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POSITIVE FEEDBACK IN COLLECTIVE MOBILIZATION: THE AMERICAN STRIKE WAVE OF 1886

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POSITIVE FEEDBACK IN COLLECTIVE MOBILIZATION: THE AMERICAN STRIKE WAVE OF 1886*

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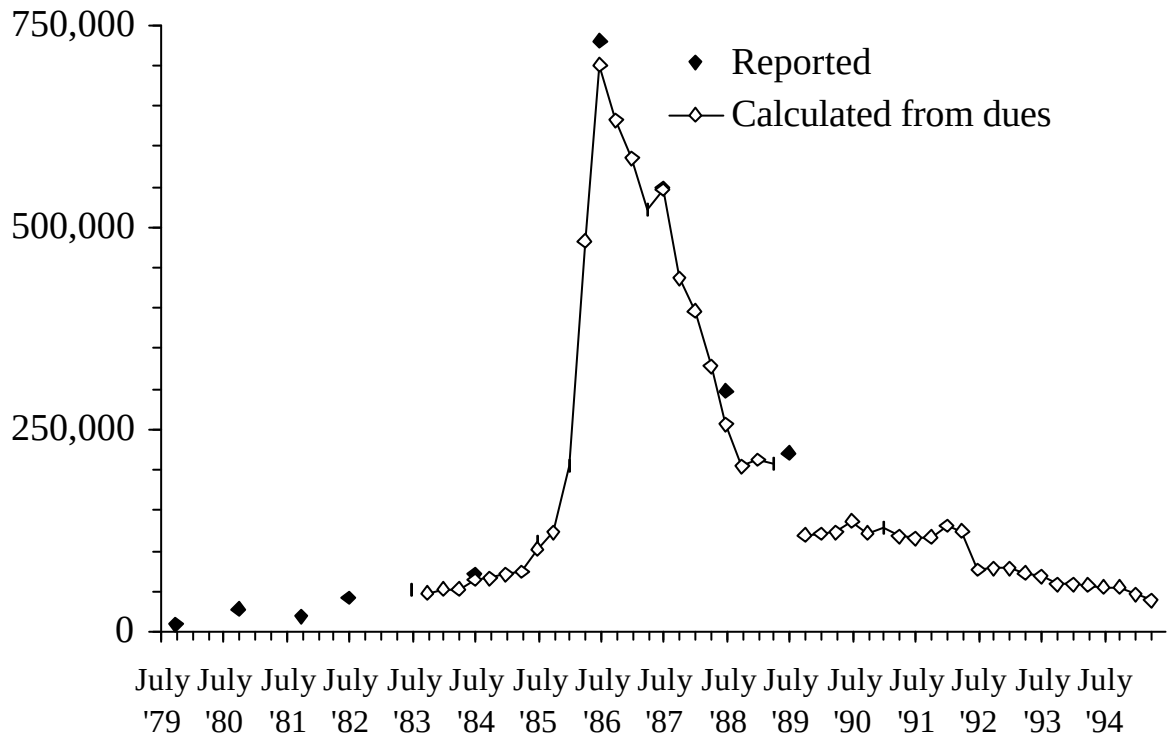
ABSTRACT

Formal models prove the possibility of positive feedback in collective action; the metaphors of historically minded observers convey the same insight. It is still neglected in the literature on social movements, which emphasizes exogenous factors—above all, political opportunities—rather than endogenous processes. This paper draws on an intensive investigation of strikes for the eight-hour day in Chicago in May 1886. It demonstrates that changes in economic and political circumstances cannot explain the magnitude of the strike wave. More importantly, it provides evidence for positive feedback in collective mobilization, showing how optimistic expectations percolated through the working class in the spring of 1886. As each new group of workers became hopeful enough to organize, the fact of their organization inspired other groups to follow suit. New hopes gave rise to new organization; new organization became evidence that such hopes were justified.

Positive Feedback in Collective Mobilization: The American Strike Wave of 1886

In the first months of 1886, hundreds of thousands of American workers joined trade unions and, above all, the Holy and Noble Order of the Knights of Labor. The Knights of Labor appealed to workers who were not represented by established craft unions, and to trade unionists who believed in working-class

Figure 1: Membership of the Knights of Labor, 1879-1895



solidarity. Figure 1 shows the influx of members which made it—briefly—the largest labor organization in the world.[1] Membership growth was accompanied

[1] Total membership figures (as of the first of the month) were published by the General Assembly (1879ii, p. 117; 1880, p. 202f.; 1881, p. 333; 1882, p. 391; 1883, p. 528; 1884, p. 796; 1885, p.

by mass strikes. May 1, 1886 had been arranged as the date when workers would enforce the eight-hour day. Over two hundred thousand workers struck for shorter hours, and many more gained concessions without conflict. Altogether, the strike wave of 1886 was not surpassed until the First World War. The upheaval was spectacular because of the sheer number of workers acting collectively to defy their employers. It was also spectacular because it was so sudden. "In ten months a revolution has been accomplished in American society" proclaimed Friedrich Engels (1887, p. i).

What happened in 1886 was remarkable, but not unique. As Eric Hobsbawm observes, labor movements everywhere have progressed by sudden 'explosions' or 'leaps.' A membership graph "looks like a series of sloping steps, or of broad valleys broken by sharp peaks, or a combination of both; very rarely is it a mere rising slope" (Hobsbawm 1952, p. 126; cf. Freeman 1997). There was a close parallel in the strike wave and membership influx in Britain, associated with New Unionism, in 1889-90. Similar episodes are found much farther afield. In 1775, grain riots spread from town to town across the Isle de France within a few weeks (Rudé 1981, p. 25). In 1830, revolt spread among the rural counties of southern England, as laborers destroyed threshing machines, set fire to barns, and demanded higher wages (Hobsbawm and Rudé 1969, p. 196). In 1989, the number of protesters in East Germany grew from hundreds to millions within a matter of months (Lohmann 1994, table 2, p. 66).

These are all instances of 'innovative collective action' (McAdam 1999). This can be conceptualized, and often measured, in two dimensions: the rate of protest (a flow), and the extent of collective commitment (a stock). *Protest* is collective action which disrupts everyday routine, defies normative rules, and entails personal sacrifice (Piven and Cloward 1978). Protest is preceded by *mobilization*, in some form. A riot appears spontaneous, but even that occurs only after people have furtively aired their grievances and assayed each other's intentions (Oliver 1989). In the modern social movement, by contrast, mobilization is characteristically public (Tilly 1995). It can be approximated, more or less adequately, by the number of members enrolled by formal organizations. A *wave* of collective action is initially characterized by a very rapid increase of participation—change on a scale of weeks or months, rather than years or decades. This is accompanied by dramatic changes in

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174; 1886, p. 328). The other series is calculated from the 'per capita tax' receipts reported by the General Secretary: membership at the beginning of each quarter equals the total receipts received during the quarter, divided by the tax rate of 6¢ per member per quarter (cf. Oestreicher 1984).

expectations. People are taken by surprise. Optimism escalates with participation: what was unthinkable now seems inevitable. Such waves, I argue, can only be explained by an endogenous process of positive feedback.

The strike wave of 1886 is an excellent case because it was a dramatic manifestation of rapid change. It is also convenient because unionization and striking can be separated. In cities where the eight-hour campaign was salient, newly organized workers generally delayed striking until May 1. Therefore mobilization can be analyzed without introducing an additional dimension of complexity—the interaction between workers and their opponents (see Biggs forthcoming). In other waves, by contrast, mobilizing and protest are intermingled. Chicago is selected for intensive investigation because it was the epicenter of the strike wave, and because the Illinois Bureau of Labor Statistics collected exceptionally detailed statistics.

The paper begins by tracing various manifestations of positive feedback in social science, with the aim of explaining its curious absence in the literature on social movements. The circularity of positive feedback is unraveled in the second section, which analyzes interdependence and inspiration in collective action. The third section examines various precipitants of the upsurge of 1886, proposed by historians and social scientists. None of these can account for the magnitude of the strike wave. The fourth, and longest, section focuses on the mobilization of workers in Chicago during the winter and spring of 1886, and provides quantitative and qualitative evidence for positive feedback. The implications of this kind of explanation are discussed in the conclusion.

