

The Role of Instagram’s Multimedia on Social Unrest in Brazil and Peru: A Connective Action Analysis Based on Diffusion of Innovation and Cognitive Mobilization Theories*

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Abstract. In this research, we delve into the role of multimedia (images and videos) in propelling connective action. Adopting two distinct mechanisms, it first examines the pace at which multimedia is adopted at different stages using the Diffusion of Innovation (DOI) theory, and the second pertains to how multimedia influences cognitive mobilization, with both ultimately leading to online mobilization. The data compiled for this investigation includes 78,478 images, 12,967 sidecars, and 8,810 videos extracted from Instagram, using posts from the latest wave of demonstrations in South America, specifically the protests in Brazil and Peru spanning from November 2022 to February 2023. The objective of this research is to explore and categorize social movement campaigns, with a particular emphasis on the role of multimedia. In the final analysis, this paper posits that multimedia has become an indispensable facet of modern activism. They facilitate connective action and mobilization in a systematized manner, responding dynamically to the nature and needs of the ongoing social movements.

Keywords: Connective Action · Multimedia · Diffusion of Innovations · Cognitive Mobilization · Instagram · Brazil · Peru

1 Introduction

The internet, especially visually oriented platforms like Instagram, TikTok, Twitter, and YouTube, has emerged as a potent conduit for political mobilization and demonstrations, effectively connecting and coordinating individuals across disparate geographical locales. The widespread accessibility of smartphones and

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social media platforms allows for effortless documentation and distribution of political events and human rights violations, often in a real-time manner, providing a global glimpse into various protests and uprisings [1].

With content creation and distribution becoming increasingly democratized, researchers aspiring to probe the effectiveness of multimedia within the framework of connective action are compelled to study the presence and utility of multimedia in the midst of social unrests. Our study enriches the existing body of literature work by suggesting hypotheses based on two distinct mechanisms: 1) DOI and 2) cognitive mobilization. Mobilization involves the joint efforts of individuals striving towards a common goal. Emotionally resonant content, such as images or footage encapsulating protests and acts of violence, has the potential to influence behavior and encourage connective action. Within the landscape of Social Networking Services (SNS), Instagram has often been underrepresented in academic inquiries. Yet, emerging research indicates a significant shift towards image-centric online communication, establishing it as the avant-garde of communication research. This shift not only presents an opportunity to unveil contemporary trends but also offers a platform to refine existing theories. Instagram, as a platform, facilitates diverse forms of self-expression, enabling a unique mode of self-presentation that fosters connective action. The ramifications of this connective action are manifold, extending from routine social networking to daily activism, and even to participation in expansive social movements [2–4].

Previous research has explored the relationship between social media and collective action, with a concentration on only images of Instagram. In this study, we characterize the protests according to the use of multimedia and scrutinize the extent and engagement of multimedia from the perspective of cognitive mobilization across various stages of the DOI. In the following section, we propose a theoretical framework, drawing on previous research in multimedia, the diffusion of innovation theory, and cognitive psychology. This aids in clarifying the theoretical foundation for the anticipated impact of multimedia content within the context of online multimedia mobilization.

2 Proposed Theoretical Framework

This section lays out the literature, theoretical framework, and research questions.

2.1 Diffusion of innovation theory and multimedia

During social movements, people have made use of various social platforms for different objectives. These platforms function as tools for rallying users around a multitude of campaigns. Efforts to mobilize encourage users to take on information campaigns similarly to how they would adopt new technologies [5]. An examination of Twitter data linked to six COVID-19 hashtags reveals curves shaped like the letter ‘S’. These curves demonstrate how information spreads over the lifespan of the six related misinformation campaigns. Their ‘S’ pattern

