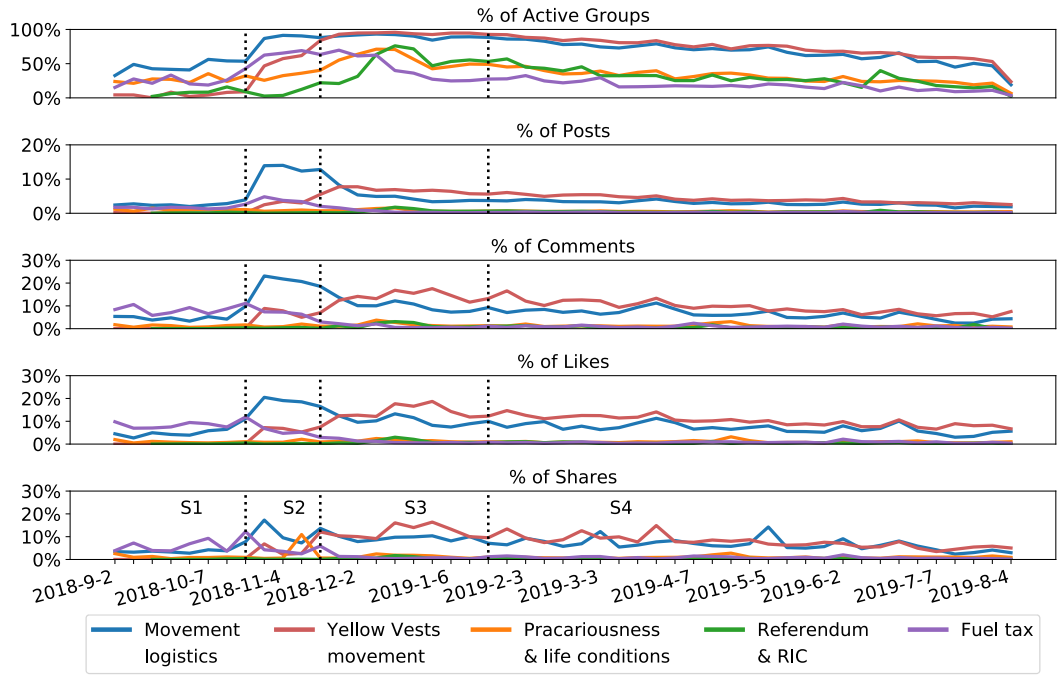

Figure 5. Issue attention in the Facebook activity of the YVs over time – online activity related to the main issues on *Acte I* (vertical line) and in the first months.

by the issue of the increase in the fuel tax (during stage S1), and then by "movement logistics" (during stage S2).

While groups did publish posts regarding the "Yellow Vest movement" during stage S2, it is only afterwards, during stage S3 (after *Acte I*), that this topic becomes the main source of expression for users.

At the same time, posts that discussed the fuel tax-hike were scarce during stage S1; reactions to these posts, however, were not scarce. While posts about this issue increased during S2, the reactions to them declined and vanished almost completely by *Acte I*. Despite this decline, groups continued to evoke the issue of fuel taxes into stages S3 and S4. Figure 5 highlights other important trends with respect to another core claim of the movement: improve democratic representation and establish the RIC . Specifically, Figure 5 shows that it is mostly after *Acte I* that attention is given to this topic, but ultimately, that only accounts for a little attention in Facebook publications.

Aside from encouraging new online activity for organizing and communicating through group creation, the successful demonstrations of *Acte I* seem to have had the effect of concentrating more attention on the movement itself rather than on the issues by which it was formed. The share of attention given to the identity of the movement increases in the months leading to *Acte I*, and remains consistent in time afterwards, becoming a focal point of attention inside the movement.

After Act I: a self-sustained movement

By *Acte X*, 96 percent, or 859 of the 892 most active groups, had already been created and were sustaining high volumes of online activity that characterized stage S3 (see Figure 3). Offline, after having lost steam, weekly gatherings began increasing again. The number of protesters had dropped from around 300, 000 to tens of thousands between *Acte I* and *Acte VII*; by *Acte X*, participation had risen again to nearly 100, 000 (see Figure 1). *Acte X* also marks an increase in the number of groups publishing daily posts (see Figure 3). From *Acte X* onward (stage S4), weekly protests continued to take place every Saturday, but attendance declined again, as so did online activity.