1. Positive feedback in social science

In this sociological context, *positive feedback* simply means that mobilization stimulates further mobilization, that protest stimulates further protest; people participate in collective action because others have recently participated. Although the process may be triggered by an exogenous cause, the magnitude of the ultimate effect depends on this process of amplification—this is *nonlinearity*. Positive feedback is synonymous with another term, *self-reinforcing process*. The choice between them is arbitrary. I prefer the former only because of its etymology: ‘nonlinearity’ and ‘positive feedback’ both derive from electronics and date from the 1920s.

Although the terminology is foreign, the basic insight accords with the intuition of careful observers, whether contemporaries or historians. In descriptions of

this upsurge and others like it, the same metaphors recur: avalanches, epidemics, and fires. For Engels (1887, p. i), the movement of 1886 "spread with the rapidity of a prairie fire." "The fever of joining"—recalled one Knight—"seemed to be epidemic" (quoted in Allen 1942, p. 26). Hobsbawm (1985, p. 18) compares the parallel British labor upsurge of 1889-90 to an avalanche. Explaining the revolt of English laborers in 1830, Hobsbawm and George Rudé (1969, p. 214) continually refer to fires and contagion. The historian J. H. Hexter (1975, ch. 5) elaborates an analogy for the process of rapid, endogenous change: the self-excited torsional oscillation of a bridge. What these natural phenomena have in common is positive feedback.

In social science, the idea of positive feedback has appeared in various guises in different literatures. Most remarkably, it has been associated with individual rationality *and* irrationality. One strand of its intellectual history begins with the literature on collective behavior, which reigned in American sociology until the 1960s. Positive feedback in collective behavior was described by Herbert Blumer (1946, p. 170) as "circular reaction." This endogenous process was inextricably connected with irrationality. Blumer defined 'social contagion' as "the relatively rapid, unwitting, and nonrational dissemination of a mood, impulse, or form of conduct." People behaved collectively like a herd of cattle when alarmed. The association with irrationality—and indeed, pathology—can be traced further back to the writers on crowds at the end of the nineteenth century (e.g. Le Bon 1895). Even Max Weber (1922, pp. 23-4) relegated contagion and imitation to the margins of 'social action.'

When a new generation of sociologists overthrew collective behavior in the 1970s, positive feedback was tainted by this association with irrationality. It had no place in the new literature on social movements. This literature has recently coalesced around three factors: political opportunities, mobilizing structures, and framing processes (e.g. McAdam, McCarthy, and Zald 1996). Political opportunities are the master variable for explaining *when* movements emerge or collective action occurs. According to Sidney Tarrow, for example, the strike wave in France in 1936 was caused by the Popular Front's electoral victory (Tarrow 1998, pp. 72-3). Social networks are most commonly used to explain cross-sectional variation in participation (e.g. McAdam and Paulsen 1993), rather than change over time. Nevertheless, the development of organizational structure is used to explain increasing levels of protest. Edward Shorter and Charles Tilly argue that unionization increased French workers' capacity to strike (Shorter and Tilly 1974, ch. 7). The third factor, framing, has proved more contentious. The most lively recent debates have concerned the significance of meaning and

emotion (e.g. Jasper 1998). The irrationality of collective behavior threatens to return, now divorced from positive feedback.

Positive feedback has also reappeared in the literature on social movements—but only in explanations for *large-scale* waves. Tarrow calls these "cycles of contention" (Tarrow 1998, ch. 9). These "cycles" are identified, it seems, when an upsurge in protest and institutional action traverses national boundaries. These very large-scale waves are characterized by a diverse—and often antagonistic—range of participants and aims; they involve more than one discrete 'movement' (McAdam 1995). The wave of the late 1960s is an obvious example. In such large-scale waves, Tarrow and Doug McAdam recognize positive feedback. "[T]he demonstration effect of collective action on the part of a group of early risers triggers a variety of processes of diffusion. Extension, imitation, and reactions among groups that are normally more quiescent" (Tarrow 1998, p. 145). In McAdam's (1995, p. 218) summary, "most social movements are caused by other social movements." Surely within a movement we could explain mobilization and protest in the same way: when some people mobilize, others join in; when some people protest, others emulate it. After all, this would be a very similar process—just occurring on a smaller scale.

Another strand of intellectual history leads back to the 1970s. Just when collective behavior was being discredited, positive feedback was discovered by another set of social scientists, committed to formal models of collective action. The pioneer was Thomas Schelling (1971), who demonstrated how individual choices could generate neighborhood segregation through a 'tipping' process. Mark Granovetter (1978) used a similar process, formalized in the threshold model, to explain the growth of a riot. These ideas have been applied to revolutions and social movements (Chong 1991; Kuran 1995, ch. 15; Marwell and Oliver 1995). Nevertheless, they have hardly influenced the field of social movements. These models of positive feedback are tainted by association with rational choice, which raises the hackles of many sociologists. Moreover, formal modeling has been taken to such heights of complexity that its relevance is obscured (e.g. Lohmann 1994; reviewed by Oliver 1993). Finally, the concept of an endogenous process is alien to the dominant empirical methodology of social science: identifying independent variables and estimating the magnitude of their effect on the dependent variable (cf. Abbott 1988).

Some recent studies provide empirical evidence for positive feedback. Within the dominant methodology, event-history analysis allows the effect of diffusion to be estimated. Peter Hedström analyses how workers' organization diffused across Sweden over many years (Hedström 1994). Similarly, Carol Conell and

Kim Voss examine the founding of Local Assemblies of the Knights of Labor over a period of one or two decades, concentrating on Assemblies which included less-skilled workers (Conell 1988; Conell and Voss 1990; Voss 1988; 1993, ch. 5). Cross-sectional variation is captured by several structural (time-invariant) variables, such as the average establishment size, and the community's ethnic heterogeneity. What changes is the 'organizational field,' a vector of dummy variables for the existence of various types of labor organization in the same community. Because it is confined to annual intervals, this kind of analysis cannot explain the proliferation of Local Assemblies in 1886. The probability of an Assembly being founded in that year is ten times higher than predicted (Conell and Voss 1990, table 2, p. 263).

Rapid change—which develops in weeks rather than years—can also be analyzed in the framework of event history. Conell and Samuel Cohn (1995) examine strikes by coal miners in France between 1890 and 1935, estimating the effect of a strike on the probability of another strike occurring in the same département. Strikes that occurred on the same day or on consecutive days are excluded, and so synchronized general strikes are not counted. Nevertheless, the effect is strongly positive, even controlling for the usual economic variables. Before the First World War, the probability of a strike was highest in the days after another strike had begun; afterwards, the probability was highest in the days after another had ended. Beyond this statistical framework, a few studies of rapid mobilization explicitly or implicitly refer to positive feedback. Anthony Oberschall (1989) uses a variant of the threshold model to explain the spread of sit-ins in the American South in 1960. Charles Kurzman (1996) proposes an endogenous explanation for the rise of protest again the Shah in Iran. Significantly, perhaps, it is framed in terms of political opportunities, though the change is neither located in the state nor exogenous. As this suggests, positive feedback is barely recognized by scholars of social movements.

These diverse strands of intellectual history can be woven together. The fact that positive feedback continually reappears, in one guise or another, shows that it is indispensable for explaining collective action. It should be central to the study of social movements.

2. Theorizing positive feedback

To unravel the circularity of positive feedback, it is necessary to understand the logic of collective action under conditions of uncertainty. Consider a situation in

which individuals face a powerful adversary, who they can challenge only by acting collectively. The example here is workers' mobilization and protest, organizing with other workers and striking against employers. The analysis applies to other social relationships and other kinds of collective protest. We can distinguish two sources of positive feedback: interdependence, which inheres in collective action, and inspiration, which follows from uncertainty. These are summarized in Table 1.

