By Marc Porter Magee, Ph.D. July 2022

Change Agents: What Social Simulations Can Teach Public Policy Advocates

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Advocacy Labs_

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About the Author
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About AdvocacyLabs
AdvocacyLabs is an initiative of 50CAN and FutureEd that provides insight into how change happens in education policy, using reports, briefs, interviews and events grounded in academic research and exclusive data from education advocacy organizations to illuminate what works and why in policy advocacy. Follow us on Twitter at @AdvocacyLabs.

About 50CAN
50CAN: The 50-State Campaign for Achievement Now is a locally led, nationally supported nonprofit education advocacy organization committed to a high-quality education for all kids, regardless of their address. Follow us on Twitter at @FiftyCAN.

About FutureEd
FutureEd is an independent, solution-oriented think tank at Georgetown University's McCourt School of Public Policy, committed to bringing fresh energy to the causes of excellence, equity, and efficiency in K–12 and higher education. Follow us on Twitter at @FutureEdGU.

Foreword

We launched AdvocacyLabs in 2019 to help advocates tap the rich trove of insights from academia and apply research to the real-world questions advocacy leaders are asking themselves every day. Over the past three years we have published a variety of reports, from a comprehensive review of the academic literature on effective advocacy to interviews with leading academics about what they have learned in studying advocacy and findings from the growing field of experimental studies of advocacy campaigns.

In this latest report, we focus on the frontiers of advocacy research by mining insights from the world of social simulations. Sometimes creating an artificial world where one can test out nearly unlimited scenarios and conditions offers the best insight into effective ways to advance change. That's exactly what a pioneering group of social scientists has done with surprising and illuminating results.

This report draws seven insights from the social simulation literature to help advocates build effective campaigns on behalf of a more just future for all students.

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Introduction

"The fundamental problems of sociology ... arise from the organic nature and constitution of society. It is not a Newton that sociology is waiting for, but a Darwin." — Leslie White, 1943

"Perhaps one day people will interpret the question, 'Can you explain it?' as asking 'Can you *grow* it?'" — Joshua Epstein and Robert Axtell, 1996

Is it possible to build simulations of the social world that help advocates seeking societal change? In this report, we explore how social scientists are striving to do just that through the creation of computer models of society that grow and change over time.

The starting point is a shift in perspective from one focused on individuals in a specific time and place to one focused on the patterns that arise over time through the interactions of hundreds or thousands of people. Just as you can't understand the flow of running water by catching it in a bucket or appreciate the image in a stained-glass window after it has been disassembled into individual pieces of glass, these social scientists argue you can't discern the causes of social change without a way to observe, manipulate and reproduce the social patterns that emerge when humans gather together in groups.

That's where computer simulations come in. They make it possible to build artificial societies that reveal the hidden mechanisms underlying social structures and shaping collective behaviors.

While these desktop laboratories can't capture everything about our social world, they can point us in the right direction. Just as road maps contain enough detail about our physical world to help us get where we need to go, simulated societies help advocates more easily find their way to the social outcomes they seek.

Each chapter in this report focuses on a key feature of the social landscape:

1 *Persuasion*. How do you forge consensus in support of bold actions? Simulations show the best strategy is to start with a goal slightly beyond a group's comfort level, and then promote increasingly bold goals over time.

2 *Influence*. Advocacy campaigns are driven by efforts to shift behavior in service of a common goal. Simulations show that early actions by a few individuals can create social cascades that bring many others into a cause, but only if these early actors are visible to the people they hope to influence.

3 *Engagement*. Building a movement that lasts long enough to secure real change means solving the problem of motivation. Simulations show that the best way to engage fellow advocates is to show them that their work matters.

4 *Connectivity*. What kinds of societal factors make the greatest difference in helping change agents achieve the scale needed for success? Simulations reveal that higher levels of community connectivity via social media and other mass communication tools dramatically increase the likelihood that social change efforts reach critical mass.

5 *Segregation*. Our world is full of racial, ethnic and class inequalities, among many others. Simulations show how important it is to stop small prejudices from snowballing into large-scale and persistent segregation.