matches with ideas from the diffusion of innovations (DOI) theory [6]. This theory talks about how new ideas and technologies spread over time by looking at how quickly users take them up [7]. We also think of this ‘S’ shape as a production function, as explained in the critical mass theory [8]. Diffusion is important for social movements to get significant support and to shape media and political agendas. Diffusion is like online recruitment into action. To get quick adoption, connective action campaigns use benefits from online social networks, reduce costs of joining, and provide anonymity. Since the costs to join a campaign are low, taking up the idea or joining the movement doesn’t expose the user to much risk [9]. Building on this research, our current study looks into the adoption of multimedia in the diffusion process. Using the ‘S’ curves obtained from social movements and looking at multimedia usage, we apply a diffusion of innovations perspective to our analysis. We put multimedia into different adoption stages for each social movement campaign based on where an innovation is in its lifecycle. To study successful social movements characterized by a high rate of multimedia adoption, we analyzed the cumulative frequency of messaging, which typically follows an s-shaped production function. Viewing a mobilization from this angle helps determine if multimedia adoption is in the initiator stage (where pioneers are the first to experiment with new ideas and technologies), the accelerating stage (comprising of early adopters who provide influential leadership, the early majority who are highly social, and the late majority who typically adopt ideas later than the average person within a given social system), or if it has reached a critical mass where it is sustained and the number of new adopters starts to decline [7]. Then, we look into their benefits and relationships of dependence by assigning likes and comments metrics to see what these relationships are like in terms of cognitive mobilization.

2.2 Social movements with multimedia and cognitive mobilization

Extensive research in social science has been conducted to understand the factors motivating individuals to participate in social movements. These studies commonly focus on political elements and public sentiment [10, 11]. Today’s social movements frequently harness internet technologies to create content and stir public engagement at low cost, with visually impactful imagery playing a crucial role [12]. However, it remains unclear how specific types of multimedia content, particularly images and videos, might encourage online protest participation [13]. This study aims to explore this topic, evaluating the importance of multimedia in social movements and focusing on how it influences public perceptions and action. The enormous volume of stimuli in modern multimedia can overwhelm viewers. To process information effectively, individuals must efficiently distribute their attention [14]. Studies suggest visual stimuli command a significant share of this attention, a phenomenon termed visual primacy or dominance [15, 16]. To understand this better, some researchers examine patterns of visual attention to various visual and textual elements [17]. A key concept here is selective visual attention, where individuals focus on specific elements based on their unique

attributes [18]. This leads to cognitive engagement, often described as a psychological investment demonstrated by activities like seeking deep understanding, embracing challenges, and employing self-regulation strategies [19]. This engagement can manifest on Instagram and Twitter through likes, comments, retweets, and replies, which all suggest more than mere viewing or posting [20, 21]. Another form of cognitive engagement is argumentation, where users engage in conversation by adding information, challenging assertions, or presenting supporting or opposing evidence. Such engagement can motivate behavior both individually and collectively, and it’s frequently demonstrated through liking, commenting, and sharing content on social media platforms [22]. Despite its importance, little is known about how people interact with multimedia content on platforms like Instagram [23]. Instagram users can passively consume content or actively participate, revealing personal meanings and resources, and turning user–user interactions into dialogues with comments indicating a high level of engagement [24, 25]. This can lead to cognitive mobilization, a concept in political science referring to how individuals become informed, politically aware, and form opinions [26]. This process is crucial in democratic societies to ensure citizens are well-informed and able to make educated decisions [27].

Leveraging above mentioned socio-psychological theories and the theory of connective action, we aim to dissect the role of multimedia mobilization in connective action. Thereby our research tries to answer the following research questions:

Research question 1: What types of multimedia are collectively disseminated during a social unrest, specifically on image-based platforms like Instagram, and why? Can we segment the representative nature of Instagram’s multimedia thematically, and identify any overlaps in multimedia across various case studies?

Research question 2: How does the affordance of specific media types, such as images, videos, and sidecars, aid in the dissemination of information and cognitive mobilization?

3 Methodology

This section presents our research design such as data collection and approaches.

3.1 Data

To empirically test the research questions, we gathered Instagram data from three distinct social movements that took place from November 1, 2022, to February 25, 2023, in South America. These movements emerged during times of social unrest in Brazil and Peru, and are titled ‘Brazil anti-government protests’, ‘Brazil pro-government protests’, and ‘Peru anti-government protests’.

