Journal on Policy and Complex Systems • Volume 4, Number 1 • Spring 2018

How Stable is Democracy? Suggestions from Artificial Social Networks

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 doi: 10.18278/jpcs.4.1.5

Abstract

The structure of communication networks can be more or less "democratic": networks are less democratic if (a) communication is more limited in terms of characteristic degree and (b) is more tightly channeled to a few specific nodes. Together those measures give us a two-dimensional landscape of more and less democratic networks. We track opinion volatility across that landscape: the extent to which random changes in a small percentage of binary opinions at network nodes result in wide changes across the network as a whole. If wide and frequent swings of popular opinion are taken as a mark of instability, democratic communication networks prove far more stable than anti-democratic ones. In a final section, we consider the democratic or anti-democratic character of networks that respond to volatility by rewiring at random, in a search for community, or in a search for a leader.

Keywords: democracy, network, opinion, volatility, agent-based

¿Qué tan estable es la democracia? Sugerencias de redes sociales artificiales

Resumen

La estructura de las redes de comunicación puede ser más o menos 'democrática': las redes son menos democráticas si (a) la comunicación es más limitada en términos del grado característico y (b) está más estrechamente canalizada a unos cuantos nodos específicos. Juntas estas medidas nos dan un panorama bidimensional de redes más y menos democráticas. Seguimos de cerca la volatilidad de la opinión a través de ese panorama: el punto hasta el que los cambios al azar en un pequeño porcentaje de opciones binarias en los nodos de la red resultan en cambios importantes en toda la red. Si se toman las fluctuaciones importantes de opinión popular como una marca de inestabilidad, las redes de comunicación democrática parecen ser más estables que las que son antidemocráticas. En una sección final consideramos el carácter democrático o antidemocrático de las redes que responden a la volatilidad al reescribir al azar, buscando una comunidad o buscando un líder.

Palabras clave: democracia, redes, opinión, volatilidad, basado en agentes

民主有多稳定？人工社会网络给出的意见

摘要

传播网络的结构既可以多民主化，也可以少民主化：网络会变的少民主化，如果（a）传播在特征程度上更加受限，同时（b）其更紧密地出现在少数特定节点上。这两种方法为我们提供了一个描述不同程度民主化网络的二维景象。笔者在该景象上追踪了舆情波动性（opinion volatility）：即不同网络节点上二元观点（binary opinion）的一小部分随机变化造成整个网络发生广泛变化的程度。如果舆论发生的大幅度频繁变化被视为一种不稳定标志，那么民主传播网络就远比非民主网络更稳定。在文章最后一部分，笔者考量了不同网络的民主特征/或非民主特征，这些网络对舆情波动性的回应方式则是通过随机重组去寻找社区/或寻找领导者。

关键词：民主，网络，舆论，波动性，基于主体

Introduction

"Opinion volatility" and "opinion variability" have been used in the literature in a number of different ways (Acemoglu, Como, Fagnani, & Ozdaglar. 2013; Bybee, McLeod, Luetscher, & Garramone, 1981; Powell & Tucker, 2009). The terms "democracy" and "democratic" have a notoriously wide range of meaning (Levinson, 2006; Storm, 2008). "Political instability" appears in importantly different senses as well (Hurwitz, 1973; Sottilotta, 2003). In what follows we explore a particular type of opinion volatility in a particular sense of democratic networks, with implications that are suggestive for some among the many questions of political stability.

Democratic Communication Networks

It is clear that some forms of governmental procedure count as more democratic than others do. It is also clear that certain forms of social organization count as more democratic than others do. In the latter case, what is at issue is less a matter of formal political process than of communication: the more democratic networks are those in which communication is egalitarian, open, and diverse.

Figure 1 shows a random network on the right, contrasted with a network generated by preferential attachment on the left (Barabási & Albert, 1999; Newman, 2005). Of these, we would propose, the random network is more democratic. This corresponds to an aspect often emphasized in the literature: equality of participation (Edelsky, 2004). It is taken as a mark of democracy that "no-one can choose himself, no one can invest himself with the power to rule and, therefore, no one can abrogate to himself unconditional and unlimited power" (Asgary, 2005; Walt, 2000, p. 36) and that "all have a right to participate in making the decisions that will affect us" (Brooks, 2012, p. 20). In a preferential attachment network, communication is predominantly with and through a small number of "hubs"—the local warlords, bosses, autocrats, or authoritarian figures. Only a few individuals have contact with many; the many have contact-mediated predominantly by the privileged or powerful few. In a random network, the number of contacts for each individual is much more equally distributed, with a network of communication wider and more diverse. The social network that results has the look of communication in a small American town, perhaps. In what follows we formalize the extent to which attachment in a network is preferential, with the proposal that it is networked with concentrated hubs that are less democratic.

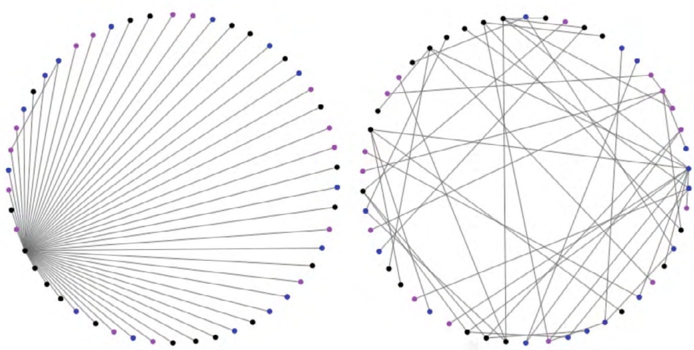


Figure 1. A less democratic network in terms of preferential attachment (left) contrasted with a more democratic communication network on the right.

We also use a second measure of democracy in communication networks. Figure 2 shows two networks that contrast only in their mean node degree. Of these, we propose, it is the higher-degree network on the right that is more democratic. Various commentators have emphasized this primary aspect of democracy in terms of freedom of expression and assembly (Brooks,

2012) and broad, equal, protected, and mutually binding consultation (Parris, 2008). In the network on the right, more people are in communication with more people, approaching the ideal of a New England town meeting. Higher mean degree, we propose, offers a second dimension along which we can measure increasingly "democratic" networks.

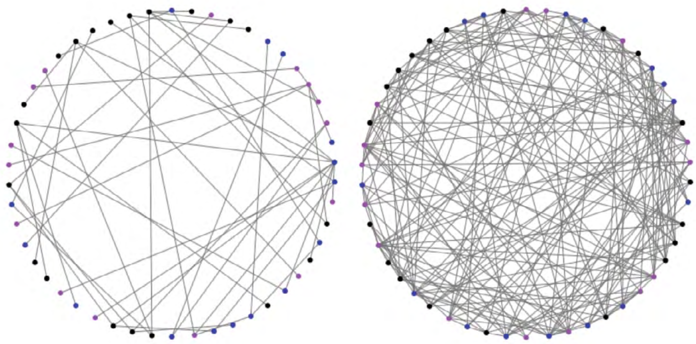


Figure 2. A less democratic network (left) and more democratic (right) in terms of higher node degree and wider contact.