6 *Polarization*. We live in an age of stark divisions between people of different beliefs. Simulations reveal the way group boundaries push people towards extreme views and how recognizing this tendency can help advocates prioritize bridge-building across differences.

7 *Revolution*. Sometimes change happens through sudden shifts in societal norms or abrupt regime change. Simulations reveal the logic of these social transitions and provide advocates with a view of the underlying patterns that cause some revolutions to succeed while others fail.

1 Persuasion

How do advocates forge consensus for bold actions? Simulations show the best strategy is to start with a goal slightly beyond a group's current views, and then promote increasingly bold goals over time.

Leadership takes many forms in advocacy, but one of the most important is forging a consensus for bold actions among a group of people who might otherwise stay on the sidelines. But what leadership style is most effective?

To help answer that question, University of Cincinnati sociologists William E. Feinberg and Norris R. Johnson set out to create a simulated world where advocates aim to rally crowds using different approaches under varying conditions. Creating simulations requires a series of decisions about how to represent these artificial actors and their environments.

For their simulation, Feinberg and Johnson created an artificial town square where outside agitators could interact with more than 600 fellow citizens. The agitators are given skills that mirror the key characteristics they might need to be successful in the real world, including the ability to assess the level of support for their cause within a target group, the ability to influence the group, and the ability to assess how group members' positions are shifting in response to their efforts. To further capture the dynamics present in real world social situations, the researchers set up their simulation so that "crowd members may react to the action cue by changing their physical distance from the sources and/or physically moving ... If consensus for crowd action is reached, the process ends ... if consensus is not reached, the milling continues."

In the study, published in The *Journal of Mathematical Sociology*, agitators use three different strategies: 1) *persistence*, where they uncompromisingly advocate for their cause with every group they meet, 2) *escalation*, where they initially moderate their position and then seek to bring the crowd along to a more radical position, and 3) *compromise*, where they start with a radical position they then gradually moderate in an attempt to gain support.

To gain additional insight into which approaches work best, Feinberg and Johnson tested two versions of the escalation and compromise strategies: 1) *certainty*, where the leaders seek support from the crowd at each step in the progress, and 2) *uncertainty*, where they move forward regardless of the crowd's reaction to their appeals.

In addition to differences in strategy, they also introduce environmental differences by varying "the degree of risk or caution of the agitator ... the certainty of crowd consensus required at one position before escalating to the next ... the time (measured by number

of cycles) they wait before moving to a less radical position" as well as "crowd size, sorting, and ambiguity indicators" to understand if "the advantage found for the escalating strategy holds across a range of conditions."

With all these rules in place, Feinberg and Johnson then ran the simulation in 12 different contexts, varying the initial environmental conditions and different agitator strategies and tracking the influence on the overall success of agitators in their attempts to win over a crowd.

A clear insight emerged: the escalation-certainty strategy, "in which the agitator increases successively the radicalness of his/her position only with the assurance that a consensus has been achieved at the less radical action-choice," was by far the most successful. Stated a different way, if you want to win over a crowd to your bold position, start with a more moderate message and slowly increase the boldness of your appeal while constantly checking with the group to see how they respond.

Why does this strategy work so well? Feinberg and Johnson find that agitators using this approach are "in effect posing as one of the group in order to gain its confidence and overcome any suspicion," which in turn ensures "that the escalation does not occur too rapidly, thereby risking the potential subversion of the gains from posing as one of the group."

By contrast, agitators using a compromising strategy where they start out assuming a more radical position and then moderate their views risk "alienating and even driving away many in the crowd by initially advocating action-choices much more radical than represented in the crowd of moderates."

The lessons

1 If you want to forge a consensus for bold actions, the first step is to establish yourself as a member of the group.

2 Start with positions acceptable to most group members and then grow bolder over time.

3 The key is to listen to the people you are trying to win over, testing incrementally bolder statements to see how they respond until you have reached your desired outcome.

2 Influence

Advocacy campaigns are driven by efforts to shift behavior in service of a common goal. Simulations show that the early actions of a few can create social cascades that energize the many, but only if these early actors are in the right place at the right time.