Figure 6 illustrates this relation by comparing

the number of protesters per *Acte* with the number of Facebook groups that were active during that week (from Monday to Friday), and filtered by whether they posted about "movement logistics" or about the "YV movement". While stage S3 sees both a decline of onsite protests and a rise in online activity, stage S4 sees a steady and simultaneous decline of both during the six months of mobilization of stage S4 Despite seeing a global decline, these quantities are also subjected to local, faster variations in time within the global diminishing trend. For example, Figure 6 shows that in *Acte XXV* there was an unusual increase of attention given to groups concerned with "movement logistics", all within a global trend of diminishing online activity. We use the previously presented content analysis and the Granger causality test to assess whether these variations in the online activity of the movement can explain variations in the volume of participants during stage S4.

To separate the global diminishing trend of the time-series during S4 from the faster variations around it, we normalize the time-series by: 1) subtracting a regressed linear, slow decline dynamics adjusted for S4, 2) subtracting the mean, and 3) normalizing the values of the series to

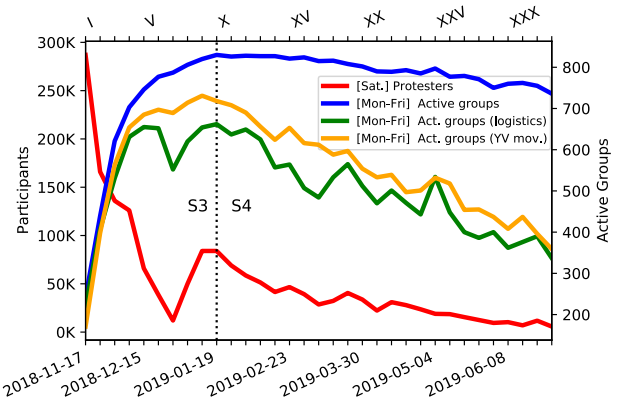

Figure 6. The decline of the movement online and offline – Country-wide number of protesters every Saturday, and the number of groups active during the days preceding the protests (Monday to Friday), distinguishing those that treated in their posts the issues of "movement logistics" and that of the "YVs movement".

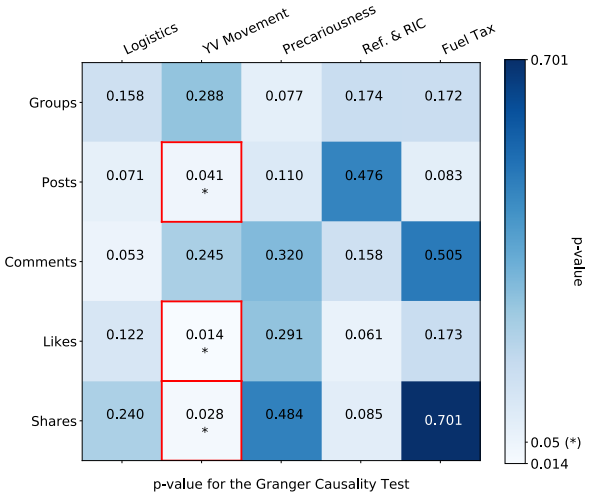

Figure 7. The online predictors of the number of protesters: p-values of the Granger causality test between the levels of different types of online activity, and the time-series measuring the evolution of the number of protesters for *Acte X*.

unitary amplitude We apply the Granger causality test to the normalized time-series that contains only the faster variations on the global diminishing trend.

The p-values of the test are reported in Figure 7 and offer quantitative evidence for the intuition suggested by the dynamics observed in Figure 6 and theorized in hypotheses H2a and H2b. The number of active groups discussing "movement logistics" content from Monday to Friday (green curve in Figure 6) has more statistical significance (p-value = 0.158) than the number of active groups discussing the "YVs movement" (p=0.288). However, both quantities lack statistical significance at a threshold of 5 percent. Among the 25 time-series considered in Figure 7 (5 types of online activity by 5 issues), only a few pass the Granger-causality test at 5 percent significance: the number of posts, comments and likes about the YV movement itself during the week preceding protests to be held that Saturday. We did not find statistical significance in the treatment of other issues such as the "RIC", "precariousness and life conditions", or in that of the initial grievance on the rise of "fuel tax".

The results of the Granger causality test suggest that the relation between online and offline activity changes at different phases of collective action. We discuss the findings and their implications in the conclusion.