We consider the idea of more and less democratic communicative networks a natural one, with a characteristic degree and preferential attachment as natural measures. Our formal treatment of the first will be in terms of mean node degree: the higher the mean node degree of a network, the more democratic we take it to be in the second sense. Our formal treatment of how preferential the attachment structure of a network is will be in terms of the preferential exponent.

Consider the prospect of adding a new node to an existing network of nodes $x_i \dots x_n$ (Barabási & Albert, 1999; Newman, 2005). The probability that the new node will be connected to a specific node x_j can be given as:

$$Prob(connection\ to\ x_j) = \frac{(d_j)^e}{\sum_{i=0}^{n}(d_i)^e}$$

Here d_i represents the degree of node j and $\sum_{i=0}^{n}(d_i)$ represents the sum of degrees of all nodes, but in each case those degrees are raised to our preferential attachment exponent e. Where $e = 0$, $(d_j)^e$ for any node = 1, and thus a new node attaches to existing nodes with no preference between them in terms of relative degrees. The result approaches a random network.[1] Where $e = 1$, $(d_j)^e$ is simply (d_j), and a new node attaches to an existing node simply as the ratio of

1 "Approaches" because nodes formed early in the process do have increased chances of being connected to by newly added nodes. We can create a continuum from more truly random networks to those of higher preferential attachment by eliminating the assumption that our network is formed node by node. In that case we regard all nodes in the network as formed *ab initio* and proceed either node by node or by random choice of node, applying the exponential function above to the totality of n nodes.

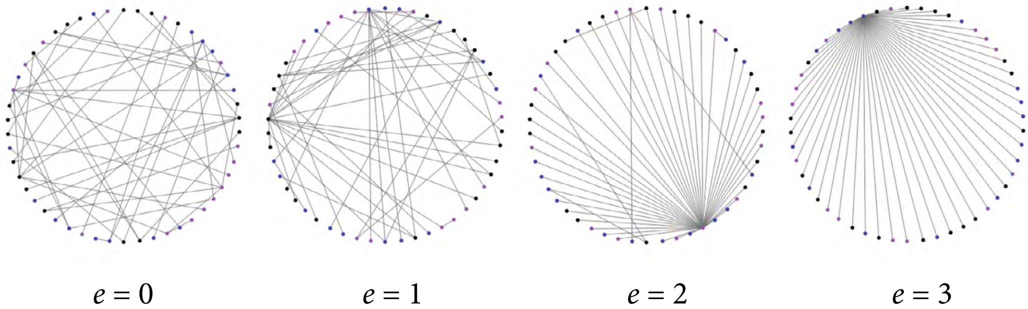


Figure 3. Networks with increasing preferential attachment in networks of mean degree 2.

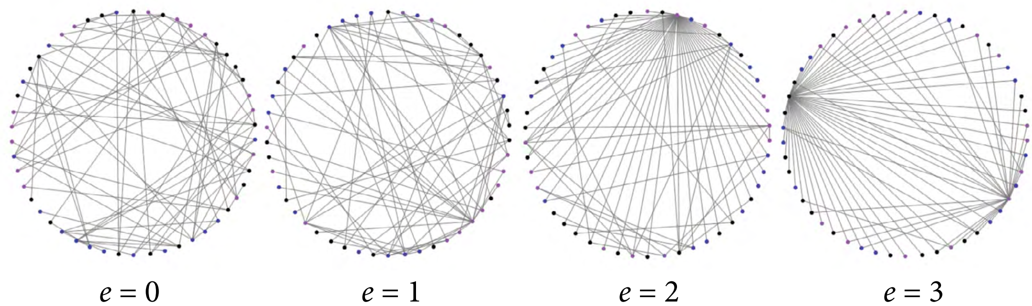


Figure 4. Networks with increasing preferential attachment in networks of mean degree 3.

its degree over the total sum of degrees in the existing network: the standard pattern for preferential attachment. As *e* is increased to higher positive values, however, the bias in favor of nodes with higher degree is exaggerated. We can, therefore, generate the extent of preferential attachment by simple adjustment of the preferential attachment exponent *e*.[2] Figure 3 shows typical networks generated with an *e* of 0, 1, 2, and 3.

Each of the networks shown in Figure 3 is generated with an average degree of only two. For networks with higher degrees, a new node will connect to one of those to which it is not already connected with a probability measured by our preferential exponent. For networks with an average degree of 3, for example, increased preferential attachment will take the form of those networks shown in Figure 4. With *e* = 3 and higher we get not one focus of preferential attachment, for example, but two.

When plotted on two axes, our two measures allow us a landscape of networks more or less democratic in the

2 In Barabási and Albert (1999), the authors note the possibility of using an exponent in this way, but confine their attention entirely to *e* =1 on the grounds that it most clearly models the scale-free networks that are their target. On the use of a variable exponent, see also Krapivsky, Redner, and Leyraz (2000); Dorogovtsev, Mendes, and Samukhin (2000); and Noble, Davy, and Franks (2004).

two dimensions of increased average node degree and increased preferential attachment exponent. Those networks that are more democratic in terms of mean degree we will plot farther to the left on the x-axis, reversing the numbering of mean node degree in order to do so. Those networks that are more democratic in virtue of low preferential exponent will be plotted further to the bottom on the y-axis. The array of networks used in what follows is illustrated in Figure 5. Across that array, the most democratic network in terms of both dimensions—high node degree and low preferential attachment—is on the lower left. The least democratic network in terms of both dimensions—low degree and high preferential attachment—will be on the upper right.