Mobilizing large numbers of people is one of the most important aspects of any advocacy campaign. What can we learn about the ways in which small initiatives by individuals in everyday situations add up to big shifts in collective action?

One area of behavior that has received ample attention in mathematical and computation models is the standing ovation. Here is how Carnegie Mellon University economist John Miller and University of Michigan economist Scott Page framed the question in their 2014 article "The Standing Ovation Problem," published in the journal *Complexity*. A performance ends "and the audience begins to applaud. The applause builds and, tentatively, a few audience members decide to stand. Does a standing ovation ensue or does the enthusiasm fizzle?"

What makes this question so interesting is it can help uncover patterns of action that provide insight into a wide variety of issues related to a small group's efforts to influence a crowd.

"Though ostensibly simple, the social dynamics responsible for a standing ovation are complex," Miller and Page write. "Of course, if the decision to stand is simply a personal choice based on the individual's own assessment of the quality of the performance, the problem becomes trivial. However, people do not stand solely based on their own impressions of the performance. A seated audience member surrounded by people standing might be enticed to stand, even if he hated the performance."

To uncover the hidden variables driving these collective behaviors, Miller and Page simulated an auditorium. In modeling a standing ovation, they sought to "explicitly account for many aspects of social interaction ... the spread of information, the timing of events, and the behavior of the agents."

The baseline model contains a square auditorium with 400 seats. Initially, "audience members make their decisions based solely on perceived quality." After that initial behavior, "each agent decides what to do entirely on the basis of what other audience members are doing." Miller and Page argue these initial assumptions are "sufficient to generate some interesting results, and the symmetry induced by the use of identical rules for sitting and standing greatly simplifies the analysis."

What did they find? First, "the system often converges to the 'wrong' equilibrium—that is, most

people can be standing even though most did not like the performance." Second, "greater pressures to conform … lead to a less efficient aggregation of information," a wider gap between individual beliefs and group behavior. Third, a simple linear model doesn't work when trying to understand how these behaviors spread and instead "the number of people standing over time tends to be roughly S-shaped" so that it starts slow, climbs rapidly in the middle and then tapers off again at the end. Fourth, "people in the front can have a large impact."

The importance of visibility is particularly crucial to understanding why and how the choices of individuals to stand translate into a collective pattern that sweeps the hall. "People in the front rows have more signaling power than people in the rear," they write. "Although people in the front can be seen by nearly everyone, people in the rear cannot. If the entire front row of audience members were to stand at the conclusion of a performance, they make their preferences known to everyone in the audience. In contrast, if the people in the back row were to stand, their preferences might only be known to people in the one or two rows adjacent to theirs."

The lessons

1 If you want to shift the behavior of a crowd, you must be willing to stand apart from the crowd by being the first to act.

2 How many people follow you depends in large part on how visible you are.

3 When the location and timing are just right, a small number of people can create a social cascade.

3 Engagement

Building a movement that lasts long enough to secure real change means solving the problem of motivation. Simulations show that the best way to engage fellow advocates is to show them that their work matters.

How do you sustain a protest once you have started it? This is a simple question that can be incredibly hard to answer. Put differently, we might ask: Are sustained movements the result of good luck or are there patterns that can be discovered amidst the complexity of social life?

To find out, University of Kansas political scientists David Brichoux and Paul Johnson created a social simulation that models the interactions between the citizenry of a simulated city and the advocates trying to rally them to their cause.

Published in the *Journal of Artificial Societies and Social Simulation* in 2002, Brichoux and Johnson's paper utilized "an agent-based simulation model of protest activity." The simulation places agents within a city-like environment and allows them to observe the activities of other people within a certain radius and then decide whether "to join or withdraw from a collective protest action."

The advocates in the simulation "are agents who will protest no matter what happens." The ordinary citizens, however, "can observe the behavior of people within a limited neighborhood" and are programmed to join a protest only when they think their participation will make a difference. Because of this motivation, without their involvement "the probability of success cannot be too high or too low, or they will refuse to act."

What happened when the researchers ran the simulation over thousands of iterations? Brichoux and Johnson found that under some conditions a small group of advocates "whose only resource is commitment, or the propensity to protest and keep protesting" could lead by example, "producing a larger and sustained protest in which most participants are not members of the original group." Stated more simply: "Just a few activists can have a major impact, if conditions are right."