Discussion and ways forward

The paper questioned the role of social media in protests. Following approaches suggesting that online activity offers novel ways to participate in politics (Bennett and Segerberg 2012; Castells 2013), we scrutinized the relationship between Facebook activity and onsite protests during the course of collective action, considering the case of the YVs in France. What first emerged as a spontaneous movement in which face-to-face meetings played a core role in promoting civic engagement (Agrikoliansky et al. 2018), the YVs then also relied on social media (and on Facebook in particular) to enhance onsite mobilization (Boyer et al. 2020). The YVs therefore present a unique case to reassess an old question as to the extent of how and why social media incites onsite protests.

Figure 8 summarizes our findings.

We demonstrated that the online activity of the 892 most active Facebook groups does not explain the geographical distribution of the onsite protest of *Acte I*. However, the creation of a different set of Facebook groups and events, specifically dedicated to the organization of gatherings in *Acte I* does correlate spatially with the outbreak of onsite protest. In other words, the most effective organizational online content was found in groups that had minimal exchanges, which mainly served for bill posting, and not within groups that exchanged at a high volume and contained core debates about the movement. The discovery of effective organization content provides further support for the hypotheses that online activity can impact the outbreak of onsite protests (H1) and that organizational content online can impact onsite protests (H2b). The analysis of online activity and onsite protest for the duration of the movement, shows that the online communication of motivational content (in particular, content about the movement itself) can impact the number of participants, providing support for H2b.

Finally, we observe a feedback effect between of online activity and onsite protest. Organizational content in the form of Facebook groups and events helped the movement to sustain the onsite protests of *Acte I*. This success spurred a period of group creation, that would serve as platform for online debates inside the movement. Some of the discussion within these groups, related to motivational content (notably talk about the identity of the YV movement) was found to explain the number of participants in subsequent protests.

Our results are in line with existing research highlighting the importance of social media activity in promoting offline protest participation (Shirky 2008) and the interconnection between these two domains.

A more detailed discussion on the methodology used in our normalization is available in the supplementary material.

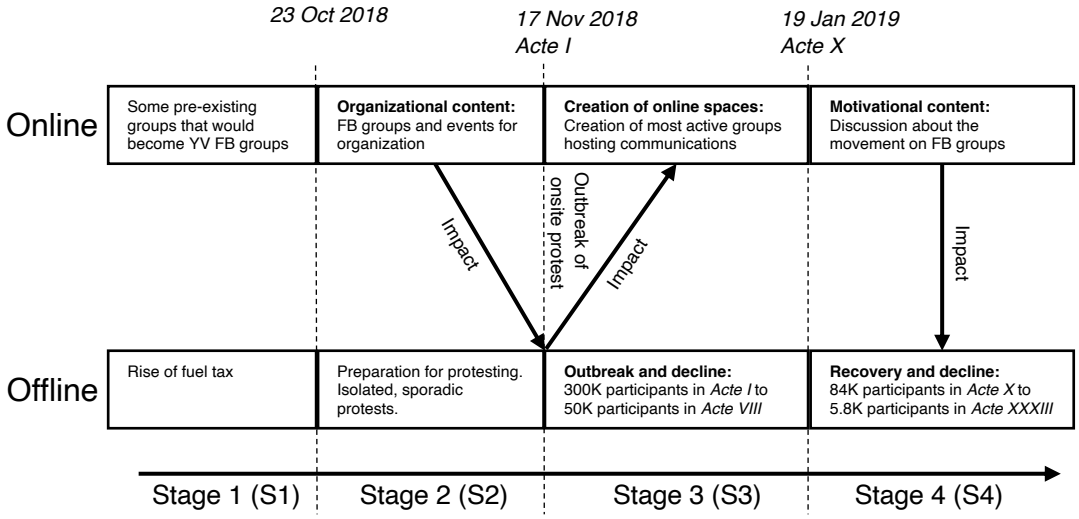

Figure 8. Online-offline interplay in the Yellow Vest movement: Organizational content on Facebook impacted the outbreak of protest. In turn, the magnitude of the outbreak of onsite protests changed online political participation. At a later stage, motivational content online was found to be related with changes in numbers of protesters onsite.

In making these claims however, we are aware of the limits of our study which future research can address. Our results would need confirmation by larger comparative studies to assess if an increase in social media activity is associated with the emergence and consolidation of onsite protests or not, and how this affects online activity. We would suggest comparing across movements and across countries, to verify if our results are specific to the YVs or remain valid for other movements and in different national contexts, including authoritarian ones. We would also suggest comparing across online platforms, and assessing whether or not other streams of online information, originating from different platforms like Twitter or Youtube, can forecast the outbreak of onsite protests. It should also be noted that even if we collected reliable data on the number of gatherings during *Acte I* and the number of participants for every weekly demonstration, our analyses are based on self-reported data by the YVs (who tend to inflate figures) and by the Ministry of Internal Affairs (who tend to deflate them). Furthermore, the unavailability of cross-sectional data on protests and blockades throughout the duration of the movement is another important limit of the present study.