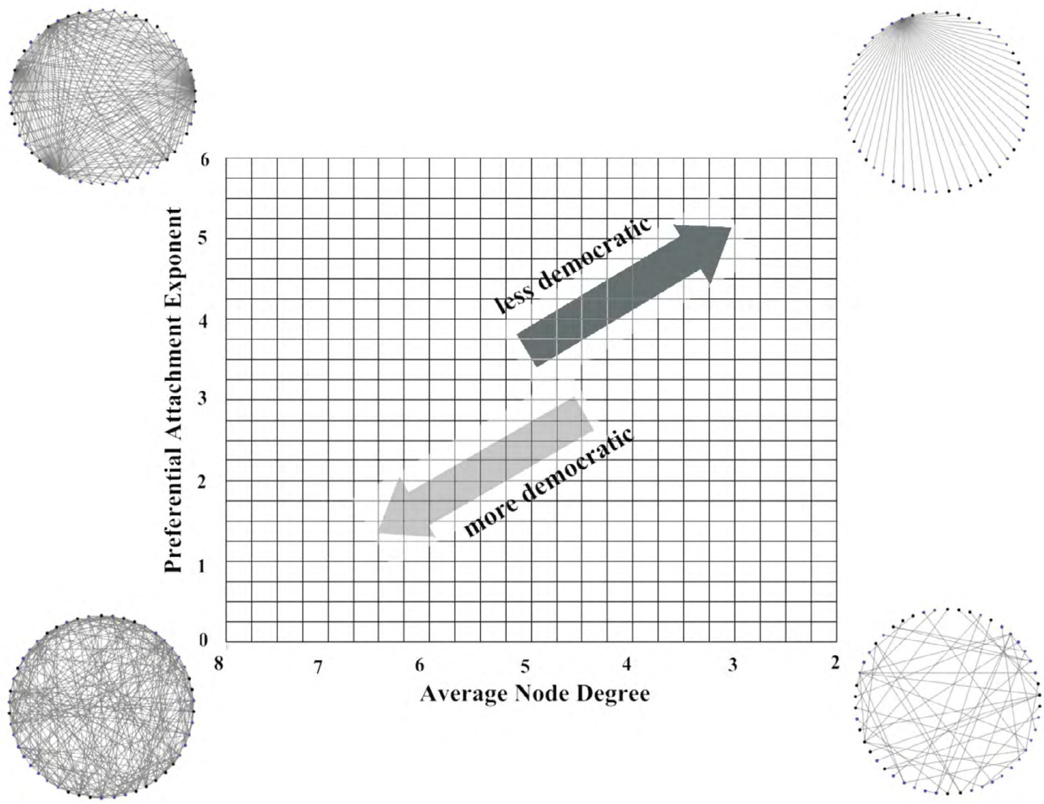


Figure 5. An array of more or less democratic networks on two dimensions: preferential exponent and average node degree.

Our focus here is opinion volatility across this landscape of networks more or less democratic on these measures. We make no claim, however, that these two initial measures should be treated as exhaustive; we remain actively interested in the possibility of using other measures of democratic and anti-democratic networks as well.

We are also fully aware of the distance between this minimal model of selected aspects of communication

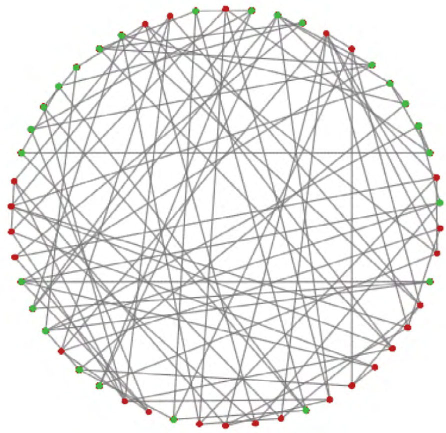


Figure 6. Initial configuration of opinion network.

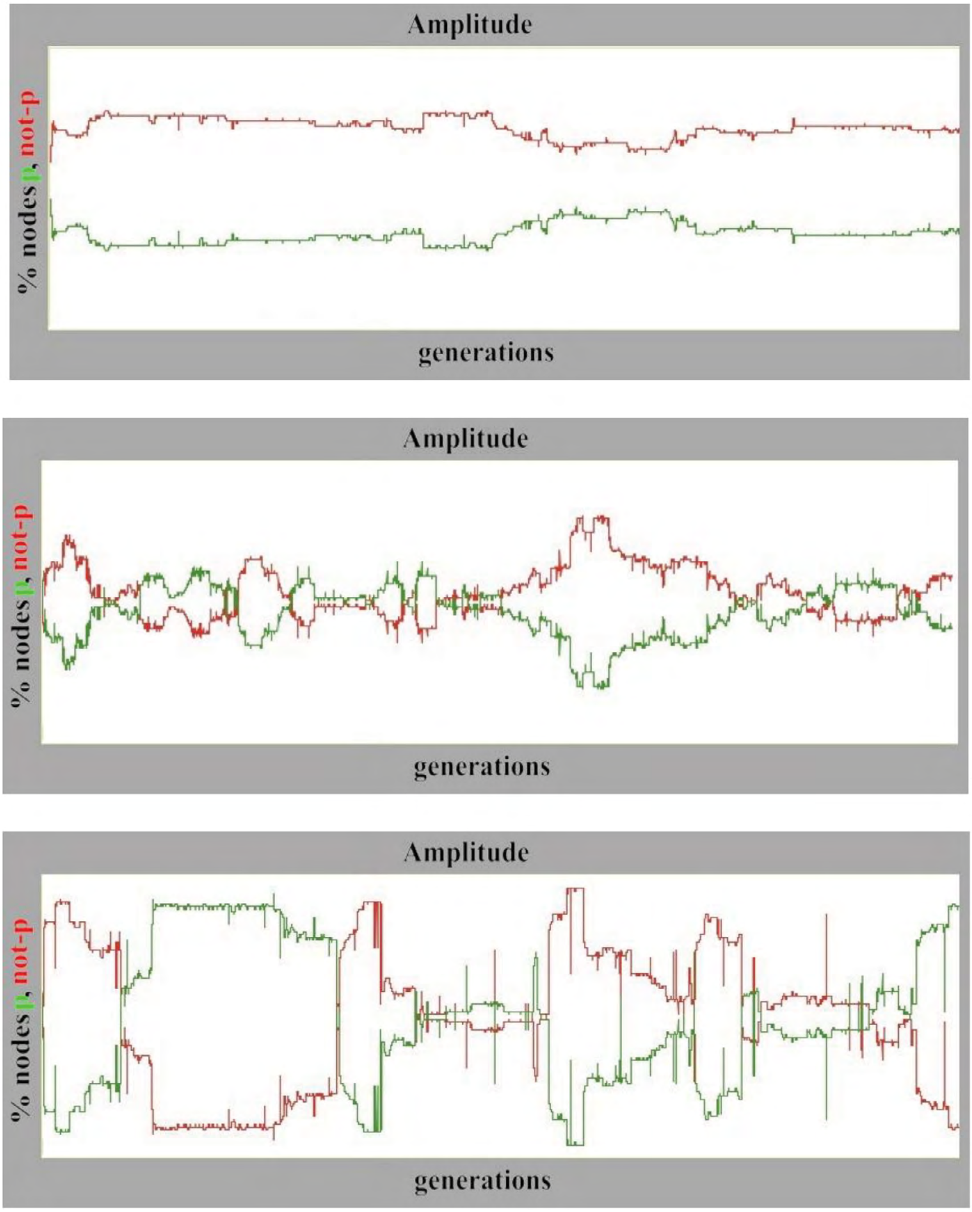
and the messy complexities of real societies, democratic, or otherwise. Any two nodes in the modeled networks have either a fully open communication link or no communication link at all, for example, with no attempt to model the topic-specific censorship that often characterizes authoritarian regimes. Within the networks considered, moreover, distinctly layered hierarchical structures do not have the clear prominence that they often do in social organization. Here, as elsewhere in modeling, the goal is not a detailed representation of reality but an intentionally schematic diagram that helps us understand it. Abstract as this model is, the hope is that attention to the dynamics of abstractly modeled opinion on this selective landscape of artificial networks can start to give us a grasp on the far messier volatility of opinions within far more complex social structures.