What are those conditions? Brichoux and Johnson found not a simple set of rules but instead a complex interaction between key parameters such as "regime resistance," vision, and population.

Patterns emerged in the complexity that may prove useful to aspiring change agents. The simulations revealed, for example, that when "we add activists into a world with a very responsive government, the impact is not too great … protest does not grow, because the regime is too responsive

to the protesters' wishes." Not surprisingly, perhaps, "individuals who might join and pitch in are discouraged because only a small amount of collective effort is needed and because others appear willing to provide it."

By contrast, when "regime resistance is high, adding a few activists can make a big difference because activists raise the probability of success significantly in their neighborhood, and the new, more hopeful estimation spreads." In the simulation, the introduction of just 20 activists to the city increased participation in a protest to about 60 percent of the population.

The lessons

1 The willingness of committed activists to lead by example is critical to a movement's success.

2 When governments appear to be responsive to protests, it can discourage large-scale mobilizations because bystanders don't think their involvement is needed.

3 When governments don't appear to be responsive, the actions of a small number of advocates can lead to widespread mobilization.

4 Connectivity

What societal factors help change agents scale protests? Simulations reveal that higher levels of community connectivity via social media and other mass communication tools dramatically increase the likelihood of movements reaching critical mass.

Do the technologies that connect us—like social media—make new kinds of social movements possible?

To answer that question, Joshua Epstein, director of the Center for Advanced Modeling at Johns Hopkins University, simulated the 2011 Arab Spring in his book *Agent_Zero*. In Epstein's model, change agents must choose whether to combat the ruling authority during "the initial resistance and overthrow phases of a stylized revolution" based on the 2011 Tunisian, Egyptian, and Libyan revolutions.

While social media enables connectivity, it doesn't usually create the underlying grievances that can spark an uprising. That connectivity, however, may facilitate the uprising's amplification and in so doing make the difference between failure and success.

To better understand these dynamics, Epstein ran his model with varying levels of connectivity between individuals, from no social connection to a fully connected society. The same level of grievance exists in every scenario; only the level of social connectivity differs.

Epstein found that in low-connectivity environments, "despite antigovernment affect rising to maximal levels," no rebellious action occurs. When the level of connectivity is increased, resentments spread, common opposition grows, and "local uprisings occur, replacing the government."

Crucially, as Epstein notes, high levels of connectivity—such as that achieved through social media and other real-time communications—can turn even low levels of antigovernment sentiment into powerful engines of regime change.

Another insight from the simulation is the way in which high levels of connectivity can reduce the need for strong leadership to spark mobilization. "It is truly the network—the swarm," Epstein observes, "that is making the revolutions ... Social media have made this possible" by strengthening "ties from the bottom up, on a global scale." Epstein names the phenomenon the "Revolt of the Swarm."

The lessons

1 Grievances are necessary but not sufficient to spark a movement that leads to real change.

2 One of the most important factors in modern movements is the degree of social media connectivity within a citizenry.

3 In a highly connected society, movements can emerge from relatively low levels of frustration and without strong top-down leadership.

5 Segregation

Our world is full of racial, ethnic and class inequalities, among many others. Simulations show how important it is to stop small prejudices from snowballing into to large-scale and persistent segregation.

One of the most persistent problems across societies is segregation, where two or more groups are separated from each other in their daily lives. While segregation has many causes, one of the more pernicious is the way small individual choices can add up to pervasive society-wide divisions.

To better understand this process, University of Maryland economist Thomas Schelling created a simulation to see if he could tease out the ways in which segregation emerges from these micro-phenomena. Schelling's model, published in *The Journal of Mathematical Sociology*, focused on the concept of "neighborhood tipping" where "exaggerated separation and patterning result from the dynamics of movement." He sought to understand how "small incentives, almost imperceptible differentials, can lead to strikingly polarized results."

While Schelling is most interested in understanding this concept from the perspective of racial segregation in America, the model itself works with "any twofold distinction ... whites and blacks, boys and girls, officers and enlisted men, students and faculty, teenagers and grownups."