Table 1: Reasons for positive feedback

Interdependence (inherent in collective action)
The larger the number of us participating in collective action, the more compelling it is for me to participate:

- we have greater hope for success;
- I have less fear of retaliation by our adversary;
- I have more of a moral obligation to join those who do participate, and they will be more likely to retaliate against me if I do not

Inspiration (follows from uncertainty)
If we know that others have acted collectively:

- that provides an occasion to consider the possibility of collective action for ourselves;
- even if the outcome of their action remains uncertain, the fact that they expect success raises our own hopes;
- if they have succeeded, that raises our hopes still further—*but* if they have failed, that lowers our hopes

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The rationale for interdependence is straightforward. For the great majority, a decision to participate in protest is *contingent* on the actions of others (Schelling 1978, p. 17). At the very least, one worker alone cannot 'strike'; he or she is just dismissed. The motivation to participate increases with the number of participants, for three reasons. First, the expected collective benefits increase. The more workers who strike, the more they can hope to win concessions. Second, the expected individual and collective costs decrease. The more workers who strike, the less they need to fear being replaced or singled out for victimization. Neither reason would dissuade truly selfish individuals from trying to free ride, of course (Olson 1971). A third reason may prove persuasive. The

moral obligation to participate increases; participants become more likely to punish those who violate this obligation. The more workers who strike, the more a potential 'scab' needs to fear ostracism and even violence.

If the motivation to participate increases with the number of participants, the situation can be modeled as an n-person assurance game (Chong 1991, ch. 6). There are two stable equilibria: either no one participates or everyone does. This gives us an inkling of the volatility inherent in collective protest. Somewhere between these two equilibria lies the threshold where the individual 'payoff' for participation exceeds that for nonparticipation. The assurance game is static; it does not model the transition from one equilibrium to another. For dynamics, we can turn to threshold model, proposed by Granovetter (1978; Granovetter and Soong 1983). As before, the threshold is the minimum number of participants required for the individual to decide to join them. The novel element is heterogeneity: individual thresholds vary. A threshold of zero indicates unconditional participation. The higher the threshold, the greater the reluctance to participate. For a given distribution of thresholds, the participation rate can be calculated. Starting at zero, participation propagates, from individuals with lower thresholds to those with higher ones—until it reaches equilibrium. Most importantly, a slight change in the distribution of thresholds can dramatically change the equilibrium participation rate. The threshold model is simple, even crude. Yet it highlights key features of an endogenous process. Participation is a process of positive feedback: individuals participate because others have participated. There is no linear relationship between the distribution of thresholds and the equilibrium participation rate; a small change may have a large effect. As Thomas Schelling observes, such models "warn against jumping to conclusions about individual intentions from observations of aggregates" (Schelling 1978, p. 14).

Interdependence applies to collective action, where everyone either succeeds or fails—or, at least, success for some will make success for others more likely. This instrumentality also creates a moral obligation: participants will punish members of the collectivity who try to free ride. Interdependence explains propagation *within* a collectivity or group. There is another source of positive feedback, which operates *between* such groups. In the absence of interdependence, collective action by one group can inspire another group to act.

Because defiant collective action is rare and risky, the actions of others are potentially influential. They are influential for three reasons. People are not continually deciding whether to act collectively. Learning that others elsewhere have acted raises the possibility—and so provides the opportunity to take a

decision, one way or the other. Hearing that other workers have struck, workers are more likely to consider whether to strike.[2] In addition, the actions of others can influence a group's expectations of their own success. Before the outcome of others' action is clear, the simple fact that they have acted implies that they expect success. That provides a second-order reason to hope—based on 'expected' facts rather than 'accomplished' facts (borrowing from Pigou 1929, p. 73). Knowing that other workers hope to win a strike, workers may raise their own expectations of victory. Once the outcome of others' actions becomes clear, that provides rather more information. If they are successful, that is further reason to hope for success. Knowing that other workers have struck and won, workers can raise their own expectations of victory. Conversely, of course, failure should lower expectations.

Inspiration can be illustrated by models of herd behavior or informational cascades (Banerjee 1992; Bikhchandani, Hirshleifer, and Welch 1992). Although they refer to individual rather than collective action, they show how the actions of others can be influential. Each individual observes a private 'signal' which indicates, to some degree of probability, whether it is worth taking a certain action. Under these circumstances, it is rational to use the observed actions of others in order to infer their signals. Ironically, their actions convey little information—because they too are following others. "[T]he very act of trying to use the information contained in the decisions made by others makes each person's decision less responsive to her own information and hence less informative to others" (Banerjee 1992, p. 798). With heterogeneity, inspiration (like interdependence) could be conceived in terms of thresholds, here referring to groups rather than individuals. A group with little hope for success have a high threshold: only when they see many others acting collectively will they believe that they also have something to gain from doing the same. The lessons of the threshold model also apply to inspiration

These two sources of positive feedback provide reasons why people act because others have done so. Interdependence and inspiration both depend crucially on actors' interpretations. The scale of interdependence is established by the scope of collective action. To take an example, a small group of craftsmen in a large plant might demand a wage raise for themselves alone, or they might join with other employees in the plant or with their fellow craftsmen in the city. Actors define the collectivity; this definition is often disputed ('who are

[2] This extends naturally to tactical innovation (cf. McAdam 1983). Learning that others have used a new tactic (like the sit-down strike) provides an opportunity to adopt it.

we?'). Inspiration depends, of course, on knowing about the actions of others. It is also a matter of interpretation. The relevance of others' actions depends on their perceived similarity ('are they like us?'). While interdependence and inspiration are analytically separable, in reality motivations may have elements of both. As social and geographical distance increases, interdependence becomes less likely, and inspiration becomes a more important source of positive feedback.

Positive feedback cannot continue indefinitely, of course. At some point, the growth of collective mobilization and protest must be reversed. Although reversal is beyond the scope of this paper, we can outline its causes. Almost by definition, mobilization and protest are inherently short-lived for any one group. Commitment cannot be maintained indefinitely at fever pitch—it dissipates unless channeled into protest. Similarly, protest cannot continue indefinitely—it eventually ends in decisive victory or defeat. There are also two more substantive causes of reversal. Firstly, an upsurge of collective action is driven by rising expectations of success. Confidence, however, is a double-edged sword, for overconfidence undermines the chances of success. A radicalization of demands tends to polarize the protagonists: moderates want to secure a minimum, while radicals want to push for more. Secondly, opponents eventually react. There is always a lag between mobilization and countermobilization. When opponents are taken by surprise, they need time to coordinate their resistance; they may also decide to delay a counterattack, for strategic reasons. Nevertheless, at some point the real extent of their resistance becomes clear, which leads the protagonists to drastically lower their expectations of success.

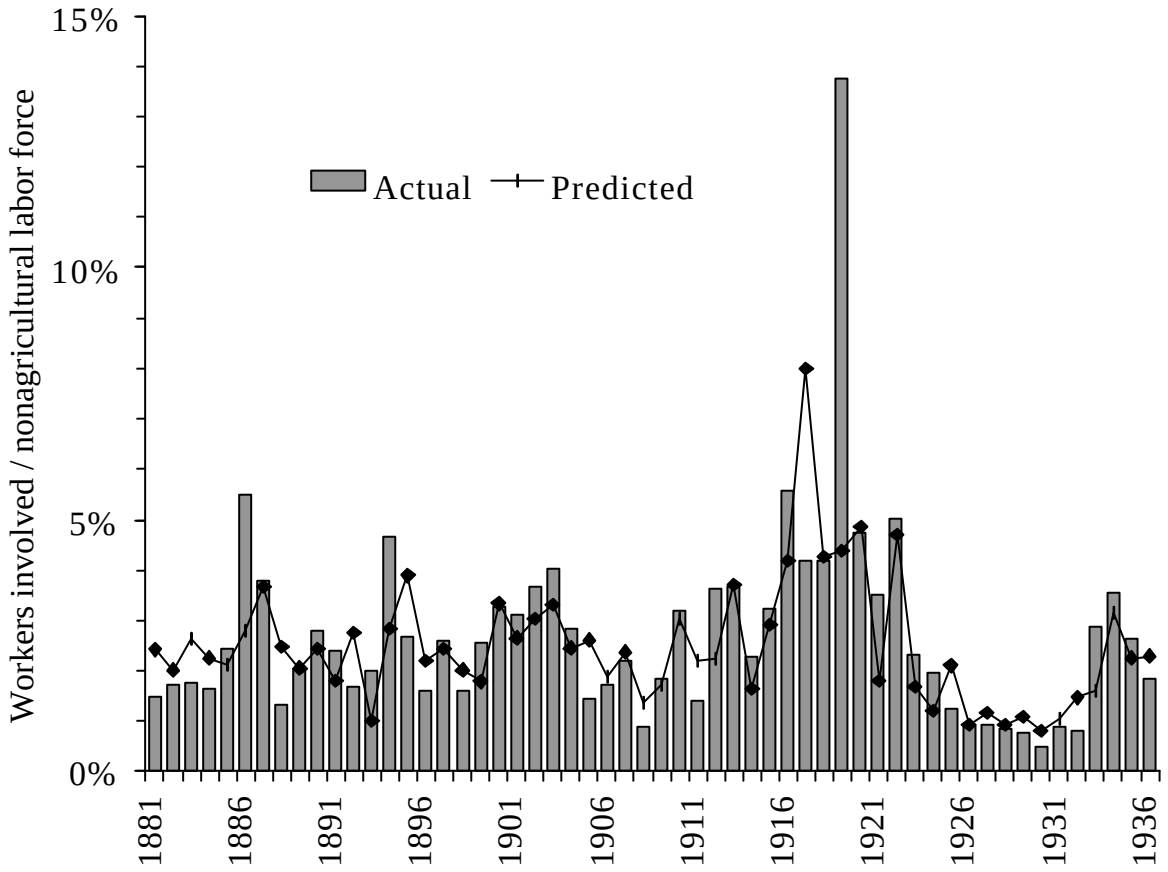
3. Potential precipitants for the upsurge

