

Rebellion in the Internet Age



Figure 1: A comic highlighting the powerful role of social media.¹

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I. Synopsis

On December 17, 2010, Mohamed Bouazizi set himself on fire in front of a municipal office in Tunisia, sparking a wave of protests that toppled governments across the Middle East. This movement, known as the “Arab Revolution,” has also been dubbed the “Twitter Revolution” due to the prominent role that social media played in the rebellions.² Following these revolutions, authoritarian regimes began implementing strict information control measures to prevent this phenomenon from reoccurring. Countries such as China, Vietnam, and North Korea now limit access to certain websites,³ and Turkey has recently banned Facebook and Twitter in the wake of an attempted coup.⁴ These nations have also started flooding the Internet with propaganda to mitigate the threat of social media to their power. The Chinese government employs a “Fifty Cent Party” that overwhelms social media with pro-China posts, fueling nationalistic sentiments across the country.⁵ Russia has also created an army of “Internet trolls” that work to influence public opinion both domestically and abroad.⁶ Thus, rebellions have evolved dramatically in the Internet Age, as both protestors and governments have learned to leverage social media to organize action and influence opinion. Since most models of rebellion predate social media, they fail to account for the influence of online social networks. My model will help explain the role that social media can play in facilitating or suppressing rebellions.

II. Case Study: The 2014 Ukrainian Revolution and Conflict with Russia

The 2014 Ukrainian revolution, along with the annexation of Crimea, offer a fascinating case study of the Internet’s role in rebellion and suppression. The revolution, also known as the “Euromaidan Revolution” or the “Revolution of Dignity,” was triggered by Ukrainian President Viktor Yanukovich’s November 2013 decision to suspend the Ukraine-European Union Association Agreement. The public saw the move as a sign that Yanukovich prioritized relations with Russia over the European Union. To protest his actions, thousands of Ukrainians flooded Maidan Nezalezhnosti (Independence Square) in Kiev. Although the movement started to die down in late November, protestors were stirred back into action on November 30, 2013 when the Berkut Special Police beat students who remained in the square (i.e. the Maidan), introducing violence into the peaceful protest. One day later, 10,000 people gathered in the square. By

December 1, 2013, around 800,000 people from all over Ukraine had joined the protesters in the Maidan, demanding that Yanukovych resign.⁷

Tensions mounted as the protests grew bloodier. Hired thugs, known as “titushkas,” attacked protestors and journalists without fear of punishment from corrupt police officers, and the Berkut began loading their guns with actual bullets rather than rubber ones. The violence climaxed on February 20, 2013, when government snipers killed 67 protestors.⁸ The protestors had only been armed with wooden clubs, and they only had shields made from sheet metal or wood to protect themselves from the bullets. Videos of the massacre saturated the Internet, and the resulting public outrage led Yanukovych’s parliamentary allies to withdraw their support. On February 22, 2014, the Verkhovna Rada (Ukraine’s parliamentary body) unanimously voted to impeach Yanukovych. Shortly afterwards, he packed up his wealth and flew to Russia.⁹

Unfortunately, celebrations over Yanukovych’s ousting were short lived. Just a week after Yanukovych fled the country, men in unknown uniforms removed the Crimean prime minister from power, raised a Russian flag above Crimea’s parliament building, and installed Sergey Aksyonov as the new prime minister. Aksyonov opposed the new government in Kiev and called for a referendum vote, which took place on March 16, 2014. Voters were given one of two options: (1) join Russia or (2) give Crimea sovereign status by returning to the Crimean Constitution of 1992. Allegedly, 97 percent of voters chose to join Russia.¹⁰ Many countries find these statistics highly suspect, and they view Crimea’s absorption by Russia as an illegal annexation of Ukrainian territory. Nevertheless, Russia has continued its aggressions towards Ukraine, as its forces now occupy the Donetsk region of Ukraine. Russia’s tactics for gaining power and territory in Ukraine have been described as “hybrid warfare,” as their strategy involves a combination of “soft power” propaganda and “hard power” military force.¹¹

