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RESEARCH ARTICLE

STRIKING, MARCHING, TWEETING

Studying how online networks change together with movements

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ABSTRACT: This article aims to achieve a better understanding of how online networks contribute to the organization and the symbolic production of social movements using big data coming from social media platforms. It traces and compares online social and semantic networks that emerged on Twitter during two protest events organized by the feminist Italian movement Non Una Di Meno (NUDM) – a national strike organized on March 8th, 2017 and a march organized on November 25th of the same year. Our results suggest that, over time, online networks created on Twitter remain sparse and centralized around the movement handle but that they continue to host an interactive dialogue between the movement, its activists, and supporters. Also, over time, participants to online conversations around NUDM tend to use Twitter to discuss different aspects of the mobilization – paying more attention to the spaces of the protest during the strike and to the issue of gender-based violence in November.

KEYWORDS: Social Movements, Digital Media, Online Networks, Integrative Power,

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1. Introduction

Over the last decade, a lively stream of research has emerged that aims to unveil how online networks, i.e., the systems of relations that emerge in the online space as a result of digital media use, contribute to the organization and the symbolic production of social movements. In tight connection with theories that see collective action as organized through networks (see e.g., Diani 2015; Diani and Bison 2004), thorough explorations of online networks have contributed to a more genuine understanding of how increased relational and communication possibilities intersect with key movement mechanisms such as framing (Tremayne 2014); protest diffusion (González-Bailón, Borge-Holthoefer and Moreno 2013); individual recruitment and solidarity formation (Crossley 2015); the identification of leaders (Padovani and Pavan 2016); the redefinition of internal power dynamics (Bennett and Segerberg, 2014); sustained activism (Bastos and Mercea 2016); and the organization of offline protest (Howard and Hussain 2013).

Albeit online activism is nowadays recognized to be complementary to rather than a substitution for offline engagement (Earl 2016), not everything is rosy and clear in the study of the nexus between digital media and social movements. This is particularly the case when it comes to the study of online networks and, more particularly, of whether and how they contribute to movement dynamics. In this respect, two seem to be the main issues at stake.

The first deals with how online networks have been approached so far. As social movement studies have typically conceived of media as something external to movements, online networks have often been considered as a product of environmental conditions and, hence, as a space for action disconnected from or, at best, alternative to offline mobilizations (Pavan 2014). More importantly, because digital media are often depicted as “pervasively diffused”, their adoption within contentious dynamics is rarely problematized (Mattoni and Treré 2014).

Thus, online networks have been often approached as a “matter of fact” in contemporary mobilizations and have been rarely analysed in connection with the evolution of movement dynamics and strategies (Pavan 2017). This approach is at best partial, particularly considering recent accounts that address movement actors’ communication choices and media practices as tightly connected to their strategic, organizational and decision-making cultures (Mattoni 2012; Mattoni and Treré 2014; Kavada 2013). In this sense, Mattoni (2012) suggests that movements own and enact “communication repertoires” which, as much as protest repertoires (Tilly 1986), are spatially, temporally and culturally situated. In fact, although offering invariantly the same material features

(for example, the acts of tweeting or liking are performed identically in every context), digital media afford different protest possibilities depending on the different stages of the mobilization, on the users that decide to employ them and their action strategies (della Porta and Mattoni 2015).

The second critical issue pertains to the data that are used to trace and investigate online networks. Increased accessibility to big data, particularly those coming from social media platforms, has been crucial to make online interactions visible and intelligible. In line with recent discussions on the value of big data for social sciences (Kitchin 2014; Wagner-Pacifici, Mohr and Breiger 2015), Rojas (2015) argues that big data possess several benefits for researching social movements. In particular, Rojas underlines the advantages that derive from the amount of available data; the fact that these data are not generated in response to external stimuli like interview or survey questions; their low-cost, constant production, and inherent complexity; and the fact that they allow to investigate a dimension of social and political action that is becoming relevant for an increasing number of citizens.

However, Rojas admits that big digital data have some limitations – particularly, their low generalizability, incompleteness, and instability. More critical in this respect is Schradie (2015), who argues that the focus on the digital space yields to “ignore” the complexity of offline dynamics that continue to sustain collective endeavours as well as to elaborate explanations and interpretations starting from “cherry-picked” starting points (i.e., a specific hashtag on Twitter, a specific page on Facebook). More radically, Schradie criticizes the lack of depth of information that is derived from digital data and the overall tendency to disregard the societal structures that shape technology availability and use.

At the crossroads between a “taken for granted” vision of online networks and a poor methodological problematization of the data that are used to study them, questions about the interconnections between online and offline mobilization processes and about the specific contribution that digital activism bring to contemporary collective endeavours remain wide open. On the one hand, there is still a strong need for investigating online networks as rooted within broader movement dynamics and embedded within specific protest strategies. Only in this way, indeed, their study cease to be a mere technical exercise and becomes informative about the features and the implications of the current hybridization between online and offline participation dynamics.

On the other hand, it is also necessary to move towards a more informed use of big data to study political processes and, particularly, collective participation. Certainly, big data endow researchers with crucial resources to achieve a more fine-grained under-

standing of digitally mediated forms of political action. Nonetheless, as much as any other type of data, big data are partial insofar as they refer to a subset of contemporary multidimensional participation dynamics. Hence, online networks built starting from these data allow observers to trace and understand what happens when digital media are appropriated within contentious dynamics. However, the study of online networks does not shed light on the totality of relations that sustain contemporary multidimensional collective endeavours. Only a theoretically grounded research effort that bridges extant knowledge on social movement dynamics with the peculiarities and the potentialities of big data can prelude to a more genuine understanding of the specificities and of the role played by online networks within contemporary social movement dynamics.

In order to move one step further in the study of digital activism and towards a fruitful and sound exploitation of big data for social movement research, in this article we propose and apply a multifaceted analytical framework to study how online networks evolve as part of broader and multidimensional movement processes. We start from existing attempts to capture the evolution of online networks and, more particularly, from the analytic framework centred on the concept of “integrative power” (Pavan 2017). According to the integrative power lens, the *structure* of online networks evolves over time as a product of both digital media materiality and the uses of this materiality during movements’ unfolding. We add to the current formulation of this analytical lens by purporting that the evolution of online networks is not only structural but also *ideational*. Indeed, users employ digital media to interact amongst themselves through the continuous generation and circulation of contents that, in turn, make of online networks spaces where mobilization frames and identities are discursively developed (Bennett and Segerberg 2013).