Positive feedback is theoretically plausible. Can it actually explain the strike wave of 1886? My argument has two sides, positive and negative. The negative is necessary to refute alternative explanations, which postulate precipitants for the upsurge. Some of these have been proposed by historians of this episode; others could be applied from theories of social scientists. Most obviously, the strike wave might have been precipitated by exogenous changes in economic or political circumstances.

The impact of exogenous changes can be tested with time series analysis (see Appendix for sources). Figure 2 shows the dependent variable: the logarithm of

strike propensity, the number of workers involved in strikes divided by the nonagricultural labor force. The period begins in 1881, when strikes were first counted, and ends in 1936, when recursive regression identifies a structural break in the series (McCammon 1993). The independent variables test hypotheses from the literatures on strikes and social movements. There are three economic variables: unemployment measures the relative bargaining power of labor and capital (Rees 1952); growth in money earnings captures workers' grievances

Figure 2: Strikes and lockouts in the United States, 1881-1936



(Ashenfelter and Johnson 1969); price change indicates uncertainty for workers and employers alike (Cousineau and Lacroix 1986). There are also three alternative measures for political opportunities: one presumes that labor had the support of Democrats (Snyder 1977); one assumes that workers had less to fear from incumbents elected with narrow margins (Friedman 1998); one is simply a

dummy variable for Franklin Roosevelt's administration (Piven and Cloward 1978, ch. 3).

Table 2 presents the results. Variables are transformed to give the best fit. This includes asymmetry (cf. Lieberson 1985, ch. 4): rising unemployment

Table 2: Determinants of (logged) strike propensity, 1881-1936

	coefficient	standard error	t-value
Economic variables			
Positive change in unemployment	-.109	.034	**-3.18
Negative growth of money earnings	-.055	.035	-1.58
Absolute rate of price change	.051	.020	*2.54
Political variables			
Ratio of Democrats to Republicans in House	.000	.002	.06
Margin of victory of President in last election	-.009	.005	-1.90
Roosevelt administration	.408	.476	.86
Autoregressive (t-1)	.518	.130	***3.99
constant	.770	.135	***5.69

R^2 = .57
s_e = .40

Note: t-values significantly different from zero (two-tailed test) * at the .05 level, ** at the .01 level, *** at the .001 level

reduces strike propensity, for example, while falling unemployment has no discernible effect. Some independent variables are statistically significant, but overall their predictive power is modest. Indeed, the best predictor is the autoregressive coefficient: the more strikers last year, the more are expected this year. Most importantly, for my purpose, these independent variables do not predict a strike wave in 1886. As Figure 2 shows, predicted strike propensity for that year is actually below average; its residual is the second largest. Union density, the parallel series, yields still more meager results (not reported here for

reasons of space). In sum, exogenous changes in economic or political circumstances did not precipitate the upsurge of 1886.

When we look more closely for origins of the upsurge, we paradoxically find political *dis*opportunities. In October 1884, two dozen delegates of the Federation of Organized Trades and Labor Unions (1884, p. 14) resolved "that eight hours shall constitute a legal day's labor from and after May 1, 1886." For years they had tried to elect independent socialist candidates or lobby established politicians. Repeated failure finally convinced them of the futility of politics; they concluded that workers must rely on their own economic power to enforce their demands. The eight-hour campaign would surely have proved abortive if the economy had continued in the depths of recession. As it happened, economic recovery began at the end of 1885. By itself, as we have seen, falling unemployment is not associated with high strike propensity.

Labor historians have proposed two other precipitants of the upsurge. The Knights of Labor articulated a novel interpretive frame, which historians label 'labor republicanism' (e.g. Fink 1988). This supplied American workers with an indigenous critique of capitalism, appealing to republican values. Nevertheless, such ideas had been articulated since the end of the Civil War, and so they cannot explain the timing of the upsurge (Montgomery 1967). It is not clear that workers refrained from striking in the early 1880s because they believed that capitalism was legitimate. Recall the lesson of the threshold model: if individual decisions depend on the actions of others, aggregate behavior may not reflect average inclinations.

Historians also offer a more contingent explanation, referring to an event in the fall of 1885.[3] After a lockout of Knights on the Wabash, St. Louis, and Pacific Railway, the Order's leaders met directly with the notorious railroad magnate, Jay Gould, and arranged a settlement. According to historians, this inspired workers all over America, who naturally attributed great powers to the Knights of Labor. This would fit perfectly into a theory of positive feedback. Unfortunately, however, nothing of this sort actually happened (Kemmerer and Wickersham 1950). There is no evidence that the settlement of the Wabash lockout had an

[3] Selig Perlman (1918, pp. 370, 373) first proposed this hypothesis. It has been repeated so often by historians and sociologist that it has the appearance of solid fact (e.g.. Fink 1983, pp. xii-xiii; Foner 1975, p. 53; Friedman 1998, p. 46; Hirsch 1990, p. 56; Kealey and Palmer 1985, p. 75; Klein 1986, p. 358; Oestreicher 1986, p. 117; Schneirov 1998, p. 193; Voss 1993, p. 75). Only when I looked for the evidence to really prove this explanation did I discover that it was a myth—as was pointed out decades ago (Kemmerer and Wickersham 1950).

electrifying effect on other workers. It was not mentioned by contemporaries as an inspirational victory. The settlement was considered a compromise even by the Order's leaders. There had been a larger railroad strike earlier in the year, which encompassed Gould's Southwestern system as well as the Wabash, and this really had been a notable victory. Most importantly, these railroad workers generally lived in small towns—in the Midwest and Southwest—without linkages to other kinds of workers. There were certainly a number of successful strikes (and boycotts) in 1885. The most prominent was probably the victory of six thousand laborers in the lumber mills of East Saginaw, Michigan. These were not sufficiently salient, however, to be the catalyst for the mobilization of workers across North America. Killing an enticing hypothesis with facts is always frustrating. It is also reassuring, though, for it shows that positive feedback is not *carte blanche* to claim that anything leads to anything else. Inspiration is something which can be tested against empirical evidence.