III. Notable Characteristics of Euromaidan and the Ukraine-Russia Conflict

A closer look at the events of Euromaidan and Russian aggression in Ukraine reveals important features of rebellion and suppression. Below, I identify two, broad characteristics of these real-world events that will be incorporated into my model of rebellion in the Internet Age.

a) Social Influence Effects

Social influences, particularly from prominent members of society or individuals with large networks, helped grow the Euromaidan protests. When they first began, the crowds in the square mainly consisted of students, but then grew to include members from all levels of society as people reached out to their networks and urged others to join them in the Maidan. Based on surveys conducted in the midst of the Euromaidan Revolution, 47 percent of people gathered in the square learned about the protests from their friends, 18 percent from work colleagues, and 15 percent from family members. These social networks were critically important for bringing first-time protestors to the Maidan. 42 percent of protestors stated that they were prompted to action from texts sent by a family member or friend.¹² Notably, individuals with greater social weight or status had a greater likelihood of encouraging others to join the protests. For example, the well-known Ukrainian journalist, Mustafa Nayyem, is popularly credited for bringing the first crop of protestors to the square by posting the following message on Facebook: “We are meeting at 22:30 under the Monument of Independence. Dress warm, bring umbrellas, tea, coffee, good mood and friends. Reposts are highly encouraged!” (translated into English from Ukrainian).¹³

Another facet of social influence highlighted by the 2014 Ukrainian Revolution is the relationship between social influence and government legitimacy. Prior to the Euromaidan Revolution, the Yanukovich regime was broadly considered to be a corrupt, greedy administration that was embezzling money from the Ukrainian people.¹⁴ Thus, it had minimal

legitimacy as a government. Nevertheless, citizens only began actively protesting once social influences came into play, such as the Facebook post from Mustafa Nayyem. These social influences then helped grow the protest as people called for others to join them. Hence, social influence may have helped stabilize the Yanukovich regime's rule before the protests, even when government legitimacy was low, as citizens may have observed that no one else spoke out against the regime so they chose to remain silent as well. However, once a social movement started to develop, it quickly escalated into a full-blown revolution as social influences created a "domino effect." Hence, the Euromaidan Revolution reveals that social influence can help stabilize the status quo, but as government legitimacy drops, this stabilizing effect deteriorates.

The Euromaidan Revolution also revealed that social influence may offset the deterrent effects of punishment. Throughout the protests, the Yanukovich regime attempted to curtail the movement by threatening individuals, such as reporters and NGO leaders, as well as increasing punishments. For example, in mid-January 2014 the government enacted a series of anti-protest laws with harsh punishments, such as a six-year jail sentence for blocking access to someone's residence and a 10 to 15-year sentence for mass disruption. Under the new laws, protestors could also be arrested for participating in a peaceful gathering while wearing a helmet.¹⁵ The

traditional understanding of rebellion suggests that such punishments may deter others from joining the movement. However, many Ukrainians chose instead to join the movement, and protestors began sporting kitchen colanders and other "helmets" in defiance of the new anti-protest laws.¹⁶ Thus in the case of Euromaidan, social influence counteracted the intended pacifying effect of harsh punishments.



Figure 2: Maidan protestors wearing "helmets."

b) Effect of Social Media and the Internet

Similar to the Arab Revolution that shook the world in the early 2000s, the Euromaidan Revolution has also been described as a revolution driven by social media. Protestors used platforms such as Facebook, Twitter, and VKontakte (a Russian social network) to amplify the protests, unite individuals and messages under common themes of the revolution, and coordinate action. For instance, one witness in the Euromaidan protests, Yevgeny Volokin, stated that “social media played a part in bringing the events in Odessa to light. At least two web videos live streamed the initial clashes between pro-Russian and pro-Ukrainian activists and then showed fighting at the trade union building. Twitter provided photos, updates, and commentary. Facebook was inundated with postings.”¹⁷ Additionally, new social media pages were created to serve specific needs of the protest, such as coordinating legal support, medical services, and transportation. A Facebook page, “helpgettomaidan,” was created in early December 2013 to organize carpools from other citizens and across Kiev to the Maidan.¹⁸ Hence, social media helped catalyze the speed at which protests spread among the public, and it also allowed protestors to organize and sustain their movement for a long period of time.