We apply our extended version of the integrative power lens to study how online networks contributed over time to the Italian movement *Non Una Di Meno* (NUDM) against gender-based violence. More in details, by tracing and comparing online social and semantic networks that arose during a national strike organized by NUDM on March 8th, 2017 and during a march organized on November 25th of the same year, we seek to achieve three main goals. First, we aim at contributing to the study of the nexus between online networks and social movements by connecting network structural and ideational dimensions to the dynamic unfolding of collective endeavours across time and spaces. Second, by reconstructing and comparing online networks in conjunction with different action choices made by NUDM, we aim at shedding light on the differentiated and situated use of digital media that movement organizers and participants do over time depending on and, at the same time, contributing to shape spe-

cific protest moments. Finally, as we propose a research approach to embed the study of online networks within broader movement dynamics, we aim at providing evidence of a possible way to master the potentialities of big data for the study of social movements.

The remainder of this article is structured as follows. In section 2, we illustrate and update the concept of integrative power so to enrich its current structural perspective with our proposed ideational one. In Section 3, we present our case study, the *Non Una Di Meno* movement. In Section 4, we elaborate a set of exploratory research hypothesis about the structural and ideational changes that NUDM Twitter networks may have undergone over time and in conjunction with the uses of digital media that organizers and participants may have put in place during different protest moments. In Section 5, we illustrate the data and the methods through which we translate the different components of the online networks integrative power into observable network measures. After illustrating our results in Section 6, we conclude by elaborating on the potentialities and the limitations of our approach to the study of online networks as part of broader movement dynamics.

2. Studying how online networks change through the integrative power lens. Material, social and ideational aspects

The concept of “integrative power” has been recently proposed as a suitable analytical lens to capture, starting from the study of online networks, the multifaceted implications of digital media for the unfolding of collective action dynamics (Pavan 2017). It grounds on the assumption that the use of digital media inevitably generates online networks that, because of their large scale, tend to be sparse, shaped by weak ties, locally clustered, and held together by few “disproportionally connected nodes [that] keep the network small in terms of path length or average distance between any two nodes” (González-Bailón et al., 2013, 954). To be sure, while digital media impose, rather than allow, a network organization logic, not all online networks are movement networks. It is only when the innate networking potential of digital media meets human desires for change that these weak and sparse networks of communication become integral to collective endeavours and thus the online space comes to be a space for collective action.

Fuelled by both technological and human potentialities, online networks matter to contemporary activism as they enable the continuous circulation of information but, more importantly, of participants’ visions, energies, and contributions to common pro-

jects of change. Hence, the added value of these networks does not come from their scale or from their articulation but, rather, from their inherent “integrative power” – that is, their capacity of holding together “a multiplicity of heterogeneous actors in spite of their differences and under shared and ever-evolving frames” (Pavan 2017, 435). As this integration capacity follows from the reciprocal leveraging between digital media affordances and movement actors’ needs and practices, the integrative power of online networks is a unique form of sociotechnical power that has two sides – a material side and a social one – and evolves over time together with the platforms and with mobilization dynamics (Pavan 2017).

Consistently, it has been proposed to investigate empirically the integrative power by looking at two aspects of the overall structure of online networks that result from the use of digital media during mobilizations (Pavan 2017). More specifically, its material side can be inferred by examining how segmented and centralized online networks are – two features that are particularly indicative of how information flows along technology-mediated ties (Himmelboim et al. 2017). When it comes instead to the social side of the integrative power, Pavan proposes to adopt a twofold perspective. On the one side, she suggests accounting for the distribution of ties within online networks. Indeed, ties’ content can be taken as a proxy for the actions that users perform when they appropriate digital media (Mattoni and Pavan, forthcoming 2018). On the other side, the study of nodes’ centrality allows to explore how users purposively employ digital media to interact amongst themselves. As it has been shown, indeed, it makes a great deal of difference if online actions are dominated by formal organizations (e.g., political parties or renowned governmental and non-governmental entities) or rather assume the form of “networks of networks” where no clear leader can be identified (Bennett and Segerberg 2013, Padovani and Pavan 2016, Pavan and Caiani 2017).

While material and social aspects are certainly fundamental, we argue that they do not fully exhaust the sociotechnical nature of the integrative power as they capture only the *structural integration* of movement actors and participants in the online space. As underlined by an increasing number of studies (Ackland and O’Neill 2011, Bennett and Segerberg 2013, Castells 2012, Meraz and Papacharissi 2013, Pavan and Caiani 2017), online conversations during contentious dynamics matter because they yield to the creation, circulation, and sharing of protest meanings and action frames (Snow and Benford 1988, Gamson 1992) that, in turn, motivate engagement and suggest modes of operating collectively to change the status quo.

Hence, we argue that the integrative power of online networks has a third, *ideational* side, which refers to the possibility of exploiting digital media communication and networking potentials to express and coordinate heterogeneous instances, claims, and

needs within shared programmes of reform. To be sure, the modes in which this coordination is achieved depends very much from the material features of the platforms adopted. In the Web-space, the construction of links amongst websites enables online issue networks in which a particular topic is collectively discussed (Rogers 2013). On Twitter but, increasingly, also on other social media platforms, the use of hashtags allows to organize and retrieve contents spread during widely participated digital conversations (Barash and Golder 2011). On Facebook, public pages provide activists and interested citizens with a space where to converge, express opinions, and build solidarity (Gaby and Caren 2012). Regardless of the ways in which it occurs, the online integration of ideational inputs strengthens the construction of a collective actor as it fosters the identification of the reasons to mobilize, underpins the construction of a collective agency, and supports the creation of collective identities – all elements that are traditionally associated with the symbolic and ideational components of collective endeavours (see Gamson 1992, Melucci 1996, Snow and Benford 1988).

3. Case Study: Non Una Di Meno

Non Una Di Meno (NUDM, literally, “Not one less”) is an Italian feminist movement addressing gender-based violence and, more particularly, male violence against women. The name of the movement represents a true call for action, as the movement’s identity builds upon its own mission: not even one more woman should be a victim of violence.