He built several assumptions into the simulation: A population that is "exhaustively divided into two groups" where "everyone's membership is permanent and recognizable." People in the simulation "care about the color of the people" they live among and are able "to observe the number of blacks and whites that occupy a piece of territory." Every person has a particular location at any moment. And every person in the simulation "is capable of moving if he is dissatisfied with the color mixture" of a given location.

People are randomly distributed in the model across an artificial "checkerboard" space with "a suitable fraction left blank for ease of movement." Agents are aware of who occupies the other squares in their neighborhood, which is defined as "eight surrounding squares that, together with one's own square, form a 3 x 3 square."

Schelling ran the simulation in multiple ways to test the effect of the changes in "numbers of blacks and whites, their color preferences, and the sizes of 'neighborhoods'" in an environment "with a limited capacity, like real residential neighborhoods with some fixed number of houses or schools with a limit on pupils." At the end of a cycle in the simulation, Schelling assessed how the distribution of the two groups had

changed based on the choices of the members.

Schelling found that if "there is a limit to how small a minority the members of either color are willing to be—for example, a 25 percent minority" then "initial mixtures more extreme than that will lose their minority members and become all of one color. And if those who leave move to where they constitute a majority, they will increase the majority there and may cause the other color to evacuate." In other words, even if individuals aren't seeking out completely segregated communities, their individual preferences to avoid being part of a small minority in their neighborhood inevitably lead to the outcome of total segregation.

Where might this phenomenon be most pronounced? Schelling's simulation points towards environments made up of comparatively small and well-defined geographic boundaries. Schelling concluded: "City school systems evidently lend themselves to the phenomenon" since people's preferences interact with sharply drawn boundaries in a way that can lead to greater separation along racial and class lines.

The lessons

1 Sometimes individual choices add up to large-scale patterns that the individuals involved couldn't predict or didn't chose.

2 In order to understand large-scale social phenomena like segregation, it's important to look at the ways individual preferences can cascade into big changes.

3 Efforts to combat segregation can benefit from the insight that some public infrastructure—like city school systems—may be particularly vulnerable to cascading individual preferences, which in turn may expand into large-scale divisions.

6 Polarization

We live in an age of stark divisions between people of different beliefs. Simulations reveal the way group boundaries push people towards extreme views and how recognizing this tendency can help advocates prioritize bridge-building across differences.

If Schelling's simulations help illuminate the ways individual preferences can create strong patterns of segregation, do such preferences also contribute to the polarization of public opinion?

To find out, Bert Baumgaertner and Stephen Krone of the University of Idaho teamed up with Rebecca Tyson of the University of British Columbia to see what happens when differences of opinion are amplified through confirmation bias in repeated interactions with neighbors.

They utilized an agent-based model that includes a "spectrum of opinion strengths" and several different rules for how the opinion strength of one individual affects others. They note that the "expanded spectrum allows us to explore the effects of unequal influences and the hardening of opinions."

In the model, individuals are characterized by the intensity of their attitudes. The simulation is focused on a series of interactions between neighboring individuals during which individuals adjust their attitudes based on the opinions they encounter.

Published in *The Journal of Mathematical Sociology* in 2016, the study revealed a "small probability for hardening of opinions is magnified at the macro-level, producing ever larger clusters of opinions with fairly well-defined boundaries, eventually leading to polarization in the spectrum of opinions." In other words, there is a natural tendency to create self-reinforcing cliques around our beliefs.

The boundaries of these cliques create a kind of social "surface tension" that both holds a group together and separates it from surrounding opinions. As these groups grow in size, members located at their core become more and more insulated from any differing opinions.

Indeed, as Schelling's simulation showed with our tendency toward self-segregation, it is these self-reinforcing group boundaries that make polarization possible. Baumgaertner, Tyson and Krone write: "This might help explain why there is a tendency for political parties to become extreme in their views. It may also explain the geographical contiguity of like-minded voters." Once the group's walls are firmly established and no "breach" of challenging or contradictory data is possible, the drift towards extreme beliefs becomes inevitable.

"In this sense," the researchers conclude, "our model is another example of how small changes in the micro-level (in our case a small amount of amplification) can produce a large effect at the macro-level."

The lessons

1 A natural tendency to seek out people who share our views can very easily snowball into group think and hyper-polarization.

2 Individual preferences can quickly lead to clusters of opinions with clear boundaries that discourage people with different beliefs from joining in.

3 Recognizing this natural pull towards polarization can encourage advocates who are seeking larger coalitions to make greater investments in the bridge-building needed to overcome these trends.

7 Revolution

Sometimes change happens through sudden shifts in social norms or abrupt regime change. Simulations reveal the logic of these social transitions and provide advocates with a view of the underlying patterns that cause some revolutions to succeed while others fail.

When does radicalization lead to revolution? That's the question asked by University of Trento sociologists Eugenio Dacrema and Stefano Benati in their paper "The Mechanics of Contentious Politics: An Agent-based Modeling Approach," published in *The Journal of Mathematical Sociology* in 2020.

Dacrema and Benati combine agent-based modeling and network game-theory in a simulation that explores the factors leading to the radicalization of politics and a range of possible outcomes, including "violent or peaceful uprisings ... government change through elections" and situations where "ruling regimes may manage to resist power and can even reverse the process."

They look at the interaction of four societal variables—repression, inequality, social tolerance, and interconnectivity—during a contest between two political entities: "the regime" and "the opposition." In the simulation, the regime "needs the support of the majority of the citizens. When it ceases being majoritarian, a regime change occurs, and the opposition becomes the new ruling party."

In each run of the simulation, Dacrema and Benati introduce a shock to the system in the form of "a sudden change of agents' private opinions ... intended to simulate the deterioration of the society's socioeconomic situation." They then run the simulation to see whether this shift sets a big change in motion or causes it to fizzle out.

What do they discover about the conditions that do or do not lead to revolt?

First, the flexibility of democratic societies makes them harder to fundamentally disrupt because "social discontent generated by socioeconomic shocks turns into a political change" that heads off a larger revolt. Put another way, democracies are better at sapping social movements of the anger needed to fuel a revolution.

Second, "Successful revolts sparked by an apparently negligible event are usually the result of the cumulative effects of previous shocks. Those shocks increased the fragility of the system without making it apparent."

Third, in authoritarian societies "when the opposition takes over the government, it finds more support from the elite than from the medium and lower class."

Finally, in authoritarian societies there is a "higher variance of the number of shocks necessary to achieve regime change, making its evolution less predictable."

"In recent years, the association between increasing

inequality and revolts has grown in popularity," Dacrema and Benati observe, "leading to a widespread belief that high inequality leads inevitably to more contentious actions, populist politics, and uprisings." Yet their simulations reveal that intermediate levels of inequality often cause more contention than very high levels and that lower levels of inequality generate more support for opposition parties than higher ones.

Why doesn't high inequality lead to more protests? Because those conditions reinforce the status quo by denying poor people the very resources needed to challenge their economic conditions. In other words, you need both a reason to fight and enough reasons to think you have a chance to win.

Echoing the findings of Joshua Epstein, the authors also find that "high levels of interconnectivity via social media and real-time communication play a fundamental role in curbing the gradualness of change and in making sudden switches in political behavior more massive."

"After the first socioeconomic shocks, especially in very interconnected societies, the network effect compacts the average political behavior in favor of the ruling regime, making it look robust and stable," they write. "Then, after a sufficient number of shocks, the same network effect compacts the public opinion in favor of the opposition, causing a sudden and dramatic rise in the number of its supporters."

Finally, the simulations suggest that revolt is more likely to originate among members of the elite than among members of poorer classes, despite the latter often suffering relatively more from socioeconomic shocks.

The lessons

1 If you are looking to secure sweeping changes, it helps to build upon the waves of change that came before.

2 The more rigid and authoritarian the system you are looking to change, the more unpredictable the opportunities will be.

3 High levels of social interconnectedness can help advocates move more quickly to take advantage of these opportunities and secure dramatic shifts in short periods of time.

Selected Articles

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About AdvocacyLabs

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