The Primary Predictors Behind the Formation of Social Bubbles on Online Social Media Platforms: Focusing on Young Individuals in Ukraine

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Abstract

This research focuses on examining why young social media users might become trapped in a "social bubble" defined as seeking information that supports only one's existing beliefs. We use a method called Qualitative Comparative Analysis to identify various combinations of factors that either contribute to or prevent the formation of these bubbles. Our findings reveal three combinations that tend to create social bubbles. All three involve young people's tendency to conform to dominant opinions and how often they expose themselves to diverse viewpoints. We have also identified one combination that leads to the opposite outcome, where young individuals reject the idea of being in a social bubble. Specifically, such persons are characterized by rarely conforming to dominant opinions, engaging in frequent debates, and regularly exposing themselves to diverse perspectives, even if they use only a few social media platforms. These results suggest that universities can play an important role in shaping social media behavior by teaching students to seek out diverse viewpoints and critically evaluate them to form their own independent opinions.

Keywords: Social media, Social bubbles, QCQ, Young users, Ukraine

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Platforms: Focusing on Young Individuals in Ukraine

Introduction

Social media plays an important role in shaping how the public perceives events and policies, with a particularly strong impact in the case of online media where individuals run the risk of becoming trapped in what is known as a social bubble (Ausat, 2023). This bubble, also referred to as an echo chamber or filter bubble, describes a scenario where people primarily encounter information, ideas, and perspectives that resonate with their preexisting beliefs and preferences (Kitchens, Johnson and Gray, 2020). Online media often employs algorithms tailoring users' content feeds based on their past interactions (Dorcas, 2023). This creates a cycle where individuals are continually exposed to content that reaffirms their existing viewpoints, confining them within a social bubble.

The current study examines how young people's choice of information on social media can influence their opinion formation in Ukraine. The country is in a crucial stage of the war, and hence, comprehending the formation of social bubbles under the impact of online social media can help to avoid the undesirable effects of manipulations of public opinion. The focus on young people is necessary since they are usually regarded as the most vulnerable group in society, prone to external influence, and relatively unstable in maintaining their opinions.

According to the theory, social media shapes the formation of opinions through various channels. One of the most prevalent issues is how individuals seek information on media platforms. It is believed that individuals typically choose the information that aligns with prevailing or widely accepted beliefs while avoiding content that challenges those beliefs (Modgil,

Singh, Gupta and Dennehy, 2021). This inclination is especially pronounced among young people, as the desire to conform is particularly strong during early adulthood years (Bautista and Mabulay, 2023).

The personal characteristics of young individuals are expected to influence this tendency to conform. Those who are more resilient to social pressure are less likely to conform to dominant opinions within their social networks and more willing to express less popular viewpoints (Riva, Wiederhold and Cipresso, 2016). This is because resilience fosters a practice of critical evaluation of information, leading to opinion formation based on reasoned analysis rather than social conformity (Luthar, Cicchetti and Becker, 2000). In addition to resilience, actively seeking out diverse information and engaging in dialogue with others can further reduce the likelihood of trapping oneself in a social bubble.

Furthermore, the properties of social media, such as the size of networks, can also impact the formation of opinions. As the size of a network grows, individuals are more likely to encounter a wider range of perspectives, beliefs, and opinions because, with more connections and interactions, people have increased opportunities to engage with individuals from diverse backgrounds, ideologies, and experiences (Burbach, Halbach, Ziefle and Calero Valdez, 2020). In turn, a greater diversity of opinions within the network can prompt individuals to incorporate new information and perspectives into their own belief systems, increasing the probability of breaking out of a social bubble (Bozdag, 2020).

Additionally, in larger networks, minority viewpoints or opinions that initially exist on the periphery of the network have a greater chance of gaining visibility through the process called information cascades (Easley and Kleinberg, 2010). As more individuals adopt and share minority

perspectives, they can challenge dominant beliefs and contribute to the diversification of opinions within the network, encouraging users to reevaluate their current stance regarding certain events.