In addition, Granger causality tests are informative on the usefulness of one time series in forecasting another one, and spatial correlations are informative for the spatial co-occurence of observations. This does not preclude the existence of confounding variables and delayed mechanisms from providing other plausible explanations for the interplay between online activity and onsite protest. Additionally, Granger causality is not informative about the magnitude of mutual online or offline effects.

The paper is another step in the study of the interplay between online activity and onsite protests. Our mixed findings invite scholars to go beyond existing interpretations, which assume that social media activity incites (or is irrelevant for) protests. Instead, we call for a more integrated approach to online and offline dynamics to understand the consequences that technology may have for (contentious) political participation in the twenty-first century.

Acknowledgements

Removed for peer review.

References

Abul-Fottouh, D. and Fetner, T. (2018), 'Solidarity or schism: ideological congruence and the twitter networks of egyptian activists', *Mobilization: An International Quarterly* **23**(1), 23–44.

Agrikoliansky, E., Bendali, Z., Challier, R., Della Sudda, M. and Filleule, O. (2018), 'Le mouvement des gilets jaunes: un apprentissage en pratique (s) de la politique? introduction au débat', *Politix* **4**(128).

Algan, Y., Malgouyres, C. and Senik, C. (2019), 'Territoires, bien-être et politiques publiques', *Notes du conseil danalyse economique* (7), 1–12.

Anduiza, E., Cristancho, C. and Sabucedo, J. M. (2014), 'Mobilization through online social networks: the political protest of the indignados in spain', *Information, Communication & Society* **17**(6), 750–764.

Barberá, P., Wang, N., Bonneau, R., Jost, J. T., Nagler, J., Tucker, J. and González-Bailón, S. (2015), 'The critical periphery in the growth of social protests', *PloS one* **10**(11), e0143611.

Bastos, M. T., Mercea, D. and Charpentier, A. (2015), 'Tents, tweets, and events: The interplay between ongoing protests and social media', *Journal of Communication* **65**(2), 320–350.

Bedock, C., Zakaria Bendali, a. A. B. d. R., Beurier, A.-G., Blavier, P., Bonin, L., Courty, A., Sudda, M. D., Delozière, G., Dondeyne, C., Elalaoui, C., Flipo, F., Frémont, C., Gaborit, M., Girardin, A., Grémion, G., Guillemin, P., Havard, M., Ivanovic, M., Larrouqué, D., Levain, A., Liochon, P., Neyrat, F., Ormiere-Noblet, L., Pauchard, L., Pigot, F., Reungoat, E., Schnatterer, T., Lejeune, L. S., Soulié, F., Valeria, A. and Étienne Walker (2019), 'Enquêter in situ par questionnaire sur une mobilisation', *Revue Française de Science Politique* **69**(5-6), 869–892.

Bennett, W. L. and Segerberg, A. (2012), 'The logic of connective action: Digital media and the personalization of contentious

politics', *Information, communication & society* **15**(5), 739–768.

Boyer, P., Delemotte, T., Gauthier, G., Rollet, V. and Schmutz, B. (2020), 'Les déterminants de la mobilisation des gilets jaunes', *Revue économique* **71**(1), 109–138.

Castells, M. (2013), *Communication power*, OUP Oxford.

Castells, M. (2015), *Networks of outrage and hope: Social movements in the Internet age*, John Wiley & Sons.

Clarke, K. and Kocak, K. (2020), 'Launching revolution: Social media and the egyptian uprising's first movers', *British Journal of Political Science* **50**(3), 1025–1045.

Della Porta, D. (2015), *Social movements in times of austerity: Bringing capitalism back into protest analysis*, John Wiley & Sons.

Della Porta, D., Andretta, M., Fernandes, T., O'Connor, F., Romanos, E. and Vogiatzoglou, M. (2016), *Late neoliberalism and its discontents in the economic crisis: comparing social movements in the European periphery*, Springer.

Della Porta, D. and Diani, M. (2020), *Social movements: An introduction*, John Wiley & Sons.

Earl, J. (2018), 'Technology and social media', *The Wiley Blackwell Companion to Social Movements* p. 289.