The ‘Brazil anti-government protests’ were triggered by allegations of electoral fraud after the Brazilian presidential elections on October 30, 2022. Supporters of Jair Messias Bolsonaro, the 38th president of Brazil, demanded the nullification of the election results, which sparked polarizing content on social media and eventually led to riots on January 8, 2023. Pro-Bolsonaro protestors

demanded military intervention, using the hashtag #Brazilwasstolen, among others, #brazilelectionfraud, #brazilianspring(s), #sosffaa, #SOSbrasil, #resistenciacivil, #intervençãofederal, #BrazilCoup, #brazilsupremecourt, #brazilcrisis, #brazildemocracy, #sosbraziliandemocracy, #crimeeleitoral, #festadaselma, #brazilprotest [28].

In response, ‘Brazil pro-government protests’ emerged, with citizens demanding retribution against those who had participated in the riots. Instagram accounts, such as "Contragolpe Brasil", used this moment to share images of alleged rioters to aid in their identification, reaching more than 1 million followers in just 24 hours with hashtags #semanistia, #infromacia, #brazilcapitolriots, and #brazilriots [29].

The ‘Peru anti-government protests’ began following the removal of President Pedro Castillo from power on December 7, 2022. Castillo had proposed a new constitution, which led to his removal by the Congress. His primarily indigenous supporters took to the streets, causing violent clashes with police. Following are the popular hashtags used in this social movement #peruprotest(s), #protesta(s)peru, #protesta(s)perú, #protestasenperu, #peruprotesta, #peruprotests2023, #asambleaconstituyente, #nomasmuertes, #asambleaconstituyenteahora, #dinaboluarteasesina, #peruendictadura, #manifestacionesperu, #SolidaritywithPeru, #dinarenunciaya, and #PedroCastillo [30]. We utilized an Apify scraper (<https://apify.com/>) to collect Instagram data. The data we used in this study is shown in Table 1.

Social movements	Nature of the social movement	Time frame of the collected tweets	Number of Instagram posts collected
Brazil anti-gov	Riot	Nov 1, 2022 – Jan 31, 2023	64,280
Brazil prov-gov	Confrontation	Nov 1, 2022 – Feb 25, 2023	21,517
Peru anti-gov	Grievance	Dec 7, 2022 – Jan 31, 2023	64,280

Table 1: Collected data details

The definition of the collected multimedia objects in our data sets is as follows: 1) **Sidecars** – A collection of multiple permanent photos/videos stitched together. 2) **Videos** – A post with any type of video that Instagram supports. 3) **Images** – A post with any type of images that Instagram supports. To examine the role of multimedia in the above social movements, we use two steps of content analysis for online mobilization: presence (significance of multimedia objects in three different stages of diffusion) and interaction (engagement on multimedia posts from cognitive engagement and mobilization aspects).

3.2 Empirical Analysis and Results

In this section, we focus on answering the research questions.

Collective multimedia diffusion in accordance with mobilization

In this analysis, we discuss the results for **Research question 1**. Figure 1 offers insightful illustrations. The charts plot elucidate the temporal frequency of multimedia posts, using an s-curve function. This approach enables us to track the cumulative count of Instagram posts, identifying the adoption rate of new multimedia-infused posts until the growth curve begins to plateau. In this function, we incorporated the concept of Diffusion of Innovations (DOI), as demonstrated in our previous study [7], to discern whether a social movement is at the initialization, amplification, or sustainment stage of multimedia adoption. The function represents the cumulative sum of multimedia posts, with the slope indicating the adoption rate for new multimedia-containing posts until it reaches an inflection point in the growth trajectory where new posts continue to decline.