The above overview of theories allows us to identify the following determinants of social bubble formation when using social media platforms: perceived pressure to conform to dominant opinions, frequency of exposure to diverse viewpoints, frequency of debating, and network size. These factors will be the main conditions addressed in our study. Our research question is formulated in the following way: "Which combinations of the aforementioned conditions can explain trapping the online social media users in a social bubble, and which combinations contribute to the opposite situation when the users seek information deviating from their preexisting beliefs, values, and preferences?"

Data and methods description

For the purpose of our analysis, we use data collected by the authors through an online survey in February 2024. The sampling strategy relied on voluntary participation, affording interested individuals the opportunity to contribute. In total, 257 persons provided responses in this survey. Their age ranged from 16 to 31, with a mean age of 19.9 years. The gender distribution indicated that 65.8 percent of respondents were female, while 34.2 percent were male. Additionally, half of the respondents (55.3%) were employed at the moment the survey was conducted.

We use qualitative comparative analysis (QCA) (Rihoux and Lobe, 2009), which is based on set theory and investigates combinations of conditions associated with a given outcome. More specifically, this method abandons the idea that each predictor has an autonomous influence on the dependent variable. Instead, it assumes that several causes have to be combined for a certain

outcome to occur, entraining two important properties (Oana, Schneider and Thomann, 2021). First, the combinations for a positive outcome can be different from combinations of conditions that matter for a negative outcome. In terms of social bubbles, this means that the combinations explaining being in a social bubble on social media platforms are different from those for the opposite situation – when the individuals admit avoiding social bubbles. Second, there is more than one combination of conditions explaining the same outcome. In other words, there can be several combinations leading to the creation of social bubbles and several combinations that prevent this situation.

The analysis begins with calibration, involving the transformation of the raw data into membership scores. The outcome variable is "being in a social bubble on online media platforms" (SOCBUB) assessed by asking respondents whether they feel to be in a social bubble due to being primarily exposed to information, ideas, and perspectives that match their existing beliefs and preferences. A response of "yes" is coded as "1," while "no" and "I am not sure" are coded as "0." In total, 50.6% of respondents declared to be in a social bubble.

To facilitate the analysis, all predictors are converted into binary crisp sets. The tendency to conform to the dominant opinion (CONFORM) is operationalized through the question, "Do you feel the pressure to align your opinion with dominant or popular ones even if you disagree with them?". Responses are measured on a Likert scale from 1 ("Not at all") to 5 ("Very often"). Following Emmenegger et al. (2014), responses of 1, 2, and 3 are calibrated as "0" (more out of the set), while responses of 4 and 5 are calibrated as "1" (more in the set), thus converting them into a binary crisp set. The frequency of debating (DEBAT) is measured by the question: "How often do you participate in debates on social media?" The responses "Never to avoid confrontations" and "Seldomly" are coded as 0, and "Sometimes or often" are coded as 1. Network

size (NETSIZE) is determined by counting the number of social media platforms respondents reported using most frequently. This number ranges from 1 to 6 in our dataset. We calibrated these values into binary crisp sets using a threshold of 3.1, identified with the *findTh* command. Values below the threshold are coded as "0," while values above the threshold are coded as "1." Exposure to diverse opinions (DIVEROP) is assessed by asking respondents how often they listen to or read opinions on social media that differ from their own. Responses of "Rarely" and "Sometimes" are coded as "0," while "Often" is coded as "1."

Empirical analysis and results

We begin our analysis by assessing necessity. Specifically, we aim to identify which predictors are necessary for individuals to choose the information that aligns with their existing views and opinions. A predictor or condition is considered necessary if it is always present when the individual declares being in a social bubble. The analysis includes the calculation of consistency and coverage to determine the reliability and relevance of the selected predictors. Table 1 presents these statistics, suggesting that none of the selected conditions meet the necessity criteria when using the conventional consistency threshold of 0.90. This means that none of these predictors are required to ensure that individuals are placed in a social bubble. Therefore, young persons can feel trapped in a social bubble even if none of these conditions or their various combinations are present in their environment.