Opinion Volatility

Consider the 50-node network shown in Figure 6. We begin with a percentage of agents in the network holding opinion p, coded in green, with another percentage holding opinion not-p, coded in red. At each step of the simulation, we have a certain percentage of our agents update their opinions using a simple majority version of the threshold model (Andjel, Liggett, & Mountford, 1992; Durrett & Steiff, 1993; Liggett, 1999). Agents adopt the opinion held by the majority of those with whom they are in contact in the network, with a random choice in the case of a tie.[3] In what follows we have a random 10% of our agents update on the majority view of their network contacts.

In order to measure volatility within different networks we introduce

3 There is a range of related work on voter model variations on complex networks, though without the focus on political implications explored here. See, for example, Castellano, Villone, and Vespignani (2003); Suchecki, Equíluz, and San Miguel (2005); Sood and Redner (2005); Schneider-Mizell and Sander (2009).



a.
b.
c.

Figure 7. Different patterns of opinion volatility stimulated by a background change in a small percentage of nodes.

background noise: at regular intervals, we make a small percentage of random agents change their opinions. In what follows we have a random 5% of the agents in a network change their opinions every tenth generation. We think of this as a background rate of spontaneous belief-change by some percentage of individuals in the network.

The measure we are after, however, is what impact that background rate of belief change will have on the volatility of beliefs across the network as a whole. In some cases, in some networks, a changed percentage of nodes may have little more impact than that change itself, giving the pattern of a random walk in small steps illustrated in Figure 7a. In other cases, in other networks, the impact of a small changed percentage may be much greater, with wider swings and reversals of dominance, as in 7b. Given some initial patterns of belief and some network structures, a small percentage may produce repeated cascades of changed opinion amounting to the wide swing of dominant opinion shown in 7c.

How does network structure correlate with opinion volatility in this sense? We measure changes in the configuration of belief on a network that are greater than 150% of the change artificially introduced as background noise. We track both the frequency with which changes of that size occur in different networks—the percentage of cases in which the introduction of a random change in beliefs of 5% of the population change leads to a greater than 7.5% swing in over-all beliefs—and the amplitude of change when it does occur. We measure amplitude as the difference in the number of agents holding *p* at the point of noise introduction and the number holding *p* in the next time interval. At points of volatility in a network, what percentage of the network changes beliefs?

The radical simplifications involved in the model should again be emphasized. We are dealing with a single binary issue and an extremely simplified concept of belief change. The dynamics involved, however, are not entirely out of range as an idealization of important aspects of opinion change across a community. There are indeed issues that can be phrased as binary choices, and attitudes are indeed subject to the kind of conformity pressure modeled here in terms of deference to the majority of contacts (Asch, 1952, 1955; Bond & Smith, 1996; Cialdini & Goldstein, 2004).

Just as we would not claim our measures of democratic networks to be exhaustive, we would not claim our measures of instability to be exhaustive, even with regard to opinion instability. Within the constraints of those measures, however, we can ask a very simple question of our simple models:

In terms of both frequency and amplitude, how does the volatility or stability of opinion correlate with the democracy or anti-democracy of a communication network?

Opinion Volatility in Democratic and Anti-Democratic Regimes

In the graphs that follow, we map our two dimensions of network "democracy" on two axes, as outlined above. The *x*-axis shows a decreasing mean degree in sample networks—decreasingly democratic networks in that sense—from left to right. The *y*-axis shows increasing preferential exponent—decreasing democratic networks in that sense—from bottom to top. Networks most democratic in both regards will be at the lower left, with high degree and low preferential attachment. Networks least democratic in both regards will be at the upper right, with a low degree and high preferential attachment.

How does opinion volatility correlate with the democracy or anti-democracy of a network? Using 100-node networks, we introduce a background belief change in 5% of the nodes at each 10th iteration over 10,000. The percentage of cases in which the result is greater than 7.5% change in beliefs across the networks we count as the frequency of volatility. Figure 8 shows results in which we average frequency results over 100 runs for each combination of mean degree and preferential exponent.

What is immediately clear from Figure 8 is that networks democratic in the sense of low preferential attachment