Enjolras, B., Steen-Johnsen, K. and Wollebaek, D. (2013), 'Social media and mobilization to offline demonstrations: Transcending participatory divides?', *New media & society* **15**(6), 890–908.

Felicetti, A. and della Porta, D. (2018), 'Between deliberation and contestation: the convergence of struggles against austerity and its world in the nuit debout movement', *Social Movement Studies* **17**.

Froio, C. and Ganesh, B. (2019), 'The transnationalisation of far right discourse on twitter: Issues and actors that cross borders in western european democracies', *European Societies* **21**(4), 513–539.

Gallagher, R. J., Reagan, A. J., Danforth, C. M. and Dodds, P. S. (2018), 'Divergent discourse between protests and counter-protests:# blacklivesmatter and# alllivesmatter', *PloS one* **13**(4), e0195644.

Garbinti, B., Goupille-Lebret, J. and Piketty, T. (2018), 'Income inequality in france, 1900–2014: evidence from distributional national accounts (dina)', *Journal of Public Economics* **162**, 63–77.

Gerbaudo, P. (2017), 'Social media teams as digital vanguards: the question of leadership in the management of key facebook and twitter accounts of occupy wall street, indignados and uk uncut', *Information, Communication & Society* **20**(2), 185–202.

González-Bailón, S. and Wang, N. (2016), 'Networked discontent: The anatomy of protest campaigns in social media', *Social networks* **44**, 95–104.

Graham, T., Jackson, D. and Wright, S. (2015), 'From every-day conversation to political action: Talking austerity in online 'third spaces'', *European Journal of Communication* **30**(6), 648–665.

Grömping, M. and Sinpeng, A. (2018), 'The "crowd-factor" in connective action: comparing protest communication styles of thai facebook pages', *Journal of Information Technology & Politics* **15**(3), 197–214.

Grossman, E. and Sauger, N. (2017), *Pourquoi détestons-nous autant nos politiques ?*, Presses de Sciences Po, Paris.

Guerra, T., Frédéric, G. and Chloé, A. (2019), 'Populist attitudes among the french yellow vests', *Populism* **online first**.

Gustafsson, N. (2012), 'The subtle nature of facebook politics: Swedish social network site users and political participation', *New Media & Society* **14**(7), 1111–1127.

Harlow, S. (2012), 'Social media and social movements: Facebook and an online guatemalan justice movement that moved offline', *New Media & Society* **14**(2), 225–243.

Howard, P. N., Agarwal, S. D. and Hussain., M. M. (2011), 'When do states disconnect their digital networks? regime responses to the political uses of social media', *he Communication Review* **14**.

Hutter, S. (2014), 'Protest event analysis and its offspring'.

Jost, J. T., Barberá, P., Bonneau, R., Langer, M., Metzger, M., Nagler, J., Sterling, J. and Tucker, J. A. (2018), 'How social media facilitates political protest: Information, motivation, and social networks', *Political psychology* **39**, 85–118.

Jungherr, A. and Jürgens, P. (2013), 'Forecasting the pulse: how deviations from regular patterns in online data can identify offline phenomena', *Internet Research: Electronic Networking Applications and Policy* **23**(5), 589–607.

Klein, O. (2020), 'Misleading memes. the effects of deceptive visuals of the british national party', *Partecipazione e conflitto* **13**(1), 154–179.

Lee, F. L. and Chan, J. M. (2016), 'Digital media activities and mode of participation in a protest campaign: A study of the umbrella movement', *Information, Communication & Society* **19**(1), 4–22.

Lim, M. (2012), 'Clicks, cabs, and coffee houses: Social media and oppositional movements in egypt, 2004–2011', *Journal of communication* **62**(2), 231–248.

Lim, M. (2013), 'Many clicks but little sticks: Social media activism in indonesia', *DIGITAL* p. 127.

Morozov, E. (2011), *The net delusion: How not to liberate the world*, The Penguin Press, London.

Pavan, E. (2015), '# takebackthetech and# whatareyoudoingabout-vaw. reclaiming icts and soliciting stakeholders' responsibility to end violence against women', *Feminist Media Studies* **15**(1), 159–162.

Schradie, J. (2018), 'The digital activism gap: How class and costs shape online collective action', *Social Problems* **65**(1), 51–74.

Shirky, C. (2008), *Here Comes Everybody: The power of organizing without organizations*, The Penguin Press, New York.

Snow, D. A. and Benford, R. D. (1992), 'Master frames and cycles of protest', *Frontiers in social movement theory* **133**, 155.