NUDM origins tie back to the “Ni una Menos” international protest against femicides and male violence against women, which took place in 2015 in Argentina following a petition from journalists, activists and artists. However, it was in June 2016, after the rape and assassination of a young woman in the periphery of Rome - Sara di Pietrantonio - that the movement begun to emerge. On the escort of the indignation for the umpteenth case of femicide in Italy as well as for the narrative constructed by mainstream media about it, a call was issued in 2016 to take action on November 26th, the day after the International Day for the Elimination of Violence against Women. With a march participated by more than 200.000 individuals and with the organization of a largely attended workshop and assembly on gender-based violence, the NUDM movement officially started its activity and became visible to the public.

NUDM considers gender-based violence as an epistemic dimension that invests all aspects of our lives and roots in a patriarchal and heteronormative culture. This vision was elaborated in a horizontal fashion and mainly through the organization of thematic

workshops addressing issues that are considered crucial for understanding the power relations that sustain gender-based violence. These workshops were imagined and developed as spaces of dialogue and confrontation to produce feminist knowledge to be crystallized within a “feminist plan against male and gender-based violence” – a concrete plan for action and, at the same time, a movement manifesto.

NUDM’s political strategy includes different types of action – from strike to flash mobs and street marches. After its inception, NUDM organized two national protest events. On March 8th, 2017, the movement adhered to an international strike against male violence on women geared towards the acknowledgement of women’s rights and roles in the workplace and in the unpaid care work. The strike as much as the marches, meetings and flash mobs that accompanied it were organized and held all over Italy thanks to the involvement of feminist and women’s collectives spread on the territory along with the local nodes of NUDM.

In the same year, on November 25th, NUDM organized a huge march in Rome to join global protests for the International Day for the Elimination of Violence against Women. The November march also marked the end of the collective process to write the feminist plan against violence and, therefore, provided the occasion to present the movement as a collective and unified actor made up by multiple subjectivities.

In both protests, NUDM made a strategic use of Twitter. In March, NUDM launched a Tweetstorm that connected and held together the multiplicity of local initiatives thus making of the strike a networked national protest event. In turn, the digital connection of these local experiences nourished the construction of a collective political subject able to gather heterogeneous instances and claims under a shared programme of action that fuelled the drafting of the plan. In November, instead, Twitter was used to spread the contents of the protest and of the anti-violence feminist plan. In this case, Twitter played a twofold role. On the one hand, it contributed to present to the broader public the collective political actor that NUDM had managed to become over time and whose unity was represented by the anti-feminist plan. On the other, it sustained NUDM strategy of action, which typically cross-fertilizes protest action with the construction of political alternatives.

4. Research questions and hypotheses

As seen above, in the course of 2017, NUDM consolidated on the Italian political landscape as a collective endeavour aimed at fighting gender-based violence. This growth occurred fluidly across the online/offline boundary and was nurtured by a sus-

tained series of meetings and protests that took place in physical spaces but also by online conversations that unfolded upon social media platforms and that became particularly vivacious in the days of the two national protests. But how did digital dynamics actually contribute to this growth? What kind of networks did emerge in the online space of Twitter in these two protest occasions? Did they change over time with NUDM changing its protest strategy but, more importantly, progressing its efforts to collectively shape the anti-violence plan? And how did these network sustain the overall conversation about NUDM issues and claims over time?

In order to answer to these research questions, we traced the networks that emerged on Twitter in conjunction with the two NUDM national protest events and analysed them through our proposed threefold articulation of the integrative power lens. Working at the crossroads between existing knowledge on online networks as large-scale structures and the use of digital media within social movement dynamics, we elaborated three different sets of exploratory hypothesis on how the structural and the ideational side of NUDM Twitter may have changed together with the progressive unfolding of the movement.

From a material point of view, Twitter invariantly enriched the two NUDM protests by providing movement actors and participants with a further space to organize and exchange their views. In consideration of their digital and large-scale nature, we could expect NUDM Twitter networks to have remained rather sparse and centralized over time. However, we could also expect some changes to have occurred as a consequence of the consolidation of NUDM over time. More specifically, we expected NUDM Twitter network in November to be characterized by lower network segmentation and higher centralization than that of March due to the increased public recognition of the movement as a legitimate political actor on the Italian political scene.

From a social point of view, we expected that, along this consolidation process, participants would exploit Twitter affordances in different ways to interact with NUDM. In light of the increased public recognition that the movement enjoyed in November and in consideration of the fact that the march in Rome launched the anti-violence plan, we did expect an increased use of retweets to broadcast the unified voice of the movement as opposed to the use of other affordances (e.g., mentions) to foster direct interaction amongst participants. Thus, we expected the NUDM Twitter network in November to be more extensively sustained by retweet ties than that of March.

Moreover, we also expected that, over time, participants employed digital media mainly to interact with NUDM as it became more and more recognizable as a collective political actor. In this sense, we expected the centrality of the movement handle to increase passing from the March to the November network. Finally, in consideration of

the change of protest repertoire from a networked strike to a national march, we expected this greater prominence of the NUDM handle to be accompanied by a progressive retrenchment of local feminist collectives and local NUDM nodes, which were more relevant in the organization of strike-related activities than during the organization of the march in Rome.

Finally, from an ideational perspective, we expected NUDM Twitter networks to have undergone some changes in light of the progressive consolidation of the movement but also considering the shift from a national strike addressing labour issues as part of a broader discriminatory context to a march specifically designed to present the collectively drafted anti-violence plan. In this respect, we expected the NUDM Twitter network in November to host more discussion about the challenges tackled by the movement but also to testify a greater recognition of the NUDM movement as a collective actor fighting towards greater gender quality.

5. Data and Method

To reconstruct how NUDM Twitter networks and to study whether and how they evolved together with the movement, we collected directly from the platform's API (Application Programming Interface) two blocks of tweets, one for each protest event we monitored. Every block comprised the tweets carrying the official hashtags launched by NUDM through its social media accounts with the aim of boosting collective participation during the strike and the march (table 1).