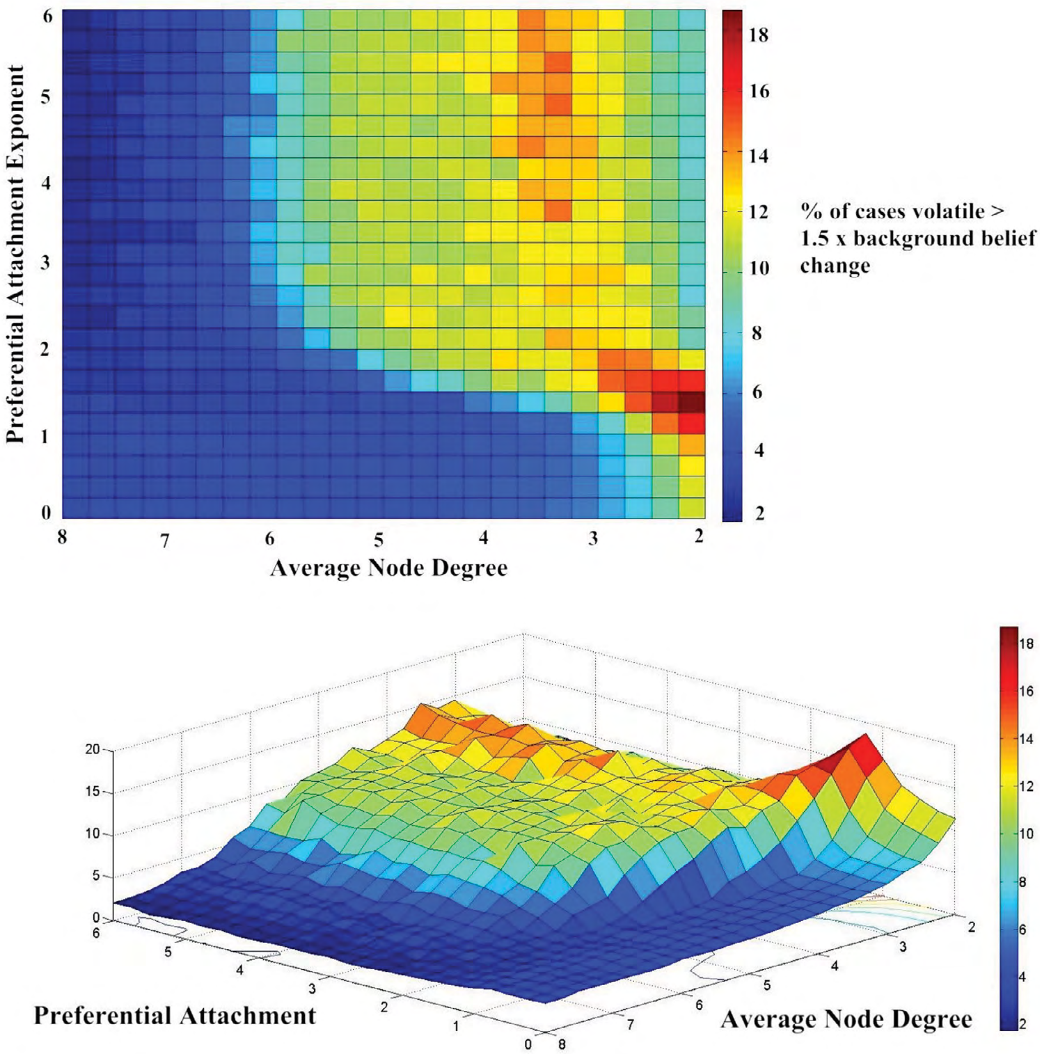


Figure 8. Frequency of volatility across democratic and anti-democratic networks.

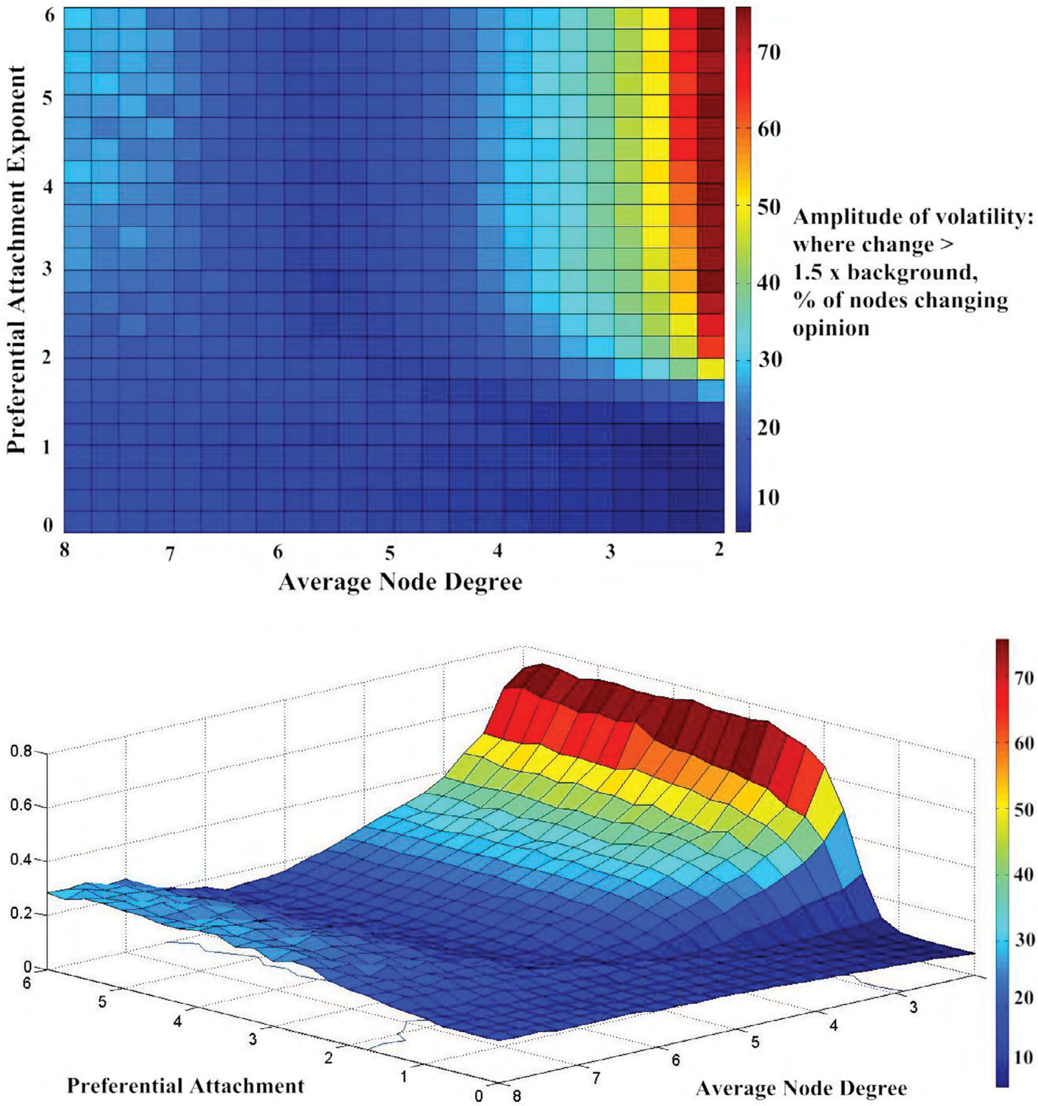


Figure 9. The amplitude of opinion volatility across democratic and anti-democratic networks.

and high average degree show the lowest frequency of volatility in the range measured. Here networks remain much in the same proportions of opinions despite small random changes in individual beliefs. The frequency of volatility increases as one move to networks in the upper right that are anti-democratic in having high preferential attachment and low degree. Here the devil is in the details, however, including details that we cannot claim to fully understand. The point with the highest frequency is that in which extremely low degree correlates with a preferential attachment exponent between 1 and 2; higher preferential attachment actually dissipates the result. The core tendency, however,