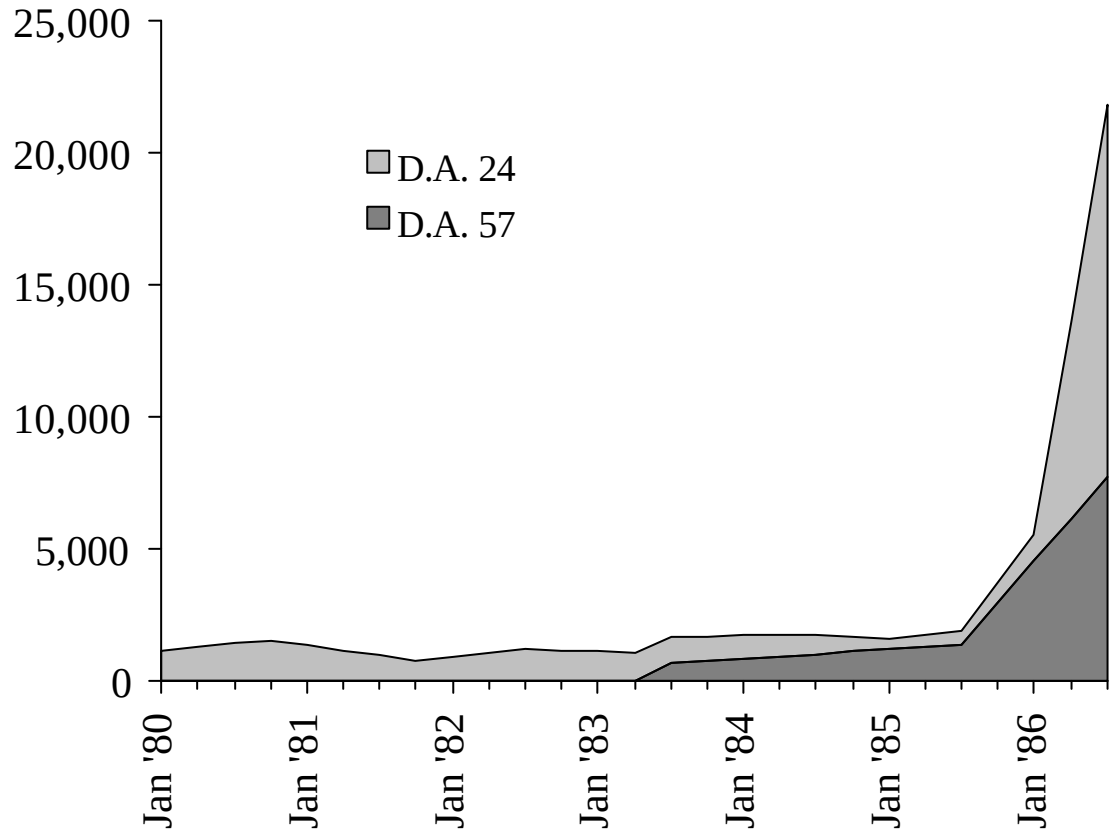
4. Mobilizing Chicago's working class

The existing explanations of historians cannot explain the upsurge of 1886, nor can the conventional explanations of social scientists. To understand what happened, we can focus on the mobilization of Chicago's workers over the winter and spring of 1886 (Avrich 1984; Hirsch 1990; Nelson 1988; Schneirov 1998). In the months before May, tens of thousands of workers joined existing organizations and founded new ones. This influx of new members was intertwined with workers' rising expectations. 'Expectations' here do not denote what workers thought they deserved (as in theories of relative deprivation), but what they thought they could get: their estimation of their collective power vis-à-vis employers. This became a process of positive feedback. As each new group of workers became sufficiently optimistic to organize, the fact of their organization inspired others to follow suit. New hopes gave rise to new organization; new organization became evidence that such hopes were justified.

Contours of mobilization

Figures on membership reveal the magnitude and rapidity of mobilization. The only comprehensive statistics, over several years, come from the Knights of Labor. Knights in Chicago established District Assembly 24, to coordinate the city's Local Assemblies, in 1879. In 1883, dissident Local Assemblies formed a rival body, District Assembly 57. Both Districts dutifully reported mid-year membership to the Order's General Assembly (1879ii, p. 114; 1880, p. 202f.; 1881, p. 333; 1882, p. 383; 1883, p. 528; 1884, p. 796; 1885, p. 173; 1886, p. 326). In addition, District Assembly 24's minute book recorded membership at the beginning of 1885 and 1886 (Jan. 15, 1886, p. 229). Figure 3 shows the membership of both Assemblies, from 1880 to 1886. In the twelve months to July 1886, the number of Knights in Chicago increased ten-fold. The bulk of this increase obviously occurred in the first half of 1886. During that time, the Order as a whole gained almost half a million members (see Figure 1).

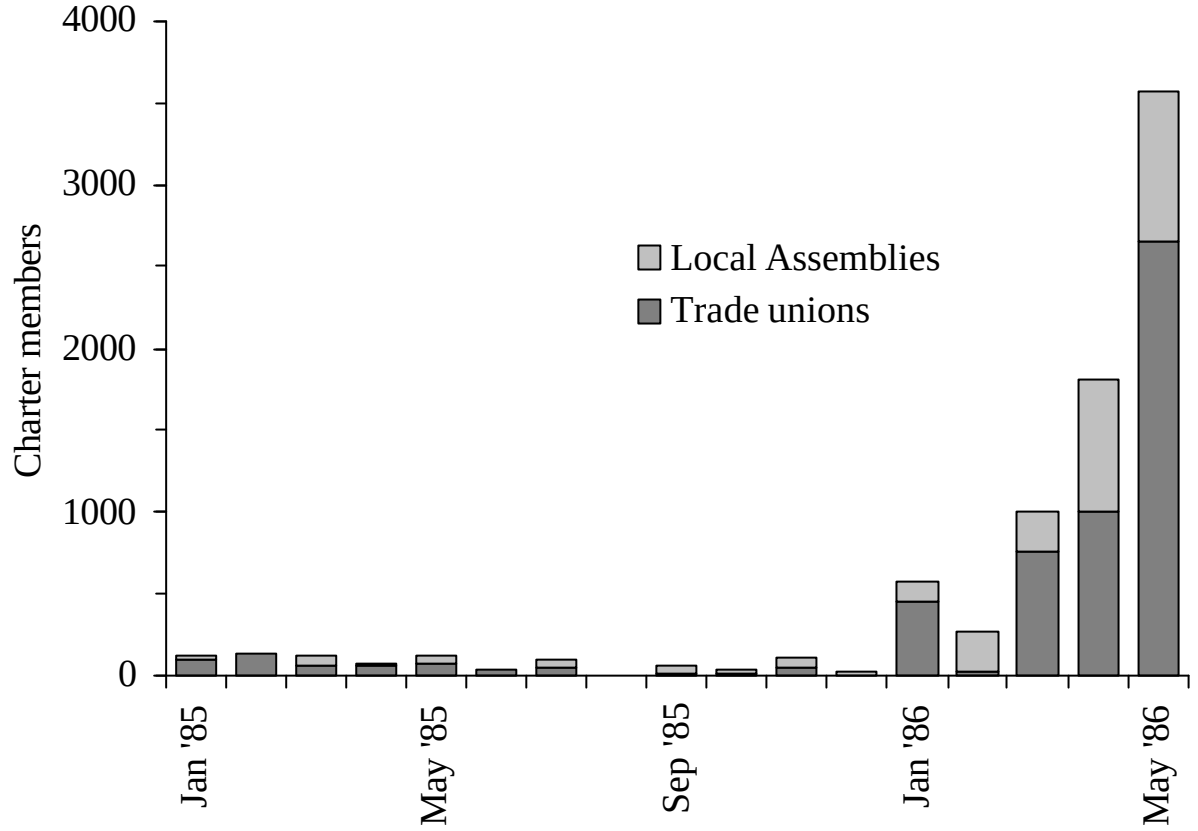
Figure 3: Membership of the Knights of Labor in Chicago, 1880-1886



The precise timing of the influx can be established from another source. The Illinois Bureau of Labor Statistics surveyed trade unions and Local Assemblies of the Knights of Labor in mid 1886, after the strikes of May (1886, table i, pp. 172-78, and table ii, p. 187). By then, a fifth of the city's workers (57,400) belonged to labor organizations; unionists (38,100) outnumbered Knights (22,000).[4] Most importantly, the Bureau recorded the founding date—month as well as year—of each organization (treating different branches of a union as separate organizations). 'Founding date' was not completely unambiguous. Those who furnished the information could refer to the date when their organization had been revived, or conversely, the earliest date remembered or recorded. A few unions founded during the upsurge had previously existed as benefit societies. Figure 4 depicts the founding of trade unions and Local Assemblies, from January 1885 onwards; to take account of variation in size, it sums the number of charter members. The first indication that something new is happening comes in January. There were more charter members in that month than in the previous nine months altogether. This began a period of accelerating increases. There was something of a lull in February. But the increase in March exceeded January, April exceeded March, and May exceeded April. In fact the graph underestimates the increase in the last two months, because the Bureau (1886, p. 191) missed dozens of newly founded Local Assemblies.

[4] These numbers do not add up because about 2,700 trade unionists were also Knights. The figure for duplicate membership excludes three trade unions that were in the midst of becoming Local Assemblies; they reported that *all* their members belonged to the Knights of Labor.