Stier, S., Posch, L., Bleier, A. and Strohmaier, M. (2017), 'When populists become popular: Comparing facebook use by the right-wing movement pegida and german political parties', *Information, Communication & Society* **20**(9), 1365–1388.

Suh, C. S., Vasi, I. B. and Chang, P. Y. (2017), 'How social media matter: Repression and the diffusion of the occupy wall street movement', *Social science research* **65**, 282–293.

Sénecat, A. (2019).

TNS Sofres, K. (2020), 'Cotes de popularités des présidents et premiers ministres'.

Treré, E. (2015), 'Reclaiming, proclaiming, and maintaining collective identity in the# yosoy132 movement in mexico:

an examination of digital frontstage and backstage activism through social media and instant messaging platforms', *Information, Communication & Society* **18**(8), 901–915.

Tufekci, Z. and Wilson, C. (2012), 'Social media and the decision to participate in political protest: Observations from tahrir square', *Journal of communication* **62**(2), 363–379.

Valenzuela, S. (2013), 'Unpacking the use of social media for protest behavior: The roles of information, opinion expression, and activism', *American behavioral scientist* **57**(7), 920–942.

Valenzuela, S., Correa, T. and Gil de Zuniga, H. (2018), 'Ties, likes, and tweets: Using strong and weak ties to explain differences in protest participation across facebook and twitter use', *Political communication* **35**(1), 117–134.

Van de Donk, W., Loader, B. D., Nixon, P. G. and Rucht, D. (2004), *Cyberprotest: New media, citizens and social movements*, Routledge.

Van Laer, J. (2010), 'Activists online and offline: The internet as an information channel for protest demonstrations', *Mobilization: An International Quarterly* **15**(3), 347–366.

Van Zomeren, M., Postmes, T. and Spears, R. (2008), 'Toward an integrative social identity model of collective action: a quantitative research synthesis of three socio-psychological perspectives.', *Psychological bulletin* **134**(4), 504.

Yann, A., Beasley, E., Cohen, D., Foucault, M. and Péron, M. (2019), Qui sont le gilets jaunes?

Supplementary material

Keywords for the Classification of Posts

Keywords used to classify the posts on Facebook posts into the identified categories of topics or issues.

Movement logistics and co-ordinations: 'manif.*','mobilis.*','marche', 'blocage',r'bloquage', r'bloquer', 'bloquons','bloqu[é—e]' 'rond.*point','p[é—e]age','autoroute', 'op[é—e]ration escargot', 'actes?', 'paris samedi','prochain samedi', 'samedi prochain','direction paris', 'rdv samedi','samedi', '17.*nov','le 17', 'jour j'.

Gilets Jaunes movement: 'gilet.*jaune','gj'.

Precariousness and life conditions: 'pouvoir d.achat', 'smic', 'pauvre','sans abri','sdf', 'pr[é—e]carit[é—e]', 'fins? d[e—u] mois','fins? mois', 'co[u—û]t de la vie', 'in[é—e]galit[é—e]', 'classe moyenne','classes? ouvri[è—e]re','classes? populaire'.

Referendum: 'r.i.c','ric','rendum d.initiative citoyenne', r'rendum',r'assembl[é—e]e citoyenne'.

Fuel tax: 'politique [é—e]nerg[é—e]tique', 'essence','combustibles*', 'carburants*','gazole','gasoil', 'di[é—e]sel','raffineries', 'kilom.tre.*heure','kmh', 'kmph','km.h', 'limit.*vitesse', 'exc[è—e]s de vitesse', 'abaissement de la vitesse', 'r[é—e]pression routi[è—e]re', 'radars?'.

Examples of posts

Examples of the posts classified under the identified categories of issues. For each issue, 5 posts are given as examples in French (original), and in English (translated).

Movement logistics

Besoin de renfort urgent a la zad !!!! On a fait le blocage des bulldozers a 10 ce matin... Les flics nous ont vite déloger... On a besoin de vous !!!! A las barricadas!!!! / Need urgent renforcements in the protected zones!!! We have blocked the bulldozers at 10 am this morning... The cops took us out quickly... We need you!!! To the barricades!!!)

Transports : grève illimitée à partir du 5 décembre. Il faut TOUT bloquer ! / Transports: illimited strike starting on December 5th. We have to block everything!

Il suffit que 3,5% d'une population soit mobilisée pour qu'une lutte non violente renverse un gouvernement / We onliy need a 3,5% of the population mobilized for a non-violet struggle to knock a government

Info du blocage sur paris ??? / Any information on the blockage in Paris ???

le groupe uzes est assez fort, qui peux être là pour une action sur bagnol samedi prochain ? / The group uzes is pretty strong. Who might be there for an action at [the comune of] Bagnol next Saturday?