Table 1. Results for the necessity analysis

Conditions	InclN	RoN	CovN
CONFORM	0.585	0.757	0.633

DIVEROP	0.338	0.662	0.379
DEBAT	0.700	0.584	0.569
NETSIZE	0.608	0.551	0.497

Note: InclN stands for "Inclusion," which specifies the proportion of the set Y that is included in the set X. For instance, the value for CONFORM suggests that 58.5% of the instances where individuals are in a social bubble (SOCBUB) also exhibit the pressure to conform to the dominant opinion. RoN indicates the relevance or significance of the necessity relationship between y and X. For the CONFORM variable, a score of 0.757 suggests a moderate level of relevance, meaning that the presence of pressure to conform is somewhat significant to the occurrence of social bubbles but not overwhelmingly. CovN is the coverage score. For CONFORM, this means that in 63.3% of the instances where the pressure to conform to the dominant opinion was present, the individuals declared to be in social bubbles. There are still many cases where X is present, but Y did not happen.

Our next step is to conduct an analysis of sufficiency. Here, the primary goal is to identify the minimal combinations of conditions that are sufficient to produce a given outcome. This process involves creating a truth table and applying a sufficiency inclusion score threshold of 0.80 or higher to choose sufficient conditions. The results from the truth table are summarized in Table 2. Briefly, there are four combinations of conditions surpassing the threshold for significance. Three of them correspond to producing the outcome where individuals admit to being in a social bubble (value of one).

Only one of the four combinations corresponds to the opposite outcome (value of zero), where individuals deny being in a social bubble. Specifically, those who are not in a social bubble

are usually characterized by rarely feeling the pressure to conform to the dominant opinion, frequently debating and listening to diverse opinions on social media, even if attending a low number of media platforms.

In contrast, there are more possible combinations for recognizing being in a social bubble. The first combination (Combination 1) represents the most negative scenario, where individuals are subjected to frequent pressure to conform, rarely expose themselves to diverse information, rarely participate in debates on social media, and use a limited number of social media platforms. This suggests that young users tend to be locked in a social bubble on social media platforms as long as they strive to conform to the popular opinion even if disagree with it, do not seek diverse information, refuse to debate with other users, and have a limited number of media platforms from which they collect opinions or information.

The second combination (Combination 2) includes individuals with high pressure to conform to the dominant opinion and rare exposure to diverse opinions while still actively debating on social media, provided that the number of social media platforms used regularly is fewer than or equal to three. In other words, young people who strive to conform to popular opinions with limited diversity in viewpoints in their network end up in a social bubble as long as their network is still limited in size despite their tendency to actively debate on social media platforms.

The third combination (Combination 3) includes young users often feeling pressure to conform to dominant opinions and rarely seeking diverse opinions even if they frequently participate in debates on social media and regularly use a large number of different online media platforms. This means that young individuals with a pronounced tendency to conform and a limited diversity of viewpoints expressed in their network are still likely to be trapped in a social bubble

even if they use a large number of media platforms to seek information and frequently exchange

opinions with other users through debating.

Table 2. Combinations of conditions for the sufficiency analysis

Conditions	Outcome = 1 (In Social Bubble)			Outcome = 0 (Not in Social Bubble)
	Combination 1	Combination 2	Combination 3	
CONFORM	1	1	1	0
DIVEROP	0	0	0	1
DEBAT	0	1	1	1
NETSIZE	0	0	1	0
Inclusion score	0.800	0.857	0.833	0.836
PRI	0.801	0.856	0.832	0.835

Note: The inclusion score indicates the proportion of the cases where both X and Y happen out of

all cases where X happens. For instance, the inclusion score for Combination 1 suggests that this

combination leads to the outcome in 83.3% of all the cases. PRI stands for Proportional Reduction

in Inconsistency and should approach 1. For instance, the proportional reduction in inconsistency

for Combination 1 is 0.832, indicating a relatively high consistency in the data.

In summary, three of the four combinations of conditions explain why young people remain

in a social bubble. We use the minimization process to identify the main predictors for this

outcome. The process involves comparing all possible pairs of combinations (including observed combinations with a positive outcome and remainders) to identify those that differ by only one predictor. These pairs are then minimized to determine the prime implicants. A prime implicant is defined as the simplest possible, non-redundant, fully consistent superset of any possible combination.