Figure 4: Labor organizations founded in Chicago, January 1885 to May 1886



As we can see, growth accelerated as May approached: mobilization was closely connected with the campaign for the eight-hour day. Nevertheless, the upsurge was not planned by any formal organization. In the fall of 1885, the plan to enforce eight hours on May 1 was still hypothetical. The national Federation of Trades and Labor Unions had no resources or authority. Its local equivalent in Chicago, the Trades and Labor Assembly, did nothing except canvass the opinion of affiliated unions. The paramount leaders of the Knights of Labor opposed any plan of action, because they feared class conflict. The city's two District Assemblies followed their lead. Chicago also had a large and well-organized group of anarchists, who dominated a rival council of trade unions, the Central Labor Union. The anarchists dismissed the campaign as "a kind of soothing syrup for babies, but of no consequence to grown men" (Schilling 1889, p. xxiii). To be sure, some activists—Knights and unionists—were enthusiastic, and formed an Eight Hour Association to promote the campaign. Yet even they were not optimistic. In December they still expected "that next

May some of the stronger unions, such as the building trades, would get an eight-hour day, while the rest would be left in the cold" (*Tribune*, Dec. 7, 1885, p. 8).

Yet ordinary workers responded with unexpected enthusiasm. A meeting of the Central Labor Union denounced the anarchists for opposing the eight-hour day (*Tribune*, Dec. 28, 1885, p. 8). The anarchists had to follow the masses, and so in January they arranged a series of mass meetings. This in turn threatened conservative unionists in the Trades and Labor Assembly, who hurriedly organized meetings "to let people know that they do not want to be identified with the men now going round and discussing the eight-hour movement from an Anarchistic point of view" (*Tribune*, Feb. 8, p. 8). The same dynamic played out in various occupations, where trade unions faced competition from the Knights of Labor. For example, carpenters dissatisfied with the moribund Local 21 of the Brotherhood of Carpenters and Joiners seceded to form a rival Local Assembly, which in turn prodded the Brotherhood into action (Brennock 1901, p. 465). Competition among separate organizations and rival activists ensured that workers' enthusiasm was not stifled: it was eventually harnessed and multiplied.

This multiplication depended on interpretive frames which posited a common identity and project for all workers—whatever their occupation, industry, location, or ethnicity. Activists did not agree what this project was. Some told workers to preserve harmony between the classes; others urged them to overthrow capitalism. There was nonetheless a common denominator: unity and solidarity. These sentiments were expressed in "that beautiful watchword of Knighthood" (Irons 1886, p. 626), 'An Injury to One is the Concern of All.' The phrase was everywhere in 1886, among unionists as well. For labor historians, it signifies a rejection of capitalism: a rejection of the relentless competition which pitted individuals against each other (Fink 1988). This normative injunction also implied interdependence, and it expressed the power of collective action. As an organization, the Knights of Labor embodied interdependence. No matter how small the Local Assembly, its members felt that they had the support of workers across the continent.

The unity of workers was not merely rhetorical. The eight-hour day was a common aspiration. This facilitated inspiration: if one group of workers had organized for shorter hours, that fact was relevant for others. There was even a degree of interdependence, because the length of the working day was a convention common to most particular markets for manual labor. As more and more workers gained eight hours, the remaining employers might offer less

resistance to the demand. Activists deliberately fostered interdependence and inspiration. At a meeting to organize brewery workers, to take one example, speakers pointed to the powerful brewers' union in New York City, and to the recent organization of other workers in Chicago. Brewery workers, exhorted the chairman, "must finally understand that unity is strength, and that going hand-in-hand with the organized workers of other industries would only be to their advantage" (*Vorbote*, Mar. 17, p. 8). Such appeals seem to have resonated with the audience. One week later, members of the new union cheered on hearing that lumberyard laborers and butchers had organized a few hours before (*Tribune*, Mar. 22, p. 3). Three huge rallies for the eight-hour day were held in March and April, attracting several thousand workers. These visibly manifested the masses of workers prepared to take collective action.

Patterns of percolation

Positive feedback is indicated by the acceleration of mobilization in the months before May, and also by the surprise of activists—who followed as much as led the movement. Activists nevertheless facilitated positive feedback, by forging connections among various groups of workers. How, then, did mobilization percolate through the working class? Tracing the actual connections between one group of workers and another is difficult, given the limitations of the historical record. Indeed, dividing workers into distinct 'groups' is somewhat arbitrary; we can only acknowledge the groups realized by workers themselves, when they founded a new labor organization rather than joining an existing one.

The diffusion of collective action can be illustrated by Chicago's famous meatpacking factories, located beyond the city limits in 'Packingtown.' They employed twenty thousand workers at the height of the killing season. Of these, barely a few hundred were organized at the end of 1885. There were three proximate groups of workers, connected by industry, occupation, or location. Firstly, the packing firms employed some coopers. Though few in number, coopers were well-organized and militant. Secondly, there were also butchers working in shops in the city, though the extent of mobility within the occupation is unclear. The shop butchers formed a trade union in March. Thirdly, railroad switchmen worked in the yards, adjacent to the packers. When they struck the Lake Shore and Michigan Southern Railway in April, other workers in the neighborhood attacked the company's trains, and laborers at one packing plant refused to load its cars (*Tribune*, Apr. 20, p. 2).

Until the eve of May, Packingtown itself was quiescent. (The only exception was the founding of one Local Assembly in February.) Then, at the end of April, packinghouse workers held a mass meeting to demand eight hours, supported by the coopers (*Tribune*, Apr. 26, p. 2). The demand was actually presented to employers by a cooper. Packinghouse workers were certainly interdependent: a handful of large firms employed everyone from laborers to butchers. Either all would succeed or none would. They therefore suddenly shifted from quiescence to militancy. Within a week, thousands engaged in collective action—going out on strike and simultaneously organizing several Local Assemblies.

The diffusion of collective action can be examined systematically, by tracing the order in which different groups of workers mobilized. In 1885, organization was largely confined to skilled craftsmen. By mid 1886, it covered almost the full range of working-class jobs. Of the forty occupations distinguished in the Census, all but two were represented in the movement (U.S. Census Office 1890, part 2, table 118, p. 650). Considering wages as a measure of power in the labor market, we find a clear pattern of percolation. The Illinois Bureau (1886, table xv, pp. 257-71, 274-81) asked each union and Assembly to report the wage of members at mid 1886. These data are far superior to occupational or industrial averages culled from other sources. Wage rates (and founding date) are available for 146 Assemblies and unions.[5] The wage rate utilized is the average of the lowest and highest wages, transformed where necessary into the equivalent daily rate.

[5] Unfortunately, the tabulation for the Knights of Labor makes it difficult to match workers with a specific Local Assembly. This affects 26 Assemblies. In addition, three trade unions must be omitted because workers received board as well as wages. Wages are inferred for two unions using the wages of Knights in the same occupation.

Figure 5: Average wage of members of labor organizations in Chicago, 1886 (excluding clerical employees)