Governments have also learned how to leverage social media and the Internet to advance their positions. As part of their hybrid warfare tactics in the conflict with Ukraine, Russia has started a pro-Kremlin campaign on VKontakte and Odnoklassniki – the two popular, Russian social media sites used in Ukraine. Russia pays bloggers and the administrators of popular VKontakte groups to spread fake news about problems in Ukraine.¹⁹ These internet “trolls” post 100 internet comments per day and maintain multiple pro-Kremlin Facebook and Twitter accounts.²⁰ A well-known example of a fraudulent story propagated by these paid “trolls” is a report about Galina Pyshnyak, a woman who allegedly witnessed a 3-year old boy being tortured and crucified by the Ukrainian military in 2014. A video of an interview with Pyshnyak was

widely shared on social media, but her story was later proven false.²¹ While the effects of Russian propaganda have had little effect on public support for Russia among Western Ukrainians, Eastern Ukrainians and residents of Crimea have developed a favorable opinion of the Kremlin.²² Thus, while the Internet has allowed governments to spread their propaganda to a broader swathe of people, the effectiveness of this propaganda varies with the recipient's opinion of the regime – more legitimate governments have more believable, influential propaganda.

IV. Existing Models of Rebellion

To explain the onset of rebellions such as the 2014 Ukrainian Revolution, scholars have developed simple models to reflect real-world behavior.

a) Unanticipated Political Revolution (Kuran 1989)

In 1989, Timur Kuran proposed a model to explain the occurrence of unexpected revolutions.²³ His model only has one type of agent, citizens, and they rely on social influences to determine whether to rebel. Individuals have two types of preferences: public and private. Public preferences are determined by two (sometimes competing) factors: (A) reputational utility,ⁱ and (B) utility of integrity.ⁱⁱ When the utility of (A) is greater than that of (B), individuals in Kuran's model may choose to falsify their public preference. This “preference falsification” allows for unanticipated revolutions to occur, as individuals hide their personal preference of rebelling until the value of (B) is greater than that of (A), as described below:

ⁱ The utility one gains for having a certain public preference (i.e. social pressure to conform to what everyone else believes). This is determined by calculating the “collective sentiment” of the public, which is the weighted average of everyone's public preferences. Weighting is determined by a person's degree of social influence.

ⁱⁱ This is the utility one gains for expressing his/her preference as the public preference, given his/her private one. Essentially, it's the degree of guilt you experience if you act out of accordance with your own beliefs (e.g. if you eat meat but think it's unethical to kill animals for consumption).

$A = \text{reputational utility (integer from 0-1)}$

$\text{Value of rebelling} = A + B$

$B = \text{utility of integrity (integer from 0-1)}$

$\text{Value of remaining quiet} = (1 - A) + (1 - B)$

If $\text{Value of rebelling} > \text{Value of remaining quiet}$, then individuals rebel.

b) Civil Violence (Epstein 2002)

Joshua Epstein (2002) proposed another model for rebellion where personal grievances and risk of punishment drive whether individuals choose to protest.²⁴ Epstein's model contains two types of actors: "cops" and "agents." He posited that agents have a certain level of hardship and a perceived legitimacy of the regime, and these two variables determine that individual's level of grievance towards the regime through the following equation:

$H = \text{hardship (integer 0 - 1)}$

$L = \text{legitimacy of regime (integer 0 - 1)}$

$G = \text{grievance}$

$$G = H(1 - L)$$

Once an agent's grievance is high enough, they will consider rebelling depending on their level of risk aversion. If an agent is risk-averse but observes that many others within their range of "vision" (i.e. social network) are likely to rebel, which reduces the probability for arrest or punishment, then risk-averse agents are more likely to join in the rebellion.

$R = \text{level of risk aversion (integer 0 - 1)}$

$J = \text{length of jail term}$

$P = \text{estimated arrest probability}^{\text{iii}}$

$Q = RPJ$

If $G - Q > \text{a certain threshold, } T$, an individual will rebel. Otherwise, they will remain quiet.