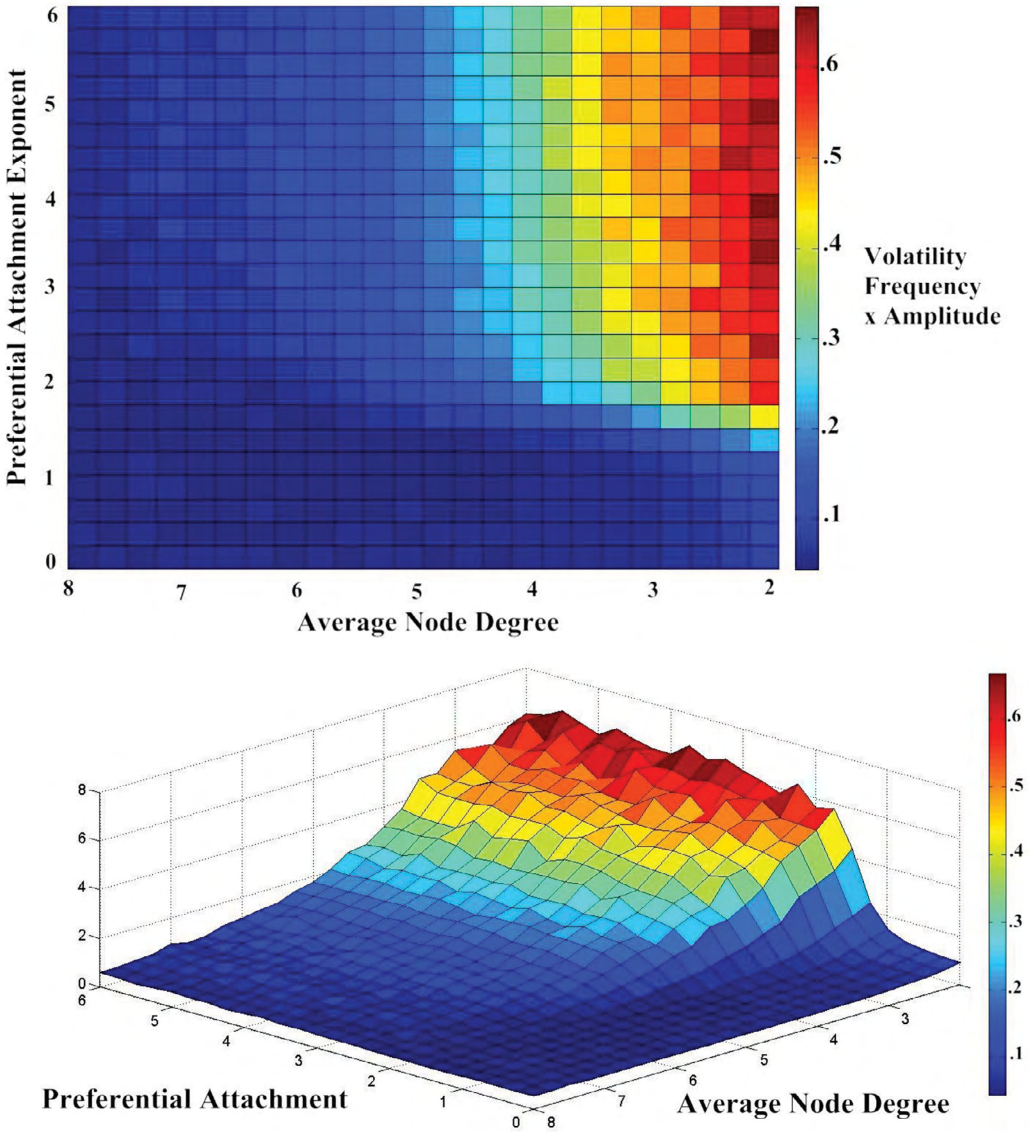


Figure 10. Multiplied measures of frequency and amplitude: a societal hazard map for opinion volatility.

is strong and obvious: the frequency of volatile opinion changes increases with the anti-democratic character of communication networks.

Figure 8 tells only half the story, however: these graphs show the frequency of volatility but not the amplitude. When a 5% change produces a more than 7.5% reaction, what is the size of that reaction? What percentage of the network changes beliefs as a result? Across the same array, the answer to this second question appears in Figure 9.

Here results are even more striking. Networks democratic in the sense of having low preferential attachment show low volatility amplitude across all node degrees. With an average degree in the democratic range above 5, the amplitude of volatility remains low despite increases in the preferential attachment. Once the preferential attachment exponent rises above 2 and average node degree falls below 5, anti-democratic networks show a steady and significant increase in volatility amplitude, approaching network changes of 75% on the right edge of the graph. Measured in terms of amplitude, anti-democratic networks prove far more volatile than do democratic networks.

Within the constraints of our model assumptions, the results seem importantly suggestive. What they suggest is that anti-democratic communication networks can be expected to be significantly less opinion-stable than democratic networks. What our models suggest, for example, is that the destabilizing influence of wide swings of opinion can be expected to occur with both greater frequency and greater depth across decreases in the two dimensions outlined for democratic networks.

We can further underscore these suggestions by combining our two measures of volatility. We simply multiply frequency of opinion volatility—the percentage of cases in which opinion change exceeds 150% of randomly introduced change—times the amplitude of volatility—the percentage of the population that shifts opinion. The result, shown in Figure 10, is something like a hazard map for opinion instability in the designing of social institutions.

What the results indicate is that the communication networks most vulnerable to volatility overall—considering both frequency and amplitude—are those that are least democratic on both of our measures: the networks with a low mean degree and high preferential attachment at the upper right. Those least affected by volatility overall are networks democratic on both our measures.

Shifting Networks, Democratic and Anti-Democratic

Opinion volatility is a plausible measure of instability in a network of political actors.

If an individual finds himself repeatedly torn between radically opposed opinions based on shifting opinions among his pattern of contacts, he seems likely to change his pattern of contacts. The result will be a change in the structure of the communication network: the network can be expected to rewire in reaction to opinion volatility.

If an abstract network rewires because of opinion volatility, in what direction can we expect it to change? In the model outlined, anti-democratic networks prove less stable in terms of opinion volatility. If those networks rewire in response to that instability, do they inevitably become more democratic? However, democratic networks are not immune from opinion volatility, either. Where democratic networks rewire, do they tend to become *less* democratic?