In relation to the national strike on March 8th, beside the official hashtag of the movement *#nonunadimeno*, we monitored the hashtags launched in the context of the Tweetstorm that accompanied the strike – i.e., *#8M* (i.e., 8th March), to recall the day of the protest; *#iosciopero8M* (i.e., “I strike on March 8th”); *#lottomarzo*, a play on words to signify the protest spirit of the strike; *#noiscioperiamo* (i.e., “We strike”); *#scioperodelledonne* (i.e., “women’s strike”); *#siamomarea* (i.e., “We are multitude”). In connection to the November march, we considered instead the official movement hashtag together with the two official hashtags *#abbiamounpiano* (i.e., “We have a plan”) and *#pianofemminista* (i.e., “feminist plan”), both referring to the presentation of the NUDM plan to fight gender-based violence.

For each block, tweets were collected over a period of approximately two weeks so to be able to grasp how the conversation online evolved over time from the preparation to the aftermath of the protest event. Overall, we collected 12.132 tweets, 9.992 produced around the strike and 2140 around the march in Rome. It is important to

stress that NUDM did not plan to use the same number of hashtags during the two protests. More specifically, the Tweetstorm that was launched before the strike in March entailed the use of a higher number of protest hashtags and thus of tweets than that of November.

Table 1 – Monitored hashtags and observation periods

<i>Protest Event</i>	<i>Monitored Hashtags</i>	<i>Observation Period</i>	<i>N Tweets</i>
National Strike, 8 th March 2017	#8M #iosciopero8M #lottoMarzo #noiscioperiamo #nonunadimeno #scioperodelledonne #siamomarea	28/02/2017 – 12/03/2017	9.992
National Demonstration, 25 th November 2017	#abbiamounpiano #nonunadimeno #pianofemminista	14/11/2017 – 30/11/2017	2.140

Source: Authors' elaboration

Starting from collected tweets, we reconstructed and compared two social and two semantic networks that emerged on Twitter in conjunction with the two NUDM protest events. We used the two social networks to investigate the material and the social sides of the integrative power of the NUDM Twitter networks, while we used the two semantic networks to study its ideational side.

5.1 Investigating the material and the social sides of the integrative power through social networks

With regard to NUDM online social networks, they comprise all the users that, within any of the two observation periods, authored a tweet containing one or more of the monitored hashtags or have been mentioned, replied to, or retweeted by users tweeting with one or more of the monitored hashtags. Nodes in the two social networks are tied by different types of edges, depending on whether a node retweeted, mentioned, or replied to another handle or published a tweet carrying one or more of the protest hashtags yet without recalling any other handle. In the cases in which a user authored a tweet that includes other handles, there is an edge that goes from the author to all

mentioned handles. In the case of tweets that do not mention any other handle, there is a tie from the author of the tweet to herself.

Consistently with the original articulation of the “integrative power” lens, the two social networks were analysed so to provide insights on the material and the social integration occurring within NUDM online networks. Material integration was thus investigated by looking at some macro features of the network that, following Pavan (2017), are particularly indicative of their segmentation (i.e., number of components, percentage of isolates and inclusivity of the main component) and centralization (i.e., network indegree centralization).

Always in line with previous analyses, we studied social integration by starting from an evaluation of ties distribution within the two networks. More precisely, we looked at the percentage of ties that in the two networks formed around mentions, replies, retweets and tweets that do not mention any other handle.

Moreover, we identified particularly prominent nodes in the two networks and, starting from a triangulation of their Twitter names with information available on their Twitter personal page and on Google, we classified them into a set of categories.¹ To identify these categories, we leaned on Garcia-Albacete and Theocarlis (2014) who, starting from a bottom-up scrutiny of nodes within online protest networks in Spain, Greece and United States, identify nine types of actors. We partially adapted their categorization in order to fit the specificities of the NUDM case thus identifying sixteen categories – five of which refer to individual actors and eleven to organizational actors. As per individual actor types, we identified:

- Activists – i.e., individuals who self-identify as activists and are actively engaged with movement issues and organizations;
- Citizens – i.e., individuals who take part in the discussion yet without identifying directly with the organization of the movement;
- Journalists and reporters – i.e., individuals who are linked to professional or grassroots journalism, such as photographer, writers, reporters;
- Celebrities – i.e., individuals who are famous primarily for reasons unrelated to gender-based violence, NUDM, or the real of politics;
- Politicians – i.e., individuals who are affiliated to a political party.

As per the types of organizational actors, beside the accounts of the national NUDM and of the local nodes, we identified:

¹ Similarly to other studies of online collective action networks (i.e., Padovani and Pavan 2016, Pavan and Caiani 2017), we selected nodes with an indegree higher than the average indegree score plus one standard deviation.

- Institutional political organizations – i.e., institutionalised collective actors such as Labour Unions or political parties;
- NGOs – i.e., a mixed category gathering civil society formal organization and non-governmental organizations;
- Civil society/political collective – i.e., informal, grassroots political formations;
- Mainstream news media and media organizations;
- Independent grassroots news and media organizations;
- Feminist/women media – i.e., news and media organizations run by women and sustaining a feminist perspective;
- Feminist and Women Collective – i.e., self-organized political collectives run by women and from a feminist political viewpoint;
- Feminist and Women Organization – i.e., formal organizations run by women and from a feminist political viewpoint;
- Other private or public organizations.

For each category we found in the two networks, we calculated the average indegree score and examined any variation occurred passing from the network emerged in march during the national strike to that emerged in November in conjunction with the national march.

5.2 Investigating the ideational side of the integrative power through semantic networks

To investigate the ideational integration within NUDM online networks, we reconstructed two semantic networks based on hashtags, one for each protest event we monitored. To this aim, we extracted all hashtags that were used within collected tweets and built a co-occurrence network where a tie existed between any two hashtags whenever they were used together in the same tweet. Thus, the more two hashtags were used together, the stronger the tie between them. For the purpose of this article, we concentrated on the main subset of the overall NUDM semantic network and extracted all hashtags that were regularly used together.² In this sense, we concentrated our study on the semantic core of the NUDM conversations that developed in March and November.