The "cops" in Epstein's model arrest active agents within their range of vision, and they never defect to revolution. Thus, this model presents a situation where decentralized dissidents ("agents") come together to start a rebellion in the face of a central authority ("cops").

ⁱⁱⁱ Calculated from number of other active individuals in that person's range of "vision" (i.e. in their social network).

Although these two models conceive of rebellion in different ways, they are similar in that group behavior plays an instrumental role in the onset of a rebellion. In Kuran's model, individuals must observe that a certain number of others feel similarly unhappy with the ruling regime before they are willing to act. In Epstein's model, individuals are only willing to rebel when they observe that others are active so that their own risk of arrest is sufficiently low.

V. Critiques of Existing Models

While Kuran's model offers a simple yet representative model of rebellion, he assumes that individuals in a society know everyone else's public preferences – something that is rarely true. Kuran includes all individual's public preferences when calculating collective sentiment, which he uses to determine the reputational utility an individual considers when deciding to rebel. Although in the real world public opinion polling offers some measure of collective sentiment for all individuals in society, most people are only familiar with the sentiments of their personal social network. For example, Girvan and Newman (2002) analyze community structures and find that most people cluster together in tightly knit groups, and these groups are only loosely connected to other social networks.²⁵ Since Kuran's assumption fails to reflect reality, his model offers a less legitimate explanation for real world behavior.

Epstein's model offers a logical explanation for rebellion, but it fails to take social influences into account. The literature on social influence suggests that it can play a significant role in shaping collective behavior such as protests and revolutions. Frith and Frith (2008) provided substantial evidence that humans have innate reactions towards others' behavior. For example, humans tend to follow one another's gaze, and the mere present of an ignorant person in a room can inhibit individual's ability to complete simple tasks.²⁶ Furthermore, Bikhchandani et al. (1998) noted that humans exhibit "observational learning" behavior, where they follow the

actions of others around them. The authors specifically cited rebellions as an example of such behavior, as people were more likely to go out to the square and protest once they observed others were there.²⁷ Lorenz et al.'s (2011) notion of "information cascades" echo these phenomena, as they found that if people were provided information about how others had answered a challenging question, they were more likely to respond in the same way, even if the answer was wrong.²⁸ Macy (1991) offers further support for the role of social influence in guiding group behavior, noting that social influences can facilitate coordination and shift the behavior of an entire group.²⁹ Hence, since social influences have notable effects on human behavior, Epstein's model can be improved by incorporating these influences.

Another flaw with Epstein's model lies in its foundations in the rational-choice model, which often fails to fully explain human behavior. Kahneman (1988) found multiple violations of the rational-choice model of behavior in his experiments,³⁰ as he found that the "rationality" of an individual varied with the context of the situation (2003).³¹ Goeree and Holt's (2001) experiments also suggest that humans often violate the behavioral norms predicted by the rational-choice model.³² They asked participants to play a number of classic games modeled by game theory. The rational-choice model predicts that the outcome of these games would fall at the Nash equilibria, but not all of them did. Hence, their findings suggest that the rational-choice model may not adequately capture human thinking, meaning that Epstein's reliance on this decision-making model fails to accurately reflect human behavior.

Finally, while Kuran (1989) and Epstein's (2002) models capture important features of rebellions, they fail to capture some of the complexity introduced in modern-day protests such as the 2014 Ukrainian Revolution. In today's age, the Internet and social media have made it easier to observe others' behavior, improving information flows and reducing barriers to collective action. For example, in the 2014 Ukrainian Revolution, protestors used social media to recruit

more protestors and organize themselves. However, governments have responded by banning access to websites, censoring information, and flooding the Internet with propaganda. Notably, Russia relies on such efforts to sway Ukrainian public opinion in its favor. Hence, the Internet adds an interesting new dynamic to the onset of rebellions, as it can be utilized to both facilitate and suppress protest.