In the rewiring considered here, new links are created as old links are

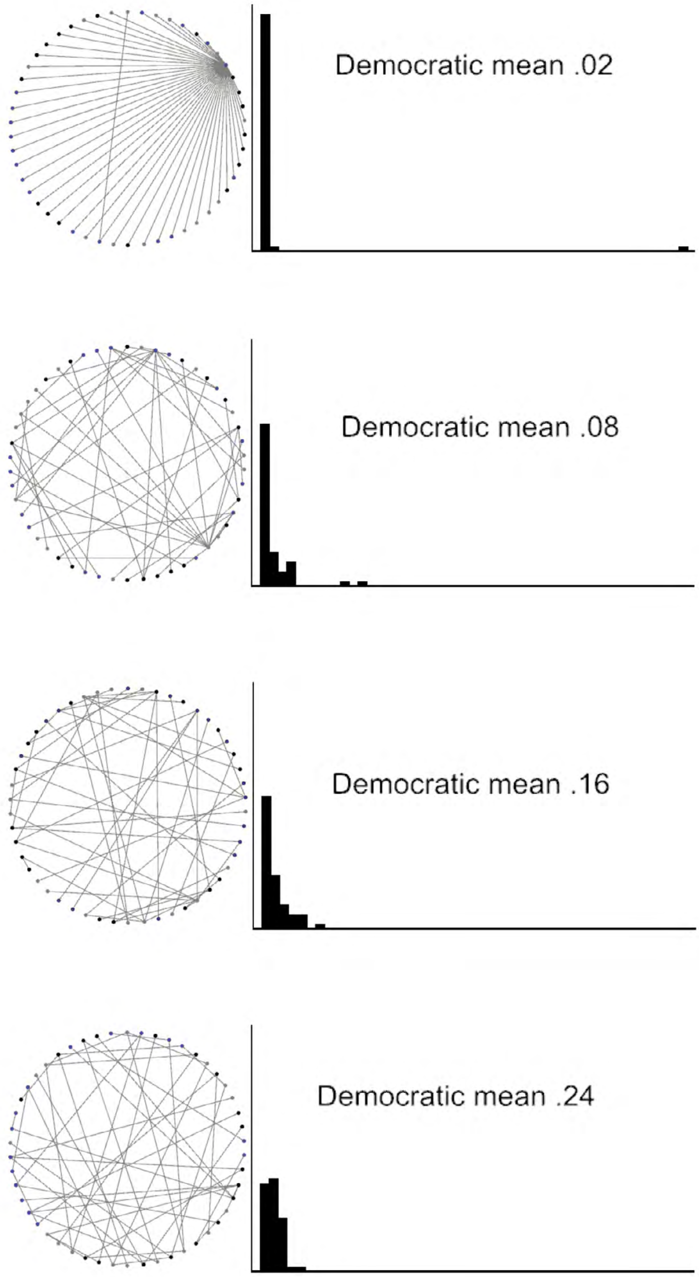


Figure 11. Sample democratic means for different degree distributions.

broken and thus average network degree will remain the same. We concentrate, therefore, on changes in the preferential attachment. In initially creating networks above, we used a preferential exponent in the generating formula. Here we introduce another measure designed to gauge preferential attachment in networks at any stage, however they have been formed or transformed.

The measure we use is the *democratic mean*, more sensitive for our purposes than Gini coefficient and easily applicable to networks before and after rewiring. Ours are connected networks, without isolated nodes. A network with a high preferential attachment will have a wide range in degree—many nodes will have few connections; a very few will have many. The ratio of the mean degree over the span between least and highest degree will, therefore, be a small number. A network with a low preferential attachment will have a much smaller range in degree, with the result that the mean degree over the difference between highest and lowest will be relatively large. The democratic mean is the ratio of a mean degree over the highest degree: the higher the democratic mean, the less the preferential attachment of a communication network and the more democratic the network is in that sense.

More formally, where *dmax* is the degree of the most connected node and *dmin* the degree of the least connected, we take the degree spread *D* as *dmax* – *dmin*. With *dm* as our mean degree, the democratic mean of a network is (*dm* – *dmin*)/*D*. For a 50-node network with extremely high preferential attachment—49 nodes with 1 connection and 1 node with 49, for example—the democratic mean will approach .96/48 or .02. In a random network with a normal distribution between 1 and 3 connections, on the other hand, the democratic mean will approach .5. Sample network distributions typical of those considered here, with corresponding democratic means, are shown in Figure 11.

How will a network rewire in response to volatility? We start with a network generated with a particular preferential exponent, then rewire in response to volatility. Will democratic communication increase, as measured in terms of a democratic mean, or not?

Volatility, as above, is stimulated by the direct change in a random 10% of our nodes at regular intervals over the course of a run. Here we count as "volatile" those nodes that change more often than they are directly changed: nodes that change opinion at least 1.5 times as often as they are directly changed by the program. These volatile nodes are those that are vulnerable to opinion change from changes elsewhere in the network as well. In all cases, we assume that it will be the volatile nodes that break links, replacing them with links to nodes. We consider each of the following as possible patterns for rewiring in response to

Random Reaction: Rewiring at Random within the Network

There is something about the reinforcement pattern of volatile nodes that makes them unstable. They, therefore, break a link at random and establish a replacement link to another node in the network, chosen at random. In the end, we can expect volatility to die down, but with a newly structured network in its wake.