Selected hashtags were then classified into six categories that we identified combining existing social movement theories on the symbolic components of collective actions

² We extracted a subcomponent of the overall co-occurrence network formed by nodes involved in ties with a strength higher than the average edge weight plus one standard deviation.

with more inductive approaches of qualitative content classification. We began by examining all selected hashtags in search for the three ideational component that Gamson (1992) associates to collective action frames:

- a) *injustice*, i.e., hashtags that refer to the “moral indignation” for the status quo that translates into political consciousness and thus motivates engagement;
- b) *agency*, i.e., hashtags that refer to the consciousness that it is possible to act upon the status quo perceived as unfair through collective action;
- c) *collective identity*, i.e., hashtags that refer to the collective political actor formed by the movement or to the adversaries against which this collective actor mobilizes.³

After this first classification round, a number of hashtags could not be assigned to any of the three categories. Therefore, starting from the joint reading of the very phrasing of these hashtags with a qualitative evaluation of the text of tweets in which they were inserted we identified three more categories to fit the specificities of the NUDM case:

- a) *space*, which gathers hashtags referring to the places where protests initiatives took place under the NUDM umbrella;
- b) *international*, which gathers all hashtags referring to international protests linked to NUDM;
- c) *media*, which gathers all hashtags that refer to media outlets and professionals.

Taken together, the categories referring to Gamson’s articulation of frames and those we identified from the bottom-up allowed us to explore the ideational dimension of the two NUDM Twitter conversations in its complexity. Through these six categories, indeed, we were able to grasp the motivations behind the protest, the awareness of the possibility to change the status quo, the presence of a collective identity under which to mobilize, the perception of the local and international ramification of the NUDM endeavour, and the role of the media and the public discourse in the NUDM collective struggle.

As a first step, we analysed the composition of the two NUDM semantic networks and searched for variations over time looking at the tendency to use more often hashtags belonging to a category rather than to another. Secondly, we examined how the different categories were connected amongst themselves. Finally, by means of an homophily test, we explored whether over time there has been a tendency towards as-

³ Each hashtag was classified exclusively in one category starting from a qualitative evaluation of its context of use (i.e., the text of the tweets in which it was found) and after comparing the results of separate coding procedures undertaken by the authors.

sociating hashtags belonging to the same category – an element that we can read in terms of consolidation of a specific ideational category.

6. Results

6.1 Material Integration

Table 2 shows the overall network features of the NUDM social networks that developed on Twitter around the protests on March 8 and November 25, 2017. As it appears, the second network is smaller than the first one. However, network size differences are mainly due to the lower number of tweets we collected for the second protest and, therefore, do not necessarily suggest a resizing of the public interest for the NUDM movement.

Table 2 – Overall network features of the NUDM online social networks

	8 March 2017	25 November 2017
Nodes	11.248	5642
Edges	28.917	14.133
Density	0,000279	0,000534
Average Geodesic Distance	4,572	3,976
Isolates	16,04%	5,69%
Number of Components	2129	414
Inclusivity of Main Component	75,71%	89,60%
Modularity	0,2716	0,1018
Average Degree	0,04	0,08
Max Degree	18,52	37,03
Indegree Centralization	0,1702	0,3699

Source: Authors' elaboration. Note: Average Degree scores normalized

In terms of segmentation, the two networks present a rather similar profile. Although the density value raises over time, it remains extremely low – suggesting that online conversations around NUDM were and remained sparse.⁴ Furthermore, both networks are formed by hundreds or even thousands of components, some of which made up by single nodes (i.e., isolates). Taken together, these elements suggest that

⁴ Density represents the proportion of present ties on the total number of possible ties in a network (Wasserman and Faust 1994).

multiple conversations were occurring at the same time around the two NUDM protests, without necessarily overlapping or resulting in the construction of connections amongst participants.⁵ Anyhow, in both cases, a large majority of nodes took part in the same conversation (approximately 76% and 90% of nodes in the two networks) suggesting that participants did converge around a common conversational core.

Despite this sparseness, the average distance value shows that nodes are on average only four steps away one from the other, meaning that NUDM users that did not talk directly on Twitter shared anyhow some friends (of friends) who bridged them.⁶ Not surprisingly, the connectedness of the network is ensured by *@nonunadimeno*, which stands at the very core of the network and holds it together. Indeed, in both networks, there is a severe gap between the average and the maximum degree, which represent, respectively, the average and the highest number of ties in which nodes are involved. As the highest degree value is always that of *@nonunadimeno*, the network results highly centralized suggesting that the two online conversations remained, rather predictably, oriented towards the movement handle.

Yet, if we look at how these network features change over time, we can indeed infer that some changes occurred as NUDM continued to struggle against gender-based violence. While, as seen above, both networks are sparse, levels of segmentation decrease over time. The percentage of isolates drops from March to November down to a 6% of the total number of nodes. Similarly, the overall number of components in which the network is fragmented lowers and the percentage of nodes that take part in the main conversation rises to almost 90%. While the smaller scale of the November conversation may have facilitated this convergence, the overall configuration of the second network suggests that a more inclusive and organized conversation took place in November. This suggestion is further strengthened by the modularity score, which indicates the extent to which a network is organized within clusters that are densely connected within and between them (Wasserman and Faust 1994). As network modularity decreases over time, the NUDM online network becomes less clustered and increasingly held together by ties between groups of nodes, rather than within them.

Finally, strictly connected to the ripening of a more inclusive and organized conversation, is the overall growth of network centralization. As table 1 shows, passing from March to November the value of indegree centralization, which indicates the extent to

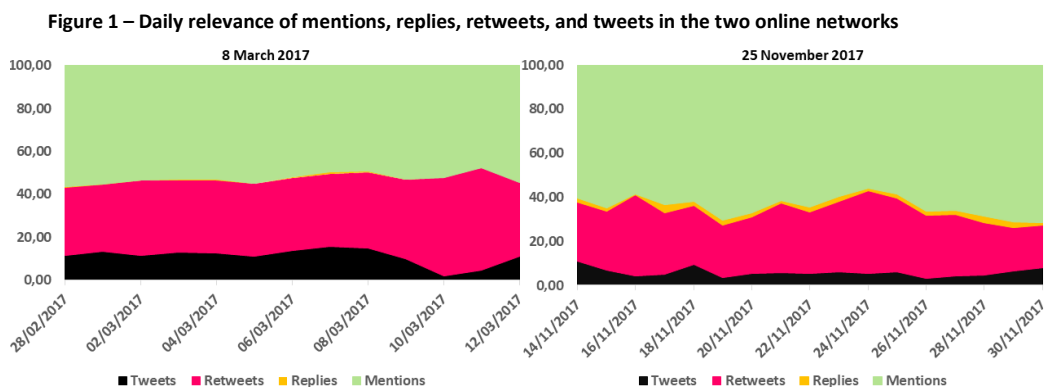
⁵ A network component is a subset of nodes that are all directly or indirectly connected amongst them. The component with the highest number of nodes is called the “main” component (Wasserman and Faust 1994).