YV Movement

Le mouvement des GJ repart partout en France et ici à Cognac on fait quoi ? On baisse les bras !!! J'ai honte !! / The YV movement is restarting everywhere in France, and here at Cognac what are we doing? We are desisting!! I am ashamed!!

Sur la violence d'Etat, et les contestataires, syndicats, GJ, etc... / About State violence, and the protesters, unions, YVs, etc...

Bon pour les fachos gilets jaunes de ce groupe qui se déchainer sur un mort. / Well, for the fascists YVs of this groups that loose it over one dead.

c'est loin d'être fini notre mobilisation gilets jaune se n'est que le début du commencement tout en se protegéant / This is far from being the end of our YV mobilization, it is only the beggining of the starting [...?]

"Il y a des Gilets Jaunes parce qu'il y a des problèmes; il n'y a pas des problèmes parce qu'il y ait des Gilets Jaunes". Manifestation des Gilets Jaunes du 5 octobre à Bordeaux / There are YVs because there are problems: there are no problems because there have been Yellow Vests. YV demonstration from October the 5th at Bordeaux

Fuel tax

Équateur... manif' contre le prix de l'essence... Ça vous rappelle rien? / Ecuador... demonstrations against the cost of gaz... Does it remind you of something?

MR MACRON.** **BAISSEZ LES TAXES, L'ESSENCE ET** **REMETTEZ L'ISF (symboliquement) / Mr. Macron. Lower the taxes, the fuel, and re-install the tax on wealth

Le gasoil devrait être actuellement a 0,43€ si on fait la conversion (Fr / €) / Gaz should now be at 0,43€ if we made the conversions Francs / Euros

En Équateur le carburant est devenu trop cher, donc le pays c'est arrêté depuis jeudi !! Et nous ?? / In Ecuador gaz became too expensive, so the country is on strike since Thursday!! And you??

Actions des gilets jaunes à Aurillac pour dénoncer le poids des taxes sur le carburant et son prix exorbitant. / YVs' actions at Aurillac to denounce the weight of fuel taxes and its exorbitant price.

Precariosness and life conditions

*Les pauvres vont prendre cher ! **17 et 18 NOV TOUS DEHORS*** / The poor are going to take back (?)! 17 and 18 November everybody on the street

syndicats CACA c le moment de montrer de quel cote vous êtes soit: abolition privilèges de nos dirigeants soit les pauvres font des efforts je crois que j ai ma réponse / CACA unions, it's time to show on which side you're on: either abolition of priliveges of our political leaders, either is up to the poor to do the efforts. I think I already have my answer.

2,5% du PIB POUR LES PAUVRES UN POGNON DE DINGUE / 2,5% of GDP FOR THE POOR IS A CRAZY AMOUNT OF MONEY

Bonjour à tous, merci de partager et de vos dons, nous ne voulons pas qu'une femme seule de 54 ans perde tout et se retrouve SDF Merci / Hello to all, thank you for sharing and for your donations, we don't want that a woman alone of 54 years losses all and finds herself in the street

Citoyens ! Notre pouvoir d'achat a subi un coup de pompe ! Il ne faut plus en parler, il faut l'augmenter ! Stop au mépris de Macron ! / Citizens! Our purchasing power has taken a hit! Enough talking, we have to rise it! Enough disdain from Macron!

Referendum and RIC

Appel à manifester pour le RIC le vendredi. A signer et ptg !!! / A call to demonstrate for the RIC on Friday. Sign and share!!!

Referendum ADP : votons pour défendre notre patrimoine bientôt cédé aux intérêts privés... / Referendum ADP : let's vote to defend our patrimony soon to be given away to private interests...

J'espère que ceux du climat on bien compris que sans le RIC rien ne sera possible / I hope that those [interested?] about climate have understood that without the RIC nothing will be possible

Les Gilets jaune de Meaux, tiennent un stand pour le RIC ADP à Quincy Voisins. / The YVs of Meaux, have a stand for the RIC ADP en Quincy Voisins.

