

Success-Breeds-Success in Collective Political Behavior: Evidence from a Field Experiment

Arnout van de Rijt,^{a,b} Idil Afife Akin,^b Robb Willer,^c Matthew Feinberg^d

a) Utrecht University; b) Stony Brook University; c) Stanford University; d) University of Toronto

Abstract: Scholars have proposed that the emergence of political movements is highly path-dependent, such that early mobilization successes may lead to disproportionately greater eventual success. This article replicates a unique field experiment testing for positive feedback in internet petition signing (van de Rijt et al. 2014). The prior study found no significant effect of signatures bestowed by the experimenters on the signing rate of 200 online petitions posted to a political petitions website (<http://www.change.org>), but this may have lacked power because of its sample size and variation across petitions. We report on results of a new field experiment in which we posted 400 petitions differing only in tightly controlled ways to the same website, varying the number of experimentally bestowed signatures across a wider range than in the original experiment. Subsequent petition signing increased monotonically with the treatment, confirming the presence of positive feedback. These results support the existence of success-breeds-success dynamics in the mobilization of collective political behavior, confirming that early success can increase the attractiveness of collective action to potential supporters. However, while significant, the effect of prior signatures was small, suggesting that cumulative advantage effects resulting from popularity metrics may play a minor role in collective action outcomes.

Keywords: success-breeds-success; cumulative advantage; collective action; field experiment; political action; internet petitions

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MUCH research on social movements seeks to explain differences in the success of collective action initiatives as the result of preexisting determinants of mobilization potential, such as political opportunity structures (Schwartz 1976; Tilly 1978; McAdam 1982; Tarrow 1989; Meyer 2004), ideological frames (Snow and Bedford 1988; Fisher 1993; Somers and Block 2005), and ties to elite actors (McCarthy and Zald 1973; Jenkins and Perrow 1997). However, theorists have argued that substantial inequality can emerge even among units and circumstances that are a priori equivalent, namely through positive feedback operating on random, incidental advantages of some units over others. Myriad mechanisms of "cumulative advantage" (DiPrete and Eirich 2006)—social influence, legitimacy, visibility, learning—can lead these early successes to raise the probability of future success. The result is the endogenous creation of inequality, or the "Matthew Effect" (Merton 1968), increasingly distinguishing successful from unsuccessful persons, campaigns, organizations, innovations, or products that were once of comparable potential and merit.

The assumption of positive feedback plays a key role in sociological theories of collective action (Granovetter 1978; Oliver and Marwell 1988; Macy 1991; Heckathorn 1996; Kim and Bearman 1997; Willer 2009; Centola 2013). Collective action initiatives are assumed to have an interdependence structure whereby larger

numbers of initial participants provide greater incentives for others to also join. A critical mass of initial activists may then set in motion a bandwagon process, bringing ever more recruits on board of a social or political campaign (Oliver and Marwell 1988). The existence of such a feedback process would suggest that political mobilization can be path-dependent, as movements that encounter greater early mobilization success achieve greater long-run support.

Identifying cumulative advantage in observational data is difficult because of the natural correlation between past and future success generated through unobserved time-constant factors and by confounding dynamic processes. Distributional extremities, such as power-law tails, may be consistent with basic models of positive feedback (Simon 1955; Price 1976; Barabási and Albert 1998) but can also result from a host of other sources, such as convex relationships between unobserved traits and success (Allison 1980; Newman 2005; Stumpf and Porter 2012). To overcome these difficulties, recent studies have employed experimental methods to identify positive feedback using randomization in online environments that were either artificially constructed (Salganik, Dodds, and Watts 2006; Margetts et al. 2011) or naturally occurring (Hanson and Putler 1996; Bond et al. 2012; Muchnik, Aral, and Taylor 2013; van de Rijt et al. 2014; Gonzalez et al. 2015).

However, to our knowledge, no direct field experimental evidence yet exists for success-breeds-success dynamics in political mobilization. Here, we focus on a field experiment reported in van de Rijt et al. (2014). These researchers selected 200 petitions that had recently been posted on the <http://www.change.org> platform and added 12 signatures to a randomly selected 100 of these petitions. Over the course of the subsequent two weeks, they observed a gradually increasing gap in the number of third-party signatures between conditions. However, the gap was small—2.32 versus 1.74 signatures on average—and fell short of statistical significance at the 0.05 level ($p = 0.079$ in a rank-sum test). The question we ask is whether there is in fact a cumulative advantage effect in online political petition signing.