VI. A Model for Rebellion in the Internet Age

To address the flaws with Kuran (1989) and Epstein's (2002) models, as well as simulate the role of social media and the Internet in the onset of rebellions, I adapted the "Rebellion" model from the NetLogo library.³³ This model is based off Epstein's (2002) model of civil violence. I merged his model with Kuran's (1989) model of revolution, so that my new model captured both the rational-choice behavior of Epstein's agents along with the effects of social influence described by Kuran's model. I also added new features to the model to reflect characteristics of modern-day rebellions that I gleaned from the case study of Ukraine.^{iv}

a) *Merging the Two Models*

To merge the two models, I meshed together Kuran (1989) and Epstein's (2002) mathematical equations for determining when individuals choose to rebel. I took Kuran's threshold equation for rebellion:

Individuals rebel if: *Value of rebelling* > *Value of remaining quiet*

Where the two sides of the equation are defined as:

$$\text{Value of rebelling} = A + B$$

$$\text{Value of remaining quiet} = (1 - A) + (1 - B)$$

^{iv} My model can be found in the following Dropbox folder:

<https://www.dropbox.com/sh/npz04o2r5ji61ts/AAALsE4tc6hfGyli-40Rln4Ma?dl=0>

Where $A = \text{reputation utility}$, and $B = \text{utility of integrity}$. Since B is based off an individual's private preference, I replaced B with $G - Q$ from Epstein's equation, where $G = \text{an individual's grievance level}$, and $Q = \text{hesitation to rebel due to fear of punishment}$. This resulted in:

$$\text{Value of rebelling} = A + G - Q \qquad \text{Value of remaining quiet} = (1 - A) + (1 - G - Q)$$

To reflect the relationship between social influence and government legitimacy, I changed the *Value of remaining quiet* to the following:

$$\text{Value of remaining quiet} = (0.5L - A) + (1 - G - Q)$$

Thus, as legitimacy decreases, the effect of social influence on an individual's decision to rebel increases. As legitimacy increases, social influence plays a less substantial role in whether individuals rebel.

b) Additional Features

In order to reflect propaganda efforts conducted by governments, I added a propaganda component to the model by including a "propaganda?" switch. When the switch is on, citizens' grievance levels slightly decrease, but the amount that it drops varies with the legitimacy of the government. As government legitimacy increases so does the effect of propaganda, as propaganda campaigns become more believable when the government has some legitimacy.^v However, when government legitimacy is low, citizens are less convinced by propaganda efforts.

To model the influence of the Internet and social media on rebellions, I added two switches titled "citizen-internet?" and "govt-internet?" If the first switch is on, then citizens can "see" a greater number of individuals who are active or in jail. Essentially, their social networks are expanded, and they are susceptible to social influences from a greater number of individuals.

^v The relationship between the influence of propaganda and government legitimacy follows a 2^x curve.

Turning the switch off can reflect situations where governments block access to the Internet or certain social media sites, which limits individual's social networks. If the "govt-internet?" switch is on, then the government can "see" a greater number of citizens who are active, allowing them to find more targets to arrest. This feature captures the government's ability to monitor citizens over the Internet and punish online activists. Providing the government with Internet access also increases the effects of the government's propaganda efforts by 25 percent in the model, which reflects the influence of pro-government Internet "trolls" on social media.

As demonstrated by the case study of the 2014 Ukrainian Revolution, social influence can counteract an increased threat of punishment. To capture this behavior in my model, when citizens assess how many other individuals in their network are active, they count both the active citizens and 25 percent of previously active citizens who have been jailed. Thus, even when many activists have been jailed, the deterrent effects of this punishment are weakened, as these jailed individuals also contribute to social influence effects that push people towards rebellion.

Finally, I took the social weight feature of Kuran's model and included it in my new model. I gave each citizen in my model a "social weight,"^{vi} which is used to calculate the collective sentiment of an individual's social network. Thus, social weight determines how much influence individuals in a society exercise on other's decisions to rebel or remain quiet.

c) Behavior of the Model

If the "social-effects?" toggle is turned off, the model behaves as Epstein conceived of rebellion. Citizens in the model only consider their level of grievance and the risk of punishment when deciding whether to rebel. If the "govt-legitimacy" slider is set to about 0.65, the citizens in the model fluctuate between rebelling and remaining quiet. When citizens rebel, once a certain

^{vi} The social weight is a turtle attribute and is a random integer between 0 and 1.

number of individuals have been jailed, citizens tend to quiet down again because the threat of punishment has increased.