⁶ Average distance represents the average length of the shortest path between any nodes in the network (Wasserman and Faust 1994).

which there are nodes that tend to be systematically targeted by others (Freeman 2002[1979]), is more than double. In turn, this suggests that, passing from the first to the second NUDM protest, the tendency towards directing communications towards a handful of nodes, and particularly towards the movement handle, was reinforced.

6.2 Social Integration

Figure 1 shows the overall tie distribution of the two social networks unfolding around the NUDM protests. As it appears quite evidently, both networks were systematically sustained by mentions, which are messages containing original contents that are addressed to or recall the attention of other Twitter users. Indeed, in March mentions count for at least 48% of total ties during daily conversations while in November their minimum relevance raises to 55%. Retweets ties, that is, the retransmission of messages authored by other users, were important but, in both networks, were always less frequent than mentions (they count at best for 48% of all ties in March and 38% in November). Conversely, tweets that are not directed to any user in particular as well as direct replies are less frequent.



Source: Authors' elaboration

The constant prevalence of mentions over other network ties suggest that, in both online conversations, participants tended to interact more rather than to retransmit or deliver contents. In addition, mentions seem to have become more important with time, as they get to constitute 72% of ties in one of the days preceding the November protest. In this sense, our results suggest that the online conversations around NUDM

were and remained over time predominantly interactive and nurtured by original contents that were shared and discussed amongst participants.

If we look at results in table 3, which shows the average centrality of actor's' categories, we notice that this interactivity is in fact directed towards the movement handle *@nonunadimeno* whose indegree centrality, i.e., the measure of how many ties are received by other nodes in the network (Freeman 2002[1979]), is beyond double passing from March to November. In turn, this points to a greater recognition of the overall NUDM umbrella, which became the preferred interlocutor of participants also in comparison to NUDM local accounts, whose overall centrality diminishes over time.

Table 3 – Average Indegree centrality for handle categories in the two online networks

		8 March 2017		25 November 2017	
Handle Category		%	Average Indegree	%	Average Indegree
Individual	Activists	29,3	0,4475	32,4	1,6948
	Celebrities	0,9	0,3878	2,82	1,5334
	Citizens	5,8	0,4001	2,82	1,0100
	Journalists and reporters	5,3	0,8084	9,86	2,2032
	Politicians	4,0	0,4801	1,41	2,1617
NUDM	NUDM	0,4	17,0445	1,41	37,0324
	NUDM Local	1,8	1,7116	4,23	1,1463
Organizational	Civil Society/political collective	14,7	0,4373	5,63	1,7771
	Feminist and Women Collective	4,4	0,7122	7,04	2,3861
	Feminist and Women Organization	4,0	0,6036	5,63	1,0281
	Institutional Political Organizations	4,0	0,5512	1,41	2,9427
	Media - Independent femnist/women	3,2	0,8345	2,82	1,1079
	Media - Independent	8,4	0,6874	8,45	2,1568
	Media - Mainstream	5,8	0,5964	11,27	2,0319
	NGOs	2,2	0,3645	1,41	0,6913
	Other organizations	0,8	0,7602	1,41	0,6002
	Not Applicable	4,89	-	-	-
	Total	100%			100%
	(N=225)			(N=71)	

Source: Authors' elaboration. Note: Average indegree scores normalized

The passage from the national networked strike to the national anti-violence march in November seems to have fostered also a greater specialization of the conversation around NUDM. While in both occasions only a minority of nodes ended up catalysing most ties (respectively, 2% of handles in March and 1,75% in November received sys-

tematic attention from others), the network core in November gathers predominantly movement-related actors. Indeed, in November NUDM activists were more often targeted with tweets, and the same happened to feminist collectives and organizations such as @ObiezioneRes and @CasaIntDonne_Rm. Conversely, civil society organizations such as @BinItalia, political organizations (e.g., @FLC_CGIL_Lazio), and recognized NGOs (e.g., @Greenpeace_ITA) lose part of the prominence they enjoyed during the strike, very likely as a consequence of the narrower topic of the march as opposed to the transversal theme of labour inequalities faced in March.

Another interesting element that emerges from table 3 concerns the increasing prominence of media outlets and professionals. As average centrality scores in November show, mainstream media (e.g., @Corriere and @RaiUno), journalists and reporters, but also celebrities (such as @AsiaArgento) enjoy more prominence than before, and the prominence of independent media does also rise. Such augmented media prominence in the November network has a twofold motivation. On the one hand, it is the result of the spread of the *#metoo* movement soon before the march on November 25th. On the other hand, the rapid escalation of public denunciations of abuses on the workplace, journalists and mainstream media paid unprecedented attention to NUDM, which was portrayed as part of a global wave of women's protest. On the other hand, in November NUDM decided to make publicly available its anti-violence feminist plan yet without delivering it to any specific political or media actor. In this sense, the independent media circuit sustained the diffusion of the plan (as opposed to the mainstream media who focussed more on the march) thus moving from the periphery to the core of the network as a movement ally.