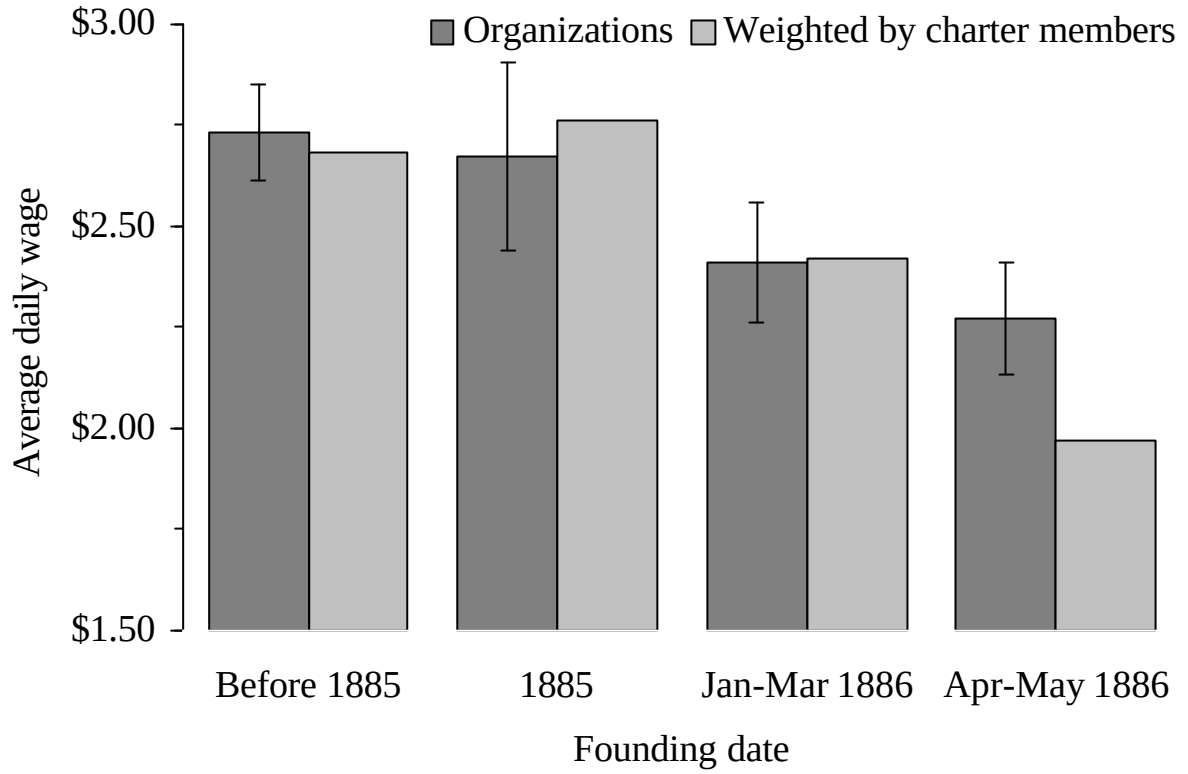
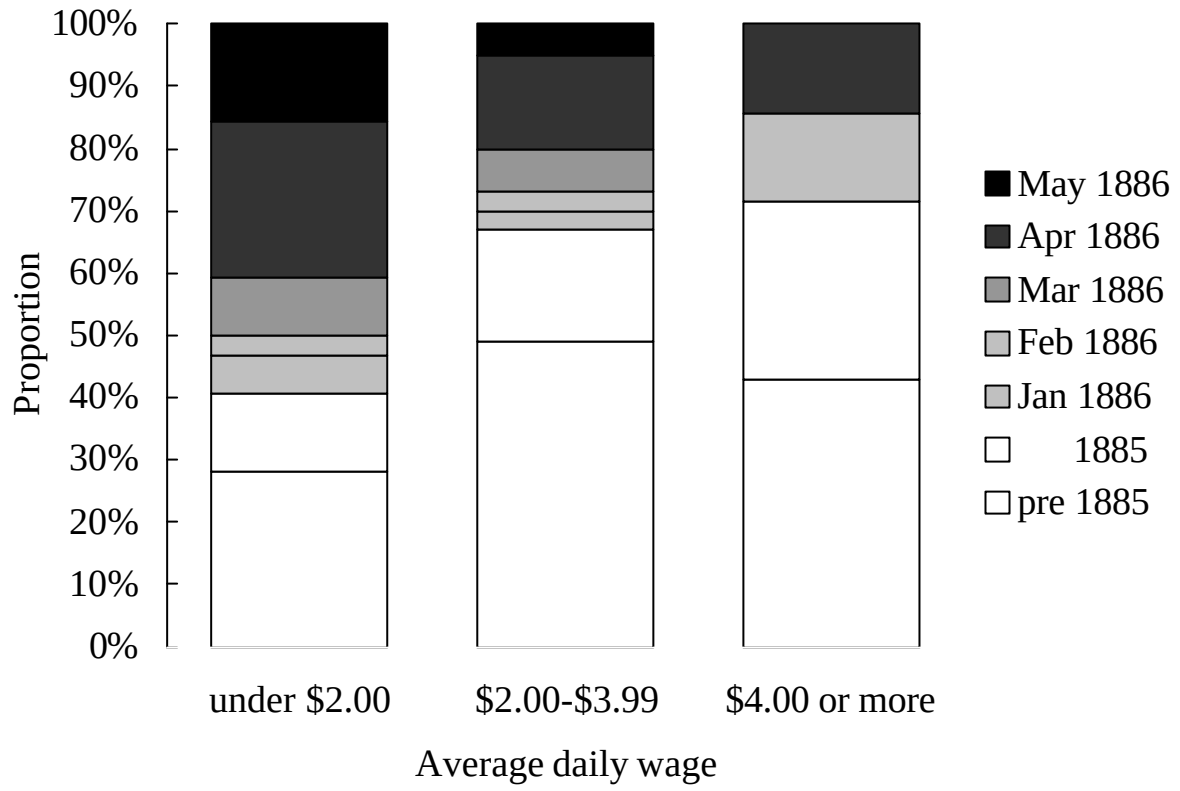


Figure 5 divides organizations according to founding date, and shows the average wage of their members (vertical bars indicate the standard deviation). Five organizations for clerical employees are excluded; they are considered below. There is little difference between 1885 and preceding years. In 1886, organization diffused to lower-paid workers.[6] Within the upsurge, there is a noticeable difference between organizations founded from January to March and those founded in April and May. This difference is still more pronounced when the average wage is weighted by the organization's charter members. This cross-

[6] Testing for the difference between two means (without assuming equal variance), the p-value is .007 (n = 56, 85)—excluding organizations of clerks. If those are included, the p-value is .024 (n = 60, 86).

Figure 6: Founding date of labor organizations in Chicago in 1886 (excluding clerical employees)



tabulation can be reversed. Figure 6 divides organizations according to the average wage of their members, and shows when they were founded. In the highest wage bracket, two thirds were founded before 1886. In the lowest, half were founded in the last three months of the upsurge.

The lowest-paid workers, of course, had minimal bargaining power; employers could easily replace them. In terms of the threshold model, they had the highest thresholds: to be persuaded to organize, they had to see many other groups of workers joining the movement. Like unskilled workers, clerical employees were among the last to organize; they also had high thresholds for inspiration. The reason, however, was different. Clerks had opportunities for individual advancement not open to manual workers. While their average wage was comparable to craftsmen's, the maximum was much higher. Therefore they were reluctant to organize collectively. Notably they did not strike in May. In sum, then, organization percolated from skilled craftsmen down the occupational

structure to unskilled workers, and up to white-collar employees. This suggests that the workers who organized in April or May were inspired by the organization of other workers in previous months.