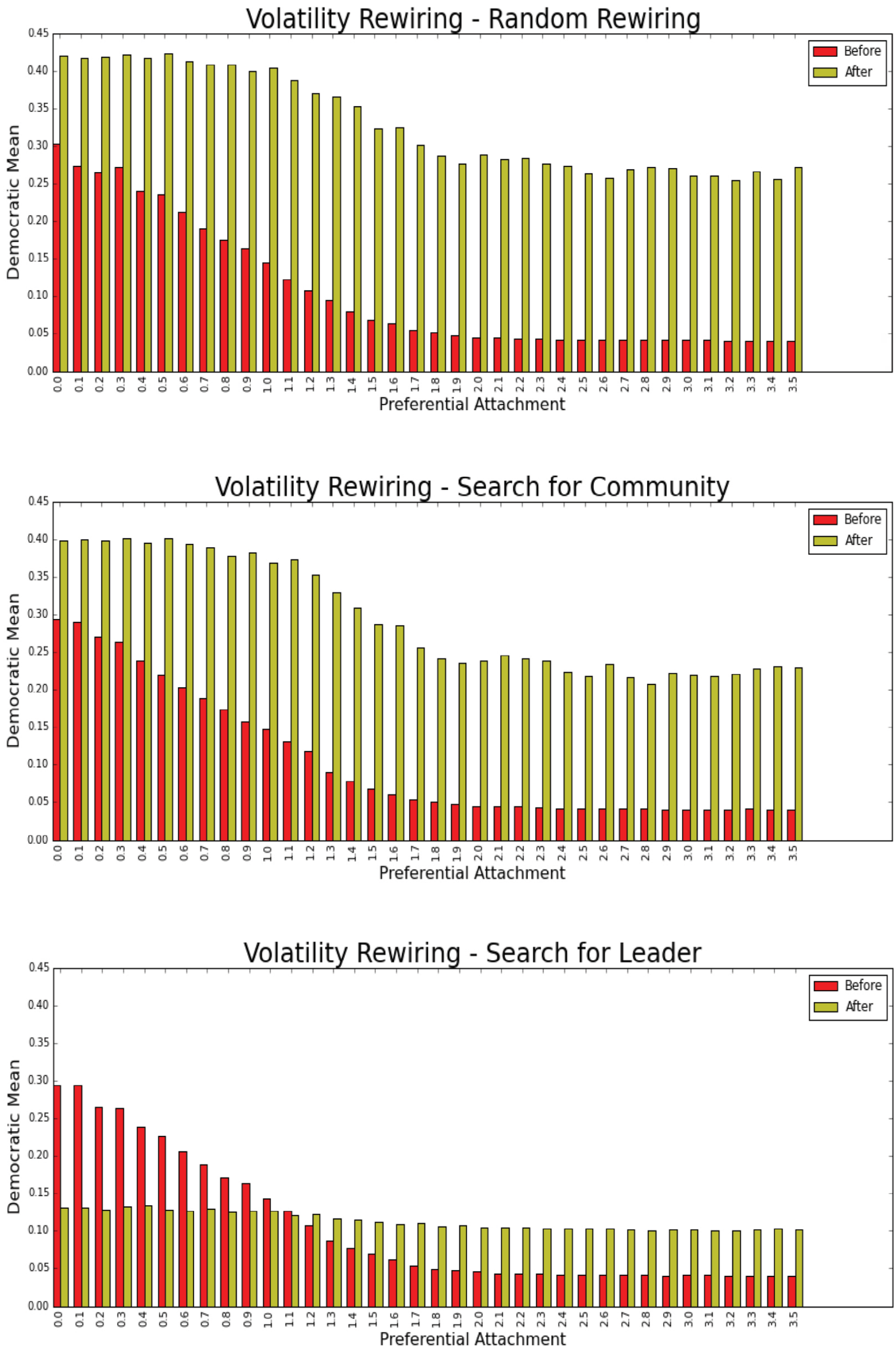


Figure 12. Change in democratic mean with different forms of rewiring in response to volatility, shown for networks with initial preferential exponents between 0 and 3.5.

Search for Community: Rewiring at Random to another Oscillator

> In the revision, volatile nodes rewire at random only within the set of volatile nodes in general: a search for community. The idea here is that opinion-vacillating agents recognize others with the same difficulty, breaking ties at random but establishing new ties *with other volatile nodes*. Here too we can expect a different network structure as a result.

Search for a Leader: Rewiring with Preferential Attachment among Oscillators

> In a third form of rewiring, nodes favor other volatile nodes but rewire in preferential attachment to other volatile nodes that have the most connections: a search for a leader.

For 50-node networks initialized with preferential exponents at .1 intervals between 0 and 3.5, 10% of the population was given random opinion changes every 10 ticks of a run, with rewiring in terms of volatility measured after 50 of those changes. Is there a difference in the new networks that form with each of these forms of updating—a difference that shows up in a change of democratic mean? We performed 1,000 runs with each form of rewiring, taking the average democratic mean of both the initial network and the result after 100,000 ticks.

The results for each form of rewiring are shown in Figure 12.

Rewiring in response to volatility results in more democratic communication networks with either of two first forms of rewiring: when that rewiring is either to random nodes or to other volatile nodes at random. Within the 100,000 tick limits of our study, the final democratic mean is lower for networks that start with high initial preferential attachment, though the percentage of change for those is even more dramatic.

One of the interesting aspects of this result is that all the networks considered become more democratic with these two forms of rewiring. This includes even those networks that are initially the most "democratic" in our sample—those on the lowest end of our preferential exponent scale. As noted in passing, even networks formed initially with a preferential exponent of 0 are not purely random. The order of attaching new nodes in sequence, in the manner of Barabási and Albert (1999), inherently biases degree distributions in favor of the first nodes. With rewiring to either other nodes or other volatile nodes at random one typically gets a network more random than one with preferential attachment 0—a network even more democratic than those on our initial scale.

The third case, however, is different. Rewiring as a "search for a leader," itself following a pattern of preferential attachment among volatile nodes, results in a more democratic network only when the initial network had a preferential attachment of greater than 1.1. For networks that are initially more democratic than that, volatility rewiring in a "search for a leader" results in a *less* democratic network.

Two related observations are of particular note with regard to rewiring in response to "search for a leader." Both of these we consider worthy of further investigation. The first observation is that there is a tipping point at an initial preferential attachment exponent of 1.1 or so: below that, point networks become more democratic with rewiring; after that point, they become less democratic.

The second observation is "search for a leader" results in virtually the same level of democratic mean regardless of the initial preferential attachment of the network. "Leader-searching" rewiring in response to volatility, whatever the original network, results in a democratic mean of approximately .13, corresponding to a preferential attachment exponent of approximately 1.1. Interestingly, this is very close to the preferential attachment exponent that Barabási and Albert claim to be particularly characteristic of scale-free networks across a wide social and economic range (Barabási & Albert 1999).

Conclusion

In broad strokes, at least, our results accord with a range of research in political communication. Social media has emerged as a major tool for the spread of information in both authoritarian regimes and western democracies. Several previous studies indicate that it is authoritarian regimes that prove most vulnerable to that wider information (Loader & Mircea, 2011; Shirky, 2011). A specific example is the powerful role of social media during the Arab Spring (Sottilotta, 2003; Stepanova, 2011), in which multiple authoritarian regimes demonstrated sudden and unexpected volatility. We also find our results to be consistent with the vast literature in American politics emphasizing the central role of open and high-quality information in the health of a democracy (Gillens, 2001; Levendusky, 2013; Prior, 2017; Van Aelst et al., 2017).

The models explored here are minimal models, clearly abstracted from a messier reality in a number of crucial ways. Unlike the social networks that are their target, the networks employed here are carefully constructed in terms of two variables representing aspects of democratic communication: characteristic node degree and extent of preferential attachment. With those radical simplifications in mind, what we claim is a series of intriguing suggestive results regarding stability and democracy.

In detail, our results are nuanced, with important specifics most clearly illustrated in the graphs above. As a rough overview in summary, however, what our results suggest is that abstract anti-democratic networks, measured with parameters of relatively low node degree and relatively high preferential attachment, may prove inherently unstable in an intriguing way. Anti-democratic networks seem to exhibit a higher propensity for opinion volatility, including volatility across large blocks of the population.

Were one to try to design a social structure that encourages wide swings of opinion, these results suggest, one could hardly do better than a structure with low node degree and high preferential attachment. Were one to design a structure that most effectively diffuses widespread opinion volatility, that structure would be democratic both in the sense of high characteristic node degree and low preferential attachment. Within the limits of the study, democratic networks prove significantly more stable in terms of both frequency and amplitude of opinion volatility.

We have taken volatility further as a sign of network instability, treating instability in turn as a plausible predictor of dynamic network change. Where networks do change in response to rewiring of volatile nodes, the change in networks structure very much depends on the form of rewiring at issue. If volatile nodes reconnect to other nodes at random or to other volatile nodes at random, the result is a clear and robust increase in the democratic mean of a network. If, on the other hand, volatile nodes reconnect preferentially to that volatile node with the highest number of existing connections—a "search for a leader" in the form of preferential attachment—networks with high preferential attachment may become more democratic but those with low preferential attachment consistently become less democratic. Precisely why the tipping point is where it is and why "search for a leader" seems to lead to the same democratic mean regardless of the initial structure are issues that call for further investigation.

The results remain suggestive, but intriguingly so. Volatility studies within carefully constructed networks suggest is that anti-democratic communication networks may prove more vulnerable to de-stabilizing opinion volatility. Where networks change in response to that volatility, both random rewiring and "search for community" lead to more democratic communication networks. "Search for a leader" may not.

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