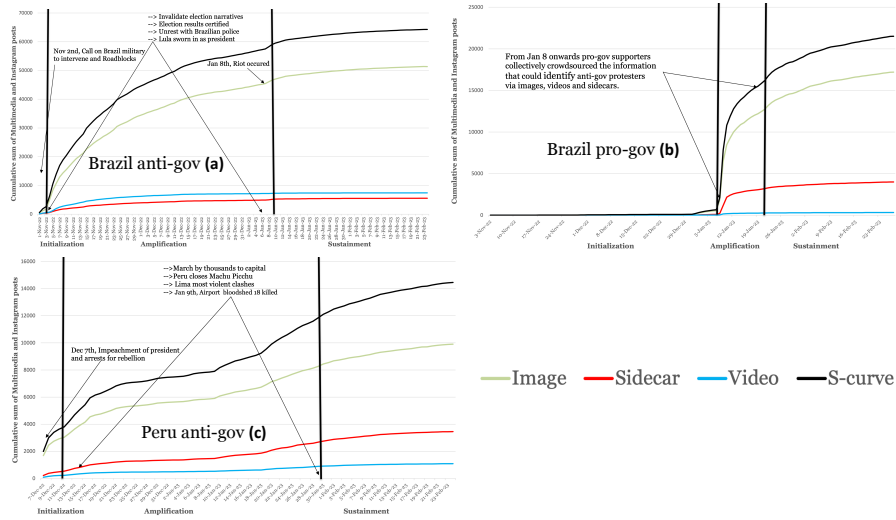


Fig. 1: Multimedia usage in pie-chart and collective multimedia diffusion on bottom

The boundaries for the three stages were determined by the slope’s acceleration and decelerating rates which consist of inflection points over the trajectory. Also noteworthy is that an uptick in multimedia use aligns with an increase in new multimedia-integrated posts, as demonstrated in the trends of all bottom charts from Figures 1(a) to (c). Figures 1(a) & (c) provide a typical representation of a social movement’s lifecycle via the s-curve function, which gradually initiates (initialization), rapidly grows (amplification), and eventually stabilizes (sustainment). Conversely, Figure 1(b) depicts a unique diffusion pattern where all three stages happen quickly, offering a different perspective on mobilization characteristics and multimedia adoption. Which leads to our first research question on, what types of multimedia, are collectively adopted during a social unrest and can we categorize the representative nature of Instagram’s multimedia content thematically based on the nature, goal, objective, or signif-

icance of the social movement? Specific to Brazil’s anti-government movement, we found a near-uniform use of videos and sidecars throughout the diffusion process, supplemented by an extensive use of images. Videos, following images, emerged as the go-to multimedia type for mobilizing the movement during key events, specifically the initialization stage (2nd November 2022) and the amplification stage (8th January 2023). The preponderance of live-streamed and shared videos indicates an intent to provide immediate data to their audience. Posts with video content predominantly featured hashtags like #Brazilwasstolen, #intervençãofederal, #crimeeleitoral, and #festadaselma, highlighting the public discontent posts of the alleged fraudulent election. For the pro-government movement in Brazil, the preference leaned towards sidecars after images, with videos seeing minimal use. The adoption rate of images and sidecars was swift throughout the campaign. Particularly during the amplification stage from January 8th to 30th, sidecars were instrumental in relaying information about anti-government protesters, arguably more effectively than videos. The key goal was to crowdsource data to identify these protesters.

Like Brazil’s pro-government movement, Peru’s anti-government campaign mostly used images, then sidecars and videos. Sidecar use remained steady, similar to Brazil’s anti-government video use, but sidecars were favored during crucial events (7th December 2022, 9th & 19th January 2023), often depicting police violence and protest deaths.

Interaction percentages in accordance with cognitive mobilization

In this analysis we discuss the results for **Research question 2**. Instagram offers a spectrum of engagement opportunities with posts that go beyond just viewing the content, including likes and comments. We used the Interaction Percentage (IP) formula to gauge user cognitive engagement with multimedia posts during social movements, assessing the influence of these elements on cognitive mobilization.

$$IP = \left(\frac{\text{Number of [Comments or Likes] of Image or Video or Sidecar}}{\text{(Number of Comments + Number of Likes) of all media objects}} \right) \times 100 \quad (1)$$

Media Object	Comments	Likes
Video	0.273819	4.619573
Image	8.58916	75.239984
Sidecar	1.132455	10.1450055
Brazil anti-gov		
Video	0.227246	3.11104
Image	3.44386	65.072422
Sidecar	1.626673	26.51875
Brazil pro-gov		
Video	0.210905	2.583055
Image	4.29889	70.40569
Sidecar	0.839473	21.661976
Peru anti-gov		

Table 2: Overall interaction percentages according to social movements

We observed substantial similarities in the interaction percentages for each multimedia type across different mobilization campaigns, as outlined in Table