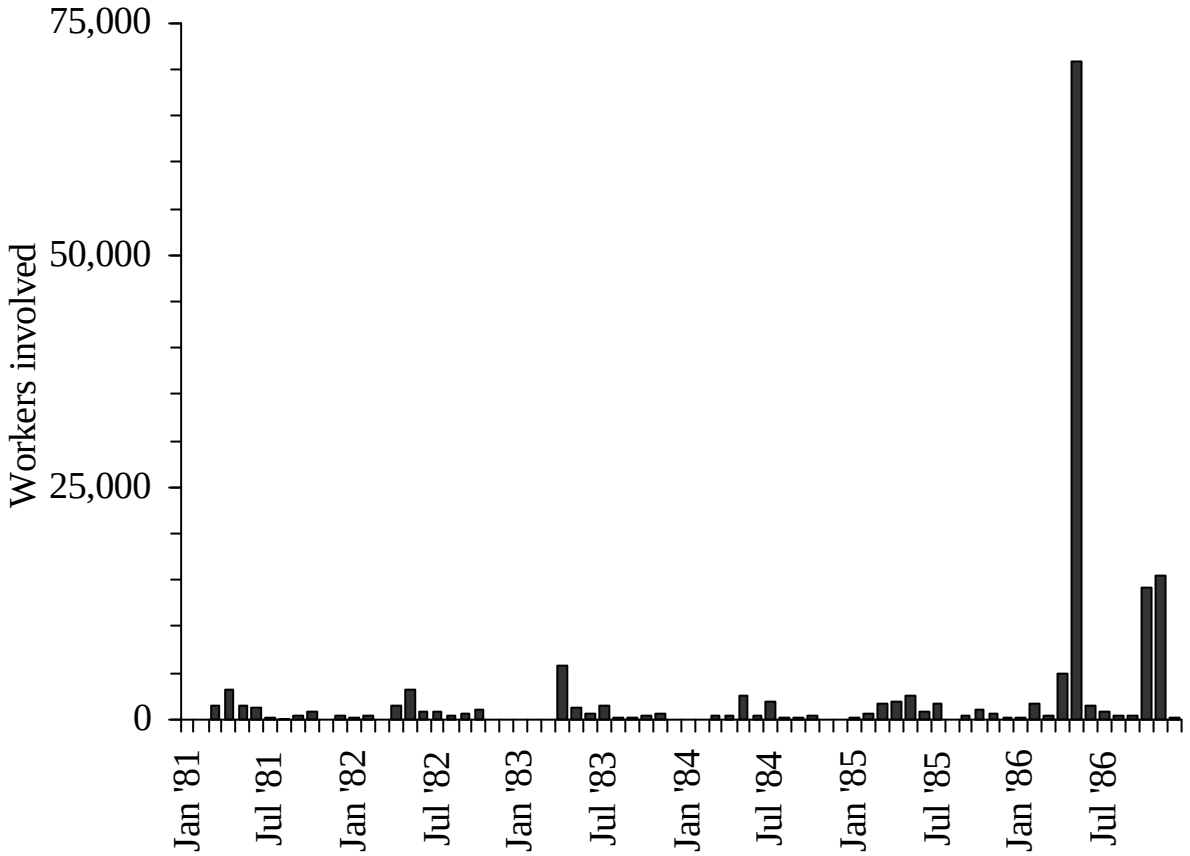
Expectations of power

Workers' optimism spiraled upwards as the number of organized workers grew. These were second-order expectations: workers became hopeful because other workers apparently had high hopes. We look in vain for any striking victory, which could have raised workers' expectations. The most prominent strike in America in the spring of 1886 involved (once again) railroad workers on Gould's Southwestern system, and it ended in a terrible defeat. In Chicago, three major strikes ended in March and April. Nailers involved in a dispute with the Calumet Iron and Steel Company since June 1885, finally left *en masse* for a plant in Wisconsin; boxmakers striking against Maxwell Brothers returned to work on their employer's terms; hundreds of workers at the McCormick Harvesting Machine Company were permanently replaced after being locked out. Yet these defeats did not discourage other workers. None of the conflicts arose from the mobilization of workers in the spring of 1886; they originated in events of the previous year. Moreover, none of them involved the demand for shorter hours.

The spiraling optimism of workers is seen in the radicalization of demands. The demand for the eight-hour day was ambiguous. Did it imply the same hourly wage? If so, workers would have their income cut by 20 percent, working eight instead of ten hours. Or did it mean that workers would keep the same daily wage? In that case, employers would have their labor costs raised by 25 percent. This ambiguity had been ignored when the campaign was formulated. In January, unionists in the Trades and Labor Assembly declared their "readiness to sacrifice wages," fearing only "the exorbitant demands [of] our fellow-workers" (*Tribune,* Apr. 20, p. 2). As the campaign gathered momentum, however, more and more workers began to demand 'eight for ten': eight hours work for ten hours' pay. Unskilled workers simply could not afford any reduction in income. Besides, as the ranks of organized labor grew, all workers had more reason to feel confidence in their collective power.

Workers' optimism was reinforced when employers began to offer concessions. About one in ten employers conceded shorter hours before May (Illinois Bureau of Labor Statistics 1886, table 2, pp. 482-90). This was an effect rather than a cause of mobilization: in almost every case, concessions

Figure 7: Strikes and lockouts in Chicago, 1881-1886



followed organization. Clothing cutters, who founded a Local Assembly in March, declared that they wanted to inaugurate shorter hours on April 5 (*Tribune*, Mar. 27, p. 3). Almost immediately, wholesale clothing dealers reduced their hours to eight, with no reduction in pay (*Tribune*, Mar. 30, p. 1). The sequence was repeated for brewers, bakers, and butchers. The sole unprompted concessions came from tobacco companies, who decided that conceding an eight-hour day would attract working-class consumers.

In the last weeks before May, there were signs of exaggerated overconfidence, especially among newly organized workers. The employees of a large furniture manufacturer, Frank Mayer and Company, demanded an immediate wage increase of 20 percent, as well as eight hours in May—which amounted to a 50 percent increase in hourly labor costs. When this was refused, three or four hundred workers struck or were locked out (*Tribune*, Apr. 16, p. 2). Their action was denounced in the Trades and Labor Assembly as "one of the

severest blows the eight-hour movement had yet received." The Möbelarbeiter Union's delegate to the Assembly concurred, and disavowed his union's endorsement of the strike. Over half the members were new, he explained, "raw and undisciplined," believing "they could get anything they wanted" (*Tribune*, Apr. 19, p. 2) On the eve of May, the comments of workers revealed their sense of overwhelming strength. A freight handler predicted the response of railroads: "I know some of them will fight it, but you'll see that the majority will give in after a few days" (*Tribune*, Apr. 30, p. 1).

Culmination: strikes in May

When May finally arrived, the depth of mobilization really became apparent. As Figure 7 shows, 66,000 workers struck on Saturday, May 1, and the following Monday. Perhaps another 37,000 gained concessions without having to strike (estimated from *Bradstreet's*, May 8, p. 290; May 15, p. 306). Thousands more made demands, were refused, but did not strike. Altogether, over a hundred thousand workers participated—close to half the wage workers in Chicago. In comparison, perhaps 40,000 workers belonged to labor organizations by the beginning of May. Organization was not a precondition for protest; it was frequently a result. Many groups of workers struck first and then formed a union or Assembly, which is why organizational founding peaked in May. A wave of enthusiasm carried along many thousands of workers who had previously given no indication of militancy—or had even rebuffed attempts to recruit them. This was recalled by an anarchist newspaper: "People in such times become unconscious of the current which draws them into the whirlpool; … the spirit of unrest seems to be propagated through the very atmosphere, seems to be communicated to people who previously had been impossible to influence" (*Vorbote*, June 8, 1887, p. 5).

Like organizing, striking was subject to positive feedback. Many workers struck in the first days of May because others had done so. Propagation was most visible when strikers from one workplace marched en masse to get others to join them. This was used especially by the unorganized. Freight handlers provide an illustration. The Chicago, Burlington, and Quincy Railroad was the center of militancy. Its men were the first to demand shorter hours, and first to strike. They marched along to other depots on the evening of April 30, and again on the morning of May 1 (*Tribune*, May 1, p. 1; May 2, p. 9). The responses varied at different depots. For some, it was clearly a matter of coordination: they

were just waiting for the moment to go out on strike. As soon as the marchers approached, they cheered and immediately quit work. Others were apparently more reluctant, but were persuaded by the size of the crowd. At one depot, it was simply intimidation. The men there refused to join and locked themselves inside; the crowd returned with reinforcements and pulled down the doors. With that tangible reminder of interdependence, the men inside decided to join the strike. Altogether, within a few hours the number on strike grew from 400 to 1500.

With tens of thousands of workers out on strike in the first days of May, this paper takes leave of Chicago. It is appropriate to end with uncertainty about the result—just as workers did not know whether they would win the eight-hour day.

5. Conclusion

The rapid mobilization of workers in Chicago—and elsewhere in the United States—in the first half of 1886 is explicable as process of positive feedback. The argument has two sides. One is negative: changes in political and economic circumstances cannot explain the magnitude of the strike wave, and a contingent event (the second strike on the Wabash) does not have the significance attributed to it. The positive argument has several strands. First, membership increased very rapidly within a few months, out of all proportion to changes in previous years. Second, this influx took even the most enthusiastic activists by surprise. Third, the propagation of organization followed a clear order. It percolated through the working class—from skilled craftsmen down to unskilled laborers, and up to white-collar employees. The workers who had least to gain from collective action were the last to mobilize. This may not be surprising, but (to my knowledge) it has never before been demonstrated with statistical evidence on such a short time scale. Fourth, workers' expectations of their relative power escalated, to an extent not justified by any change in external circumstances. If none of these arguments alone is conclusive, then perhaps their cumulative weight will prove persuasive.

'But what was the *real* cause: what *initiated* the process?' This persistent question can be answered in different ways. The campaign for the eight-hour day, which established the date of May 1 long before, shaped the timing of the strike wave. The economic recovery was a fortuitous coincidence, which made the campaign feasible. Neither of