60 députés sur 577! Vite un RIC operationarticle3.fr / 60 out of 577! We need RIC quickly operationarticle3.fr

Treatment of Time Series of Online and Offline Activity After 17 Nov 2018

Before computing the Granger-causality test between time-series quantifying offline activity and types of online activity, we apply treatment to the corresponding signals. We consider only the time-series of these offline and online activities after *Acte X* (19 Jan 2019), that is, during the period identified as Stage 4 (S4). During S4, we consider each time-series f to be composed of slow and fast dynamics:

$$f(a) = f_{\text{slow}}(a) + f_{\text{fast}}(a),$$

for a an index of *Actes*, from XI to XXXIII. We assume that slow dynamics are linear. This means that, for example, the number of protests decreases linearly between *Actes* XI and XXXIII. By fitting linear curves f_{slow} to these slow dynamics in the number of protesters (offline activity), and in all identified types of online activity, we can subtract it to obtain the curves f_{fast} containing the fast dynamics of these time-series. To obtain fast dynamics that are comparable in magnitude, we then proceed to *normalize* f_{fast}, by subtracting its mean and multiplying by a factor to assure unitary absolute maximum values. Figure 9 illustrates this process for the number of protesters for each *Acte*. Figure 10 illustrates the application of this procedure to all identified types of online activity.

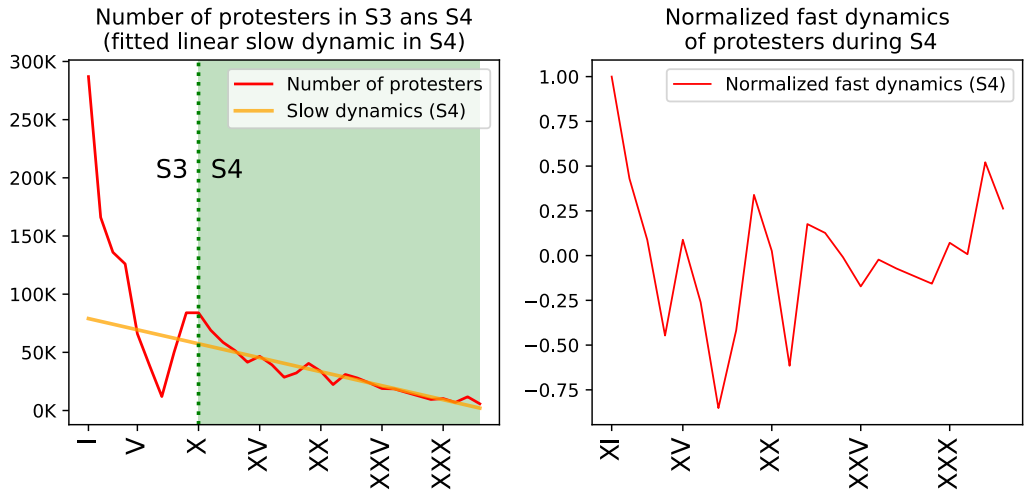

Figure 9. Nation-wide number of protesters with linear slow dynamics fitted to the period S4, after *Acte I* (left), and the resulting normalized fast dynamics for the period S4 (right).

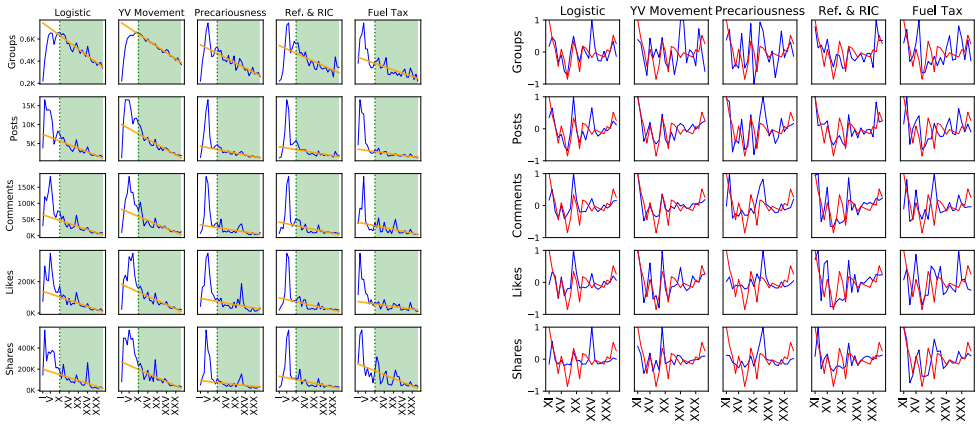

Figure 10. Different types of online activity with linear slow dynamics fitted to the period S4, after *Acte I* (left), and the resulting normalized fast dynamics for the period S4, in blue, compared with the normalized fast dynamics of the number of protesters (right).