2. Despite the variation in multimedia adoption rates for all three mobilizations, as seen in Figure 1, interaction percentages consistently favored sidecars after images. This suggests that online users’ cognitive engagement during these protests was primarily focused on sidecars following images, underscoring their crucial role in mobilization. These elements served as the main channels for information dissemination and mobilization. This underscores the significance of sidecars after images in eliciting cognitive engagement and thereby facilitating cognitive mobilization on Instagram. The propensity for a swift cognitive response to information presented in these mixed media sidecars could account for this, compared to other forms of information. Nonetheless, images on Instagram hold a unique appeal despite a variety of multimedia types. Furthermore, weekly interaction percentages, mapped on DOI stages in Figure 2, show images and sidecars as key to cognitive mobilization in the initial and amplification stages. Videos also contribute in these stages with a minimal role, but images and sidecars potentially stay crucial even in the saturation stage.

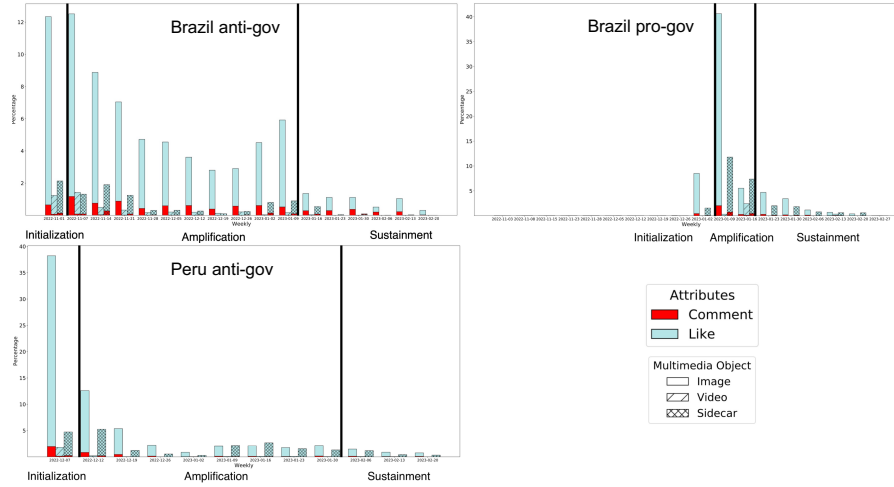


Fig. 2: Weekly engagement trends according to multimedia

4 Conclusion and Future Directions

Instagram’s image-centric nature undeniably gives images a vital role. However, during periods of social mobilization, multimedia usage extends beyond images, adopting the most suitable format that aligns with the severity of the ongoing mobilization. Despite varying media preferences for different mobilizations, sidecars consistently attracted higher engagement after images, likely due to their ability to provoke a swift cognitive response. Our in-depth study of multimedia usage on Instagram during social movements highlights the significant roles of different multimedia types at various stages of mobilization. Our results suggest

that sidecars and videos, after images, are pivotal in promoting cognitive engagement and, subsequently, cognitive mobilization. The distinct diffusion patterns witnessed in the social movements studied emphasize the importance of understanding each multimedia's unique characteristics and their contribution to driving connective action. In future research, we plan to perform content analyses of both text, multimedia, and network analyses of involved actors. This will provide us with a deeper understanding of the dynamics underlying the connective action process, in line with social science theory, cognitive mobilization theory, collective identity formation, and network organization within the social process. Overall, multimedia's influence on protests and riots is substantial and will continue to shape public opinion and drive social change for years to come.

Finally, to the best of our knowledge this is the first work contributes to the field of collective and connective action by incorporating (1) a life-cycle of multimedia(images, videos & sidecars) using DOI theory to spot 'S'-curve features and understand the role of multimedia in new social movement mobilizations. (2) Looking at the affordance linked with multimedia to tell campaign types apart from cognitive mobilization aspects. This innovative approach not only underlines the significant role of multimedia in stimulating engagement and broadening a movement's impact but also expands the traditional theoretical framework. It emphasizes the importance of technology and multimedia adoption, providing a more in-depth and nuanced perspective of contemporary social movements. As a result, our work creates new pathways for detailed exploration and understanding of today's social mobilizations.

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