A parsimonious solution is used for the minimization procedure because it produces the simplest yet equivalent expression compared to other Qualitative Comparative Analysis methodologies. This solution is achieved by including remainders (combinations that did not meet the 0.80 threshold in the truth table) in the minimization process. By including remainders, we make the implicit assumption that if these combinations could be empirically observed, they would yield a positive outcome. Table 3 summarizes the parameters of fit, indicating that there are two sufficient conjunctions, each covering a portion of the empirically observed positive combinations.

M1: DEBAT*CONFORM*~DIVEROP + CONFORM*~DIVEROP*~NETSIZE -> SOCBUB[1]

They are displayed with a logical OR relation (+). Either one is sufficient for some of the observations with the positive outcome (being in a social bubble), but both are needed to cover all of them. Table 3 identifies two key combinations of predictors that explain why young people remain in social bubbles. They are subsets of the combinations presented in Table 2. Specifically, the first suggests that young individuals are likely to form social bubbles if they experience high pressure to conform to the dominant opinion and rarely expose themselves to diverse viewpoints, even if they frequently engage in debates on social media platforms. The second conveys a similar

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[1] The tilde means that the variables take the value of zero.

finding. However, instead of frequent debating, it indicates that young people find themselves in social bubbles when they regularly use a limited number of social platforms, provided they continue to conform to the dominant opinion and rarely encounter diverse information or viewpoints in their networks. Overall, the model (M1) accounts for 31.5% of the observed cases.

Table 3. The parsimonious solution for the minimization procedure

	inclS	PRI	covS	covU
DEBAT*CONFORM*~ DIVEROP	0.841	0.840	0.285	0.192
CONFORM*~	0.842	0.840	0.123	0.031
DIVEROP*~NETSIZE				
M1	0.837	0.837	0.315	

Note: As in the previous table, inclS indicates the consistency of the combination (how consistently the combination leads to the outcome), PRI stands for the Proportional Reduction in Inconsistency. covS is coverage indicating the proportion of the outcome explained by the combinations of predictors. covU is a unique coverage that shows the proportion of the outcome uniquely explained by the combination, excluding overlaps with other combinations.

Based on the minimization results, it is possible to conclude that two factors form the primary conditions encouraging the formation of social bubbles among young social media users. Firstly, the tendency to conform to the dominant opinion plays a crucial role in shaping individuals' behavior on social media. Increased pressure to align with the dominant opinion leads users to seek information and networks that reinforce this dominant perspective. This finding is in line with the previous studies showing that the tendency to conform and seek validation from like-minded

others contributes to the formation of social bubbles (Alatawi, Cheng, Tahir et al. 2021; Bessi, 2016).

Secondly, infrequent exposure to diverse opinions prevents young people from challenging their existing views, thereby contributing to the formation or maintenance of social bubbles. This result is also in line with previous research, which concluded that the tendency to expose oneself to information limited in diversity can lead to the formation of echo chambers (Alatawi, Cheng, Tahir et al. 2021).

Conclusions

Considering the results of our analysis, we propose that universities should play a crucial role in shaping the behavior of young individuals on social media. Firstly, universities should prioritize fostering individual critical thinking skills. Students should be encouraged to act as independent thinkers, capable of critically analyzing all information and forming their own opinions. The goal should be to cultivate a culture where every opinion is personalized and formed based on the information that is critically assessed and not on the desire to conform. This can be achieved by introducing assignments in which students should critically evaluate the question under study or encouraging discussions in classrooms to foster their ability to overcome the need for conformity.

Secondly, universities should integrate independent thinking within the framework of informed thinking. This entails teaching students to seek diverse information and perspectives, going beyond conventional approaches to discuss a given topic. Demonstrating that each question can have multiple answers fosters not only more democratic conduct but also requires students to

engage in individual analysis when processing and comparing diverse opinions, thereby further enhancing their critical thinking abilities.

Ukraine's future is a function of its people, particularly its youth. Empowering these individuals to adopt the role of independent thinkers, capable of formulating and justifying their own opinions, holds the key to Ukraine's transformation. By nurturing a generation unafraid to explore diverse perspectives, we can lay the foundation for rebuilding Ukraine in a manner that uses the country's human potential and democratic aspirations.

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