However, if the “social-effects?” toggle is turned on, allowing for the new model incorporating social influences to operate, social effects help stabilize the behavior of citizens. If “govt-legitimacy” is set to 0.65, rather than fluctuating between periods of quiet and rebellion, citizens remain quiet overall with very few individuals rebelling. But, if government legitimacy decreases and a certain threshold is reached, society rapidly explodes into sudden, widespread protest – exactly what Kuran attempted to reflect in his model based on social influences. As government legitimacy increases, the shift back to being quiet is quick and sudden as well. Thus, the model demonstrates the catalyzing effect that social influence can have on shifts to rebellion or quiet acquiescence to government control, as well as the stabilizing effects of social influence.

Toggling “propaganda?” on or off changes the threshold at which society shifts from quiet to rebellious. Since propaganda decreases citizens’ level of grievance, the threshold at which society erupts into protest falls at a lower level of government legitimacy. The toggles for “govt-internet” and “citizen-internet” also affect this threshold. Turning “govt-internet” on increases the risk of arrest and the number of individuals in jail, meaning that the threshold for protest drops to a lower government legitimacy. Turning “citizen-internet” on increases social influence effects, so sudden shifts to protest or peace occur even faster. Allowing citizens to access the internet also leads to more stable states of society; peaceful or rebellious states last much longer when citizens are susceptible to the effects of larger, online social networks. Hence, the Internet can be used as both a rebellion-inducing or suppressive force.

d) Important Considerations

To simplify my model so that it was feasible to create in NetLogo, I made a few key assumptions:

1. I assumed that the social weight of each citizen varied randomly, and that they exerted the same degree of influence on every other citizen in the model. Hence, I did not consider that one person may have substantial influence on one citizen (e.g. a mother on her child), but less of an influence on another citizen (e.g. the same mother and her gym instructor).
2. I assumed that the Internet caused the same degree of increase for the government and citizens' networks (an increase in radius of five patches). I did not vary the degree of increase across individuals, even though in reality some individuals may have substantially larger networks on the Internet (e.g. celebrities have many social media followers, while average citizens generally have less).

VII. Conclusion

In essence, this model considers two schools of thought about how humans behave: rational-choice and social influence. The rational-choice model of decision-making is captured by the cost-benefit analysis individuals conduct when they are assessing the risks of joining a rebellion, or the social costs they incur for failing to align their preferences with public opinion. The social influence model can be seen in the way individuals follow one another's behavior, leading to sudden, widespread shifts to protest or quiescence, as well as sustained and stable states of society. As the rational-choice model often fails to fully explain human behavior, adding this nuance of social influence may capture how humans respond to propaganda, and how the Internet has affected the onset of rebellions.

As previously referenced, the 2014 Ukrainian Revolution stands as a fitting example for this model. Although government legitimacy was low under the Yanukovich regime, society remained in a stable state of quiescence, possibly due to both rational assessment of risks as well as social influence factors. However, once influential members of society encouraged protestors to gather in Independence Square, the country erupted in revolution. Social media helped facilitate and sustain the revolution, and these catalyzing effects can be seen in the model. However, in the case of Ukraine the Internet has helped empower regimes as well – namely the Kremlin. Utilizing social media networks, Russians have leveraged social influence effects to sway Ukrainians against their own government. These efforts have proven successful, as demonstrated by Russia’s annexation of Crimea and the popular support that Russia experiences in Eastern Ukraine.

Thus, the Internet has become a powerful tool for both protest and suppression alike. By taking advantage of the natural effects of social influence, citizens and governments can work to facilitate rebellion or quell the masses. This past year, the *New York Times* published an article proclaiming the “globe-shaking” power of social media.³⁴ Perhaps a more precise description might be the “globe-shaking” power of magnified social influence. As suggested by the situation in Ukraine, as well as the behavior of my proposed model, the Internet has enhanced the effects of social influence to the point where it may play a far more significant role than rational-choice decision-making when it comes to collective behavior.

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