After the two-week observation period, petitions in van de Rijt et al.'s (2014) study had practically stopped accumulating signatures, so extending the study does not provide an opportunity for further testing. Instead, we repeated the study on the original platform with an improved design aimed at increasing statistical power. First, we doubled the number of petitions. Second, rather than adding signatures to existing petitions posted by other users, we created and posted our own petitions, allowing us to minimize variation in the content and style of petitions. Third, we received approval from the <http://www.change.org> team to add up to 60 signatures per petition, enabling us to increase the magnitude of the treatment. The results of this new experiment show a positive and statistically significant effect of prior signatures on subsequent signatures, confirming the success-breeds-success hypothesis in the context of political mobilization. However, while significant, we also find that the effect size is very small, suggesting a limited role of social influence-driven feedback in the explanation of online petition success.

Methods

The protocol of our experiment was approved by the Committees on Research Involving Human Subjects at Stony Brook University (CORIHS #2014-2794, 649657-8). A key objective in the design of the experiment was minimizing differences in the goal and appeal of petitions. We felt that simply repeating the same petition 400 times would violate community guidelines against spam and would anger users noticing duplicates, so we sought to preserve meaningful variation across petitions. Our strategy was to petition the same general topic of U.S. economic inequality but to do so in 400 different ways. The 400 petitions varied across three dimensions. First, a distinct petition was made for each of the 50 U.S. states, each targeted at the governor, lieutenant-governor, and legislature of that state. Second, four distinct public policies for achieving greater equality were proposed to each state. Petition slogans for these were “Raise the capital gains tax on the rich,” “Raise the income tax,” “Institute a millionaire tax on the rich,” and “Institute a wealth tax on the rich.” The proposed public policies were tailored to the existing policies of the targeted state. For example, 11 states already had a “millionaire tax” at the time of our experiment, so we altered the public policy proposal to “Raise the millionaire tax on the rich” for these states. Lastly, for each proposed policy in each state, two different petitions were created: one using a moral framing (“because inequality is morally wrong”) and one using an economic framing (“because inequality is bad for the economy”) that was not explicitly moral. The framing affected the petition title, text, and illustration. An example morally-framed petition is shown in Figure 1. The complete list of hyperlinks to the 400 petitions that were all still viewable on <http://www.change.org> at the time that we wrote this article can be found in the online supplement.

Per our agreement with the <http://www.change.org> team, we automated petition initiation and signing. Over a period of 100 days, four petitions were launched each day at 9 a.m., 2 p.m., 7 p.m., and midnight ET. Four members of our team served as petitioner on 100 petitions. Immediately after launch, each petition was signed by 5, 23, 41, or 59 signatories. These values covered in equal intervals of 18 signatures the range between the minimum number of signatures necessary for showing up on the “Recent” petitions list on <http://www.change.org>, which was five, and the maximum number of signatures the <http://www.change.org> team allowed us to automate, which was 60. It is common for petitions to quickly accumulate hundreds of signatures within the first hour through recruitment on social networking sites, so our petitions were not unusual when they had strong early support.

Popular petitions appear on the homepage and “Popular” petitions list, leading to greater exposure. The low numbers of initial signatures bestowed through our treatment, however, are well below the necessary thresholds, preventing such a sorting mechanism from producing positive feedback. Also, because we bestowed the signatures ourselves, petitions with more signatures were not initially known by larger audiences who could forward a petition along to friends, preventing this exposure mechanism from producing positive feedback. The only positive feedback

Petitioning [Robert Bentley, Governor of Alabama](#) and [2 others](#)

State of Alabama: Raise the capital gains tax on the rich. Inequality is MORALLY WRONG.

[Robb Willer](#) United States



Research shows that economic inequality has reached historic levels. Not since the Great Depression have America's wealthiest citizens controlled such a large portion of the country's wealth.

These extreme levels of inequality are **wrong** and **unjust** for several reasons. When the wealthiest Americans enjoy such enormous advantages it is impossible for Americans to enjoy equal opportunity. The children of the rich have enormous advantages while the poorest Americans face unprecedented challenges.

