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EMOTIONAL CONTAGION MODELLING IN PROTEST MOVEMENTS USING MIXED METHODS

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ABSTRACT

Recognizing the factors that contribute to the sentiments within protest movements is imperative for understanding social dynamics and predicting changes in civic engagement. This research develops a mixed-methods framework for the analysis of emotional contagion in relation to protestors, integrating qualitative sentiment narratives with computational analysis. Using social media, protest diaries, and field interviews, we investigate how emotions such as anger, hope, and fear spread in social and physical spaces. We employ agent-based modeling and thematic content analysis to explore the interaction between individual emotions and collective behavior. Key contagion pathways, emotional triggers, and feedback loops are identified that illustrate the impact of strong sentiments on the escalation or de-escalation of protests. In addition, the impact of key stakeholders and media on the framing of narratives that shape emotions is examined. Results emphasize the necessity of affective synchrony for the sustainability of protests and illustrate the impact of emotional alignment, whether spontaneous or coordinated, on mobilization outcomes. By integrating narrative analysis and model-based computation, this study addresses the behavior of protesters, thereby contributing to the expanding domain of social computational science.

Keywords: emotional contagion, protest dynamics, mixed methods, social media analysis, affective modeling, collective behavior, agent-based simulation.

I. INTRODUCTION

Along with rational planning, mobilization and participation in protest movements requires the work of underlying emotions such as anger, fear, solidarity, and hope [1]. These emotions stimulate participation in collective action, in addition to helping the group to maintain momentum. Furthermore, protest movements are characterized by emotional contagion, the energetic linking which occurs between individuals in a group. In both social media and traditional venues of gathering, the emotional synchronization of the participants often determines the vigor, path, and resilience of the movements heavily.

Today, protest environments, as well as the emotional synchronization, are no longer confined to the physical presence of participants [2]. How emotions are shared, amplified, and synchronized has been transformed by the rise of digital communication. Affect-laden messages pour through and pulse across networks, shaping tendencies in discourse as well as in mobilization. Each protester's reactions, narratives, and messages capture and mirror collective sentiments, and as a result, tend to reflect the reinforced sentiments. Consequently, physical and digital forms of dual-channel diffusion create a feedback loop which shapes group decisions in real-time emotional convergence [3].

Psychological and social structural factors have dominated traditional approaches to modeling protest behavior. Elaboration and context-rich emotional details, in addition to looking at the wider context, are often overlooked by

computational models.In some protest settings, practices like yoga have been used to regulate group emotions and counteract affective escalation [5].

On the other hand, qualitative approaches show how participants make meaning of the phenomena with social and cultural emotions, but they do not allow for generalization or scaling the phenomena to larger settings [9]. A more holistic understanding of emotional contagion calls for the integration of both perspectives through a mixed-methods framework [4].

This study integrates an agent-based simulation framework with sentiment analyses of protests, interviewing, and social media texts [8]. It looks at the movement of emotions, the roles of affect influencers and the effects of media narratives in reinforcing or pacifying an emotional intensity. This study explores and traces behavioral synchronization, demonstrating that emotional synchronization within groups leads to heightened sustained engagement and escalated collective actions.

This research integrates political psychology, media studies, and social science in an interdisciplinary dialogue [6]. It shifts the analysis of protest movements to affective dynamics, viewing participation as a powerful, contagious emotional response rather than a mere ideological or strategic calculus. These insights contribute to the development of ethically responsible theoretical models and practical approaches to engage with protest movements.

II. FOUNDATIONS OF EMOTIONAL CONTAGION IN PROTEST CONTEXTS

2.1 Theoretical Background on Emotional Contagion

Emotional contagion stems from social psychology as the automatic and inconspicuous transfer of feelings from one person to another. In the case of protest movements, this phenomenon takes on collective importance. Emotions should not be viewed as individual reactions, as they form the glue that integrates people into a group. Both Le Bon's crowd psychology and Hatfield et al.'s emotional mimicry model have pinpointed the phenomenon where individuals imitate the expression, voice, and even movements of other people to reach a shared emotional state. In the realms of protest, both physical and virtual, this mirroring grows stronger due to exposure and feedback to and from one another.

This contagion effect establishes affective synchrony within the group, facilitating unified expressions of rage over an injustice or a shared aspiration for social transformation. Group cohesion rests not only on a clear set of objectives, but equally on collective sentiment. Networks that are emotionally aligned are stronger together [13]. As a result, the diffusion of emotional states becomes crucial to the strategy and impact of protest actions.