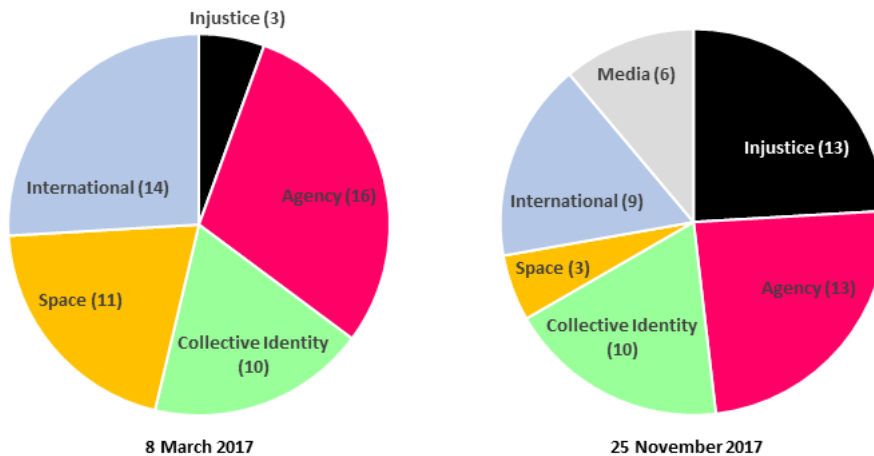
6.3 Ideational Integration

Figure 2 shows the thematic composition of the two cores of NUDM conversations. In March, tweets tended to emphasise the dimension of agency oftentimes by means of hashtags recalling the element of the strike, such as the official *#noiscioperiamo*, but also the element of the fight, as in the case of *#lottacontinua* – a play on words to suggest that the struggle would continue and to recall the Italian far left extra-parliamentary group Lotta Continua. Also, rather emphasised were the international dimension, through hashtags as *#internationalwomensday*, and the spatial dimension, through the systematic use of hashtags signalling the cities in which the strike initiatives were taking place. Also, movement actors and participants recognized in their contributions NUDM as a collective actor not only through hashtags as *#nonunadimeno* or *#donne* (i.e., *#women*) but also identifying its political adversaries – as in the case of

the hashtag *#salvini*, repeatedly used to denounce the exclusionary and discriminatory practices of the Italian political establishment. Conversely, hashtags recalling the motivations behind the strike were used less frequently and to recall the element of gender-based discrimination quite broadly – as in the case of the hashtag *#parità* (i.e., *#equality*).

A partly different situation emerged in November, when hashtags referring to the spaces of the protest became residual (mainly limited to *#Rome*) and were often substituted by those revoking the motivations behind the march - particularly those linked to gender-based violence, such as *#noviolenzasulledonno* (i.e., *#nomoreviolence-onwomen*). Also in this case, the dimension of agency remained important but was not necessarily limited to the presentation of the anti-violence plan, as showed by the frequent usage of the hashtags *#amazon* and *#backfriday* in solidarity with the strike of the employees of the company. The collective identity component also continued to remain important and so did, albeit with a small resizing, the international one – particularly in connection with the spread of the *#metoo* movement, as testified by the spread use of the hashtag *#wetogether* to testify solidarity with the international mobilization but also the strict link existing between NUDM and the global feminist wave of protest catalysed by the *#metoo*.

Figure 2 – Categorization of selected hashtags in the two semantic networks (N=54 in both cases)

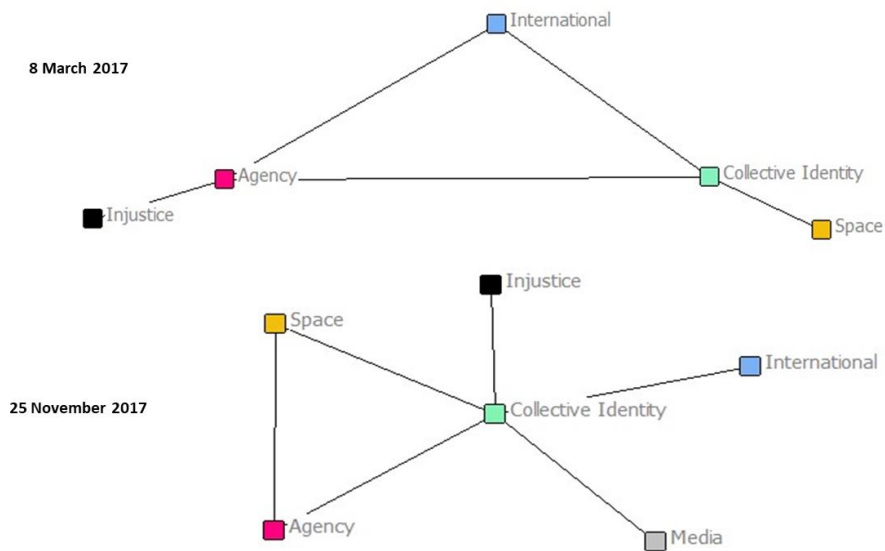


Source: Authors' elaboration

If we look at how hashtags from different categories were employed together, we notice that, as much as the online social structure, also the ideational system created

by movement actors and participants underwent some changes. Figure 3 shows the two image matrixes of the two NUDM semantic networks: every category of hashtags is here represented as a node and there is a tie between two nodes whether associations between hashtags of different categories were particularly frequent.⁷

Figure 3 – Image matrix representation of the two NUDM semantic networks



Source: Authors' elaboration

As it shows, in March the core of the semantic system revolves around the association between hashtags that point to the recognition of NUDM as a collective political actor, to its protest and reformative agency, and to the international dimension in which the strike was inserted. In November, instead, it is the dimension of collective identity, hence, the recognition of NUDM as a collective actor that holds together the system of meanings created by participants to the online conversation. With the sole exception of the link between the dimension of agency and the residual category of space, in November the more systematic associations created by participants in their tweets always enclosed an hashtag recalling NUDM. In turn, this signals the definitive recognition of the movement as a collective political actor that is perceived in many ways depending on the concrete cases – as a collective endeavour aimed to fight

⁷ More specifically, there is a tie between two nodes if the the density of ties between two hashtag categories is greater or equal to the overall density of the network.

against gender based violence (connection collective identity – injustice), active on the international panorama (connection collective identity – international), covered by the media (connection collective identity – media), and able to change the status quo (connection collective identity – agency).

Such increased recognition of NUDM as a collective actor is further testified by results in table 4, which show the outcomes of a homophily test to investigate whether participants to the two online conversations tended to use hashtags of the same category within the same tweets – an element that can be thought as a proxy for a stronger recognition of a specific ideational components. In these models, the intercept (the value in the first row) represents the probability of associating in the same tweet two hashtags from any of the five or six categories we identified while coefficients indicate how much the probability of a tie between hashtags of the same category differ from the intercept. The coefficients associated with each category indicate how much the probability of a tie between hashtags belonging to that category differs from the intercept. When the coefficient is significant (second column in each model), there is a greater tendency for hashtags of that same category to be used together within the same tweet.

Table 4 – Test of homophily tendencies within categories of hashtags

<i>Ideational Component</i>	<i>8 March 2017</i>		<i>25 November 2017</i>	
	<i>Coefficient</i>	<i>Significance</i>	<i>Coefficient</i>	<i>Significance</i>
Intercept	0.071	0.981	0.086	0.883
Injustice	-0.071	0.814	-0.071	0.158
Agency	0.071	0.159	-0.035	0.397
Collective Identity	0.196	0.022	0.275	0.005
Space	-0.052	0.361	0.914	0.007
International	-0.038	0.383	0.025	0.321
Media	n.a.	n.a.	0.114	0.146
R ²	0.025	0.111	0.041	0.013

Source: Authors' elaboration

As the table shows, none of the coefficients in the model on the left is significant. In turn, this suggests that in March participant used hashtags rather freely and without necessarily insisting on any specific associations between motivations, collective agency or identity, national and international spaces of action. Conversely, in November, a

more nuanced picture emerges. Although the variance explained by the model is very low, the model is significant and so is the tendency towards using within the same tweet hashtags that point to the existence of a collective subject under which to mobilize. This result suggests that, after a whole year of mobilization, users tweeting in conjunction with the NUDM protest tended not only to recognize the existence of NUDM by making use of hashtags that recall it in association with others describing its motives or its protest strategies. More importantly, they reinforced their acknowledgement of the movement by insisting particularly in their tweets with the use of hashtags that describe its collective nature. In doing so, they did characterize the multioi and aim communicating systematically the existence of a “we” struggling to defeat gender-based violence.

7. Discussion and Conclusion

In this article, we aimed at contributing to ongoing debates on the role of online networks for contemporary collective endeavours by proposing to trace and analyse how these online structures change both structurally and ideationally along with movement dynamics. We started from making a claim to enrich the current formulation of the “integrative power” lens so to focus not only on how the structure of online collective action networks change over time but also the contents, ideas, and frames that are collectively built within them. We thus applied our extended version of the integrative power lens to explore the case of *Non Una Di Meno* (NUDM), the Italian movement against gender-based violence. Starting from the collection of tweets produced around two national protests organized by the movement, we reconstructed two sets of networks: a social and a semantic network created by movement actors and participants around the national strike of March 8th, 2017 and a social and a semantic network generated around the national march organized in Rome on November 25th of the same year. By leaning mainly on network analysis tools, we analysed these two sets of networks to test the research hypothesis we formulated concerning the changes of these online social and semantic structures over time and in connection with the progressive consolidation of NUDM as a collective political actor on the Italian political scene.

Our first set of hypothesis concerned the material integration within online network enabled by digital media. As expected, over time the structural features of online networks proved to be resilient: regardless of the ripening of the movement and of the change of its protest repertoires, online networks resulting from the adoption of digital

media remained sparse and highly clustered. However, our results confirm also our second hypothesis for which, notwithstanding the weakness and the sparseness of these structures, the online conversation developed around the November march, after months in which NUDM worked to consolidate its collective project to fight against gender-based violence, appeared to be more inclusive as only a minority of actors remained isolated or carried out separate conversations. While becoming more inclusive, the online conversation around NUDM also became more remarkably oriented towards the movement official handle, which over time had become a preferred interlocutor for citizens and supporters concerned with gender-based violence.

Our second set of hypotheses related to the social integration within NUDM online networks. Differently from what we hypothesized, over time movement actors and participants did continue to engage in horizontal interactions through the predominant use of mentions. On the one hand, as we expected, the movement handle became increasingly central and thus constituted the very core of the conversation, also overshadowing its local spinoffs and feminists collectives. On the other hand, contrary to our expectations, retweets never became the principal mode of interaction and the NUDM handle never worked as a “programmer” (Castells 2011) setting the overall contents of the online discussion. Yet, as the movement progressively moved from the networked strike addressing gender inequalities on the workplace to the national anti-violence march in November, social integration within NUDM online networks seem to have occurred following a pattern of specialization. At the core of the online social network in November we could find mainly movement actors and activists together with the media, who were giving unprecedented attention to NUDM particularly in connection with the viral diffusion of the *#metoo* movement. Conversely, in March, the decentralized nature of the protest together with the more transversal theme (i.e., labour inequalities) let more space to build heterogeneous conversations and to identify a more variegated set of points of reference – such as trade unions, more traditional political actors – which intersected and supported the women’s strike.

Finally, our third set of hypotheses concerned the possible changes of the ideational structures created by movement actors and participants in relation to both the consolidation of the movement and the change of its action repertoire and focus. Our results confirm both our hypothesis. As NUDM moved towards the closure and the presentation of its feminist-plan against gender-based violence, users engaging in the online conversation tended to give more prominence to the problems that motivate their mobilization – particularly violence against women but also gender-based inequalities and discrimination. In parallel, movement actors and citizens seem to have reached a greater awareness of NUDM as a political collective actor with a long-term project to

achieve greater gender equality – as in the November semantic network hashtags referring to the movement were often associated amongst themselves and with others referring to collective agency, spaces of protests, and the media. Conversely, during the strike, the type of protest enacted led to emphasize the dimension of agency and the spaces (local and international) where the protest was in fact happening.

Ultimately, our analysis shows that it is possible to move one step beyond the current modes of approaching online networks as part of broader movement dynamics. Not only these networks matter as they enrich the relational milieu of contemporary mobilizations. They nurture collective action dynamics insofar as they enable the continuous circulation of ideas, inputs, and frames which are integrated and provide an overall shared symbolic universe under which collective action can be undertaken. More importantly, our analysis highlights that the actual mode in which structural and ideational integrations occur within these online networks is not unique. Rather, it depends on how digital media are embedded within specific protest moments – depending on and, at the same time, contributing to shape them. Finally, our study provided evidence of the fact that big digital data can be an asset to researching social movement, as they allowed us to explore the forms and the contents of online mobilizations under the NUDM umbrella. Whereas the whole story of NUDM, and of every other movement, to be fair, is certainly broader than that narrated by the thousands of tweets, these short texts provided us with a unique resource to begin looking more closely to a specific part of this mobilization – an invisible part, made of ephemeral and sparse ties that, nonetheless, bind.

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