Also, extreme inequality leads to poverty and suffering. The poor of America worry about basic necessities like food and shelter, facing everyday pressures that undermine their health and happiness. Because of inadequate wages the working poor of America are disillusioned, finding it difficult to support their families despite working long hours. It is **immoral** that the poor endure such hardships while the rich enjoy lives of such extreme luxury.

We should take a stand against increasing levels of economic inequality. We are calling on America's elected politicians to fight inequality at every level of government: federal, state, and community. Therefore, we ask that you please sign our petition to raise the capital gains tax on Alabama's wealthiest citizens.

This petition was delivered to:

Robert Bentley, Governor of Alabama

Kay Ivey, Lieutenant Governor of Alabama

State Legislature of Alabama

46 supporters

54 needed to reach 100

[Share on Facebook](#)

Add a personal message (optional)



State of Alabama: Raise the capital gains tax on the rich. Inequality is...

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Figure 1: Example petition.

Table 1: Average number of third-party signatures by number of assigned signatures. $N = 400$.

	Including repeat signers	Excluding repeat signers
5 signatures	4.13	0.47
23 signatures	4.06	0.51
41 signatures	4.33	0.62
59 signatures	4.49	0.81

effect enabled by the experiment was the social influence effect of seeing more previous signatures when deciding whether to sign.

Part of the agreement with the <http://www.change.org> team was that each signature represented a real person who had consented to serve as signatory. We recruited 60 students and faculty at Stony Brook who supported all of the petitions to volunteer their name for the signatures. This strategy enabled us to have each petition be signed only by people who truly supported it while at the same time maintaining full experimental control over who signed what petition. We constructed a counterbalanced design with all conditions—state, policy, framing, day, time of the day, petitioner, and number of assigned signatures—orthogonal to one another. Here, we analyze numbers of third-party signatures accumulated by January 25, 2016, when all petitions had disappeared from the recent petitions list and had all practically stopped accumulating signatures.

Results

Overall, our petitions did not turn out to be very popular, with the average petition accumulating 4.25 third-party signatures above the initial signatures we included. The majority of these came from individuals who signed many of our petitions, with the top signatory signing 321 of the 400 petitions. Because such repeat signers likely did not independently evaluate our petitions, we present results of analyses both including as well as excluding individuals who signed more than one petition. Table 1 shows average numbers of third-party signatures by number of assigned signatures.

Consistent with the cumulative advantage hypothesis, petitions with larger numbers of initial signatures drew more subsequent support. A positive association exists both in the analysis including repeat signers as well as excluding repeat signers but is only statistically significant in the latter case. A Kruskal–Wallis test finds a χ^2 of 3.238 ($df = 3$; $p = 0.356$), respectively 9.233 ($df = 3$; $p = 0.026^*$). In ordinary least squares (OLS) regression, we find a feedback effect of 0.008 ($t = 1.86$; $p = 0.094$) subsequent signatures for every experimentally assigned signature when we include repeat signers. This effect becomes 0.0063 ($t = 2.86$; $p = 0.005^+$) when repeat signers are excluded.

To assess whether any other conditions impacted petition signing, we report the results of multiple linear regression in Table 2.¹ Petitions aimed at governments of big states were relevant to more state residents and indeed accumulated more signatures from non-repeat signers. Proposals to raise income, millionaire, and

Table 2: Results of multiple regression of third-party signatures accumulated by 400 petitions.

	Including repeat signers	Excluding repeat signers
Initial signatures	0.006 (0.004)	0.006 [†] (0.002)
Big state (>10m residents)	-0.024 (0.241)	0.251* (0.119)
Tax (vs. capital gains)		
Income	0.597* (0.248)	0.282* (0.123)
Millionaire	0.504* (0.248)	0.373 [†] (0.123)
Wealth	0.404 (0.248)	0.246* (0.123)
Moral framing (vs. economic)	0.289 (0.175)	0.143 (0.087)
Petitioner (vs. Arnout)		
Robb	-0.104 (0.249)	-0.244* (0.123)
Idil	-0.106 (0.250)	-0.084 (0.124)
Crystal	-0.020 (0.248)	-0.131 (0.123)
Day	-0.008 [†] (0.002)	-0.002* (0.001)
Time of day (vs. 9 a.m.)		
2 p.m.	-0.213 (0.251)	-0.184 (0.124)
7 p.m.	0.453 (0.249)	-0.039 (0.123)
12 a.m.	0.085 (0.250)	-0.016 (0.123)
Intercept	3.998 [†] (0.351)	0.367* (0.174)
R ²	0.088	0.089
N	400	400