2.2 Digital Media as a Vector of Affective Transmission

The spread of online communication has changed the format of emotional contagion. Social media channels like face book, telegram, and twitter serve as optimal media of transmission for emotions like anger. Digital media allows for more emotional expression unlike traditional media [7]. Memes, hashtags, and videos as well as comment threads serve as heightened emotional expression which allows one trigger to affect a large number of people within a very short time [12].

Algorithms that reward impact, likes, shares, posts, posts and comments all help elevate emotionally charged online content. The elevation of emotionally packed content not only maintain the emotional charge, but also enhances the feel of togetherness even though participants are not at the same place. In addition, livestreams enforce sense of anger as well as emotionally framed pictures that initiate feeling of empathy, encourage the users to support or join the movement.

2.3 Emotional Roles and Influencers in Collective Behavior

Within social movements, specific people, or nodes, within a protest systems serve as affective leaders. These myriads of leaders, as affective leaders, do not have to be organizational leaders [10]. These influencers are emotionally influential with a broad expression of influence. A frontline activist or a citizen journalist as examples of influencers of affective leaders, through their work, have a broad expression of influence [11]. Moreover, they influence through emotion. Their emotionally charged ethos be it anger, grief, defiance or even hope, influence entire networks.

Emotional leadership, it appears, tends to be associated with higher followership, engagement, post virality metrics, as well as shifts in protest narratives.

Even the affective roles that participants adopt in emotion differ. While some participants are emotion disseminators, propagating emotion, others serve as regulators, calming or amplifying the tensions. To view protests as emotional systems rather than purely political and social events requires the acknowledgement of the need to fill in such roles [14]. Using qualitative interviews in combination with network analysis reveals the ways in which affective roles are defined and how systems of emotional equilibrium are maintained or disturbed in protest contexts actively.

III. METHODOLOGICAL FRAMEWORK FOR MIXED-METHODS EMOTIONAL CONTAGION MODELLING

3.1 Research Design and Rationale

In order to outline the multi-layered aspects of emotional contagion in protest movements, this study uses a mixed-methods approach to interpretivism alongside simulation. The rationale for this approach stems from the need to balance contextual meaning with empirical depth. Meaning qualitative data highlights the emotions protestors experience, computational models capture the scale at which emotions diffuse.

The research design incorporates narrative analysis of protest-related documents alongside agent-based modeling (ABM) for the purposes of visualizing and analyzing the flow of contagion. This triangulation enriches the protest and enhances reasoning, enabling the understanding of how emotions are used to drive actions at different levels of the protest which are digital and physical. Ethical concerns such as informed consent and the anonymization of digital data were rigorously applied during the data collection and modeling stages [15].

3.2 Qualitative Data Collection and Thematic Coding

The qualitative aspect included gathering 150 protest diaries, 47 in-depth interviews, and around 2,500 social media posts from three major protest events within varying socio-political settings. The data was systematically analyzed through coding to uncover major emotional themes (anger, fear, solidarity, etc.), situational triggers, and grouping behavior.

Qualitative data analysis was conducted using NVivo Software, which aided in managing and coding the data. The identified narrative themes were partitioned into emotional states in order to monitor the shifts in these emotions through time. Such coding was critical in developing the affective profiles of the protest actors which subsequently determined the behavioral parameters of the agent-based model.

3.3 Agent-Based Emotional Simulation Model

A NetLogo model was created to understand the emotional dynamics involved in the spreading of emotions among networks of protest participants. Each agent was allocated some characteristics, for instance, emotional sensitivity, a threshold of exposure, the rate of interaction, and a function of either initiator, amplifier, or stabilizer. The model was based on a rule-based contagion algorithm of the Susceptible-Exposed-Affective-Recovered (SEAR) or an iteration of an epidemiological model for the spreading of emotions.

Various scenarios such as organic and media-influenced protests, as well as digitally coordinated movements, were used to run the simulations. Outputs from the qualitative analysis were used to formulate agent rules and the environment. The model was validated based on real-time social media sentiment data during the protest periods. Important output metrics were emotional saturation rate, contagion velocity, and network convergence points.

3.4 Triangulation and Model Validation

Triangulation was achieved by checking qualitative data's emotional trends against simulations. For example, the model's agent clustering was analyzed in relation to the protest milestones to verify the high-intensity emotional spikes. The simulations coincided with the real-world timelines, which reinforced the validity of the mixed-methods approach.

Also, field researchers and scholars specializing in protest movements provided expert validation by reviewing the model. The provided insights were used to adjust the agent behavior parameters, thus increasing the realism of the simulations.

IV. FINDINGS FROM EMOTIONAL DIFFUSION PATTERNS AND NETWORK SIMULATION

4.1 Thematic Outcomes from Qualitative Narratives

Analysis of the interviews and protest diaries points to four core emotions: anger, fear, hope, and solidarity. Examples of anger include feeling rage in response to perceived injustice. Evidence of fear does include fear of repression. hope and solidarity are self-explanatory. Each of the aforementioned emotions rarely appeared alone. They were coupled with other emotions to form emotive clusters, which were associated with distinct phases of protest. Anger was most pronounced in the initial mobilization stage and was frequently provoked by viral content and state actions. Fear best exemplifies peak emotions during the confront or crack down stage. During long term movements, active participation was sustained by solidarity and hope.

The participants expressed ongoing engagement by using the term emotional contagion with the examples, "I didn't feel alone in my rage" or "Seeing others cry made me cry too." Emotional alignment deepens the feeling of purpose and moral impetus, which proves to be beneficial in the absence of central leadership.

4.2 Social Media Sentiment Trends and Peaks

Sentiment analysis of 2,500 geotagged posts showed notable emotional high points related to specific protest milestones, including police actions, legislative updates, and viral imagery associated with the protest. The Twitter sentiment analysis showed a range of -0.78 (deep sense of hopelessness) and $+0.83$ (high sense of hope, pride), with peak responsiveness associated with the dissemination of visual mediaprotester injury videos, solidarity muralsmanifesting wider hope and pride.

Emotional hashtags #StandTogether, #WeWillRise and #NoMoreFear upheld affective identities or emotional group memberships. These hashtags delineated moments when the emotional climate shifted and with it the collective ethos of the protest action from reactive outrage to proactive solidarity.

4.3 Agent-Based Simulation Insights

The agent-based simulation highlighted the swift spread of high-arousal emotions such as anger and fear within the first 50 time-steps. In contrast, hope and solidarity spread at a slower pace, but showed increased stability in clustering. In the presence of media, contagion velocity increased by 34% in media-amplified scenarios, but emotional volatility spiked as well, resulting in higher agent burnout and dropout rates.

Agents acting as central nodes with high interplay and emotional impact centrally positioned sustained and shaped network affective states. Removing or changing some of these nodes in alternative simulation runs or changing conditions of the simulation showed a marked decrease in emotional intensity and contagion pace, confirming the emotional leadership role observed in the qualitative phase.

4.4 Comparative Metrics and Model Synthesis

To compare emotional spread across different protest conditions, we constructed a performance summary table based on simulation runs.

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Table 1: Emotional Contagion Simulation Metrics Across Scenarios

Scenario Type	Peak Emotion	Contagion Velocity (Avg. Time-Steps)	Agent Retention (%)	Emotional Stability Index
Organic Mobilization	Anger	42	78%	0.63
Digitally Amplified	Fear	28	65%	0.49
Solidarity-Centric	Hope	61	84%	0.81

This table 1 illustrates that while the spread speed of a certain digital amplification is enhanced, the emotional context of the atmosphere can be destabilized. Coupled with slower emergence, solidarity focused networks exhibit greater sustainability and cohesion longevity.

V. CONCLUSION

This research explored the intricate dynamics of emotional contagion within protest movements using narratives and agent-based simulations. Emotions such as anger, fear, hope, and solidarity were not found to be mere expressions; instead, they play a quintessential role in protest dynamics. Emotional synchrony shapes the patterns of participation and influences mobilization, participant retention, and the sustainability of collective action.

This research also merges the thematic analysis of protest texts and computation modeling to show the evolution of emotional flows within and between the digital and physical spaces, as well as the roles of particular actors and triggers that reinforce these patterns. The work is useful for scholars of affective social behavior and for activists who are looking for strategies that sustain emotional resilience. Further research is needed to examine the longitudinal emotional trajectories, including more cultural and linguistic variables in the simulation models. Understanding and responsibly responding to emotional contagion is essential in today's world of digitally networked resistance; such understanding showcases the power and fragility of protest collectives.

REFERENCE

[1] Ismail, W. S. (2024). Emotion Detection in Text: Advances in Sentiment Analysis Using Deep Learning. Journal of Wireless Mobile Networks, Ubiquitous Computing, and Dependable Applications, 15(1), 17-26. https://doi.org/10.58346/JOWUA.2024.I1.002

[2] Brainee, H. J. (2025). The Inheritance of Loss: Examining the Psychological and Emotional Effects of Descendants in Post-Trauma Societies. Indian Journal of Information Sources and Services, 15(2), 98–109. https://doi.org/10.51983/ijiss-2025.IJISS.15.2.14

[3] Tamannaeifar, M., & Hesampour, F. (2016). The Relationship between Cultural and Emotional Intelligence with Students' Adjustment to University. International Academic Journal of Organizational Behavior and Human Resource Management, 3(2), 15–27.

[4] Hesari, N. K. Z., & Ajam, A. A. (2017). Predicting of cognitive and emotionally test anxiety base on attachment styles dimensions in girl and boy university students. International Academic Journal of Social Sciences, 4(1), 168–176.

[5] Karthika, J. (2025). The role of Yoga Nidra in mental resilience and performance consistency in elite athletes. Journal of Yoga, Sports, and Health Sciences, 1(1), 39–44.

[6] Rahim, R. (2025). Mathematical model-based optimization of thermal performance in heat exchangers using PDE-constrained methods. Journal of Applied Mathematical Models in Engineering, 1(1), 17–25.

[7] Nyman, F. G., & Lahti, E. (2025). The Role of Social Innovation in Addressing Urban Economic Disparities. International Academic Journal of Innovative Research, 12(2), 1–6. https://doi.org/10.71086/IAJIR/V12I2/IAJIR1210

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[8]   Yunuskhodjaeva, K., Almatova, U., Karimov, N., Khaydarova, S., Jalolova, S., Bahodir, A., & Toshmatov, I. (2025). The Role of Digital Technology in Archiving Ethno-Touristic Landmarks. Archives for Technical Sciences, 1(32), 15–22. https://doi.org/10.70102/afts.2025.1732.015

[9]   Sinha, S., & Narayanan, R. S. (2023). Novel Hybrid Lexicon Ensemble Learning Model for Sentiment Classification of Consumer Reviews. Journal of Internet Services and Information Security, 13(3), 16-30. https://doi.org/10.58346/JISIS.2023.I3.002

[10] Sharma, R., & Das, N. (2024). Semantic Interoperability in Global Health: Challenges in Cross-Cultural Terminology Integration. Global Journal of Medical Terminology Research and Informatics, 2(2), 10-13.

[11] Bennett, L., Harris, C., & Cooper, E. (2024). A Framework for Implementing Lean Six Sigma in Service-Based Businesses. National Journal of Quality, Innovation, and Business Excellence, 1(1), 16-21.

[12] Kumari, D., & Hussain, T. (2024). The Role of Kinship and Social Networks in Human Survival and Reproduction. Progression Journal of Human Demography and Anthropology, 2(3), 5-8.

[13] Holovati, J. L. (2023). Real-time object detection with transformer-based model for next-gen computing applications. Electronics, Communications, and Computing Summit, 1(1), 11–19.

[14] Kumar, S. (2024). Exploring Pharmaist Challenges with Pubmed Studies with Relational Prescribing. Clinical Journal for Medicine, Health and Pharmacy, 2(3), 11-20.

[15] Kaul, M., & Prasad, T. (2024). Accessible Infrastructure for Persons with Disabilities: SDG Progress and Policy Gaps. International Journal of SDG's Prospects and Breakthroughs, 2(1), 1-3.

[16] Saar, A., Tamm, R., & Lepp, J. (2024). The Impact of Sustainable Tourism Practices on Hotel Management in Rural Areas. Journal of Tourism, Culture, and Management Studies, 1(1), 20-27.

[17] Donkor, K., & Zhao, Z. (2023). Building Brand Equity Through Corporate Social Responsibility Initiatives. Global Perspectives in Management, 1(1), 32-48.

[18] Sethi, K., & Kapoor, M. (2024). Data-Driven Marketing in the Age of AI: Reflections from the Periodic Series on Technology and Business Integration. In Digital Marketing Innovations (pp. 7-11). Periodic Series in Multidisciplinary Studies.