† $p < 0.01$; * $p < 0.05$.

wealth taxes received more support than proposals for raising the capital gains tax. Morally framed petitions did not draw more signatories than economically framed petitions. The identity of the petitioner did not impact support, with the exception of Robb receiving less support from non-repeat signers. We speculate that this effect is incidental. Later petitions, which had less time to accumulate signatures, received fewer signatures. While significant, the effect is minimal in magnitude, confirming that petitions had practically stopped accumulating signatures by the time of this

analysis. Finally, what time of the day a petition was initiated did not matter for its popularity.

Discussion

The argument that mobilization processes in collective political behavior are subject to cumulative advantage is not new. In the formal literature on collective action, this assumption forms the basis for theories of “critical mass,” the notion that initial recruits can together set in motion a bandwagon effect that influences others to join who would not otherwise (Granovetter 1978; Oliver and Marwell 1988; Macy 1991; Gould 1993; Heckathorn 1996; Kim and Bearman 1997; Kitts 2006; Willer 2009; Centola 2013). Studies of the diffusion of collective action argue that mobilization spreads between spatially and socially proximate individuals, leading wider-spread initiatives to have greater momentum (Hedström 1994; Strang and Soule 1998; Vasi and Strang 2009). Social movement scholars also increasingly stress the importance of unanticipated developments in the dynamics of political mobilization (Oliver and Myers 2002; Gonzalez et al. 2015; Snow and Moss 2014). Our study contributes a randomized, controlled demonstration of cumulative advantage in the context of political petition signing. Our study’s capacity to reveal social influence through intervention in an ongoing natural political action environment reinforces the findings from an online laboratory study that identified positive effects of social information in the signing of internet petitions (Margetts et al. 2011). We find clear evidence that on a popular platform for political mobilization, the social influence exerted by larger numbers of prior signatories significantly impacts followers’ subsequent propensities to also sign.

It is important to note that the effect we identify is small in magnitude, as we find that about 150 initial signatures are needed to generate just one extra signature. This size of effect is too marginal to produce significant variation in collective action outcomes, even when operating on much more popular petitions. While the magnitude of our effect cautions against exaggerating the role of herding versus other determinants of mobilization success, the social influence effect we isolated represents only one of a number of mechanisms that may together combine into a much stronger composite feedback effect. In many scenarios, greater mobilization will not just compel other people to join, as it did in our study, but also expose the initiative to more potential participants through diffusion. Also, the social influence effect, in our case, was from seeing unknown others participate. It would very likely be stronger when coming from friends or acquaintances instead, as is the case on social networking sites (Bond et al. 2012; Lewis 2014) and in many offline political mobilization settings.

Our study adjudicates the inconclusive results from a prior experiment, finding that social influence stemming from popularity metrics produces a positive albeit small cumulative advantage effect in the collective dynamics of petition signing. While most replication studies seek to reproduce earlier positive findings, our study illustrates that it is also important to explore negative findings in follow-up research to prevent type II errors. Given the extreme impact of positive result bias on false positives in knowledge accumulation (Hartgerink et al. 2016) and the failure of

many studies to replicate (The Open Science Collaboration 2015; Camerer et al. 2016), we hope our study will inspire others to engage in efforts to solidify the empirical knowledge base on which the advancement of social science research crucially depends.

Notes

- ¹ Because the dependent variable is a count, we also estimated negative binomial regression models. These models identify the same effects with similar levels of statistical significance. We chose to report the OLS results instead, as effects are easier to interpret. For example, the coefficient of 0.006 in Table 2 represents a cumulative advantage effect of 6 new signatories for every 1,000 initial signatures.

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Arnout van de Rijt: Department of Sociology, Utrecht University; Department of Sociology, Stony Brook University; Institute for Advanced Computational Science, Stony Brook University. E-mail: arnoutvanderijt@gmail.com.

Idil Afife Akin: Department of Sociology, Stony Brook University.
E-mail: idilakin@gmail.com.

Robb Willer: Department of Sociology, Stanford University.
E-mail: willer@stanford.edu.

Matthew Feinberg: Rotman School of Management, University of Toronto.
E-mail: matthewfeinberg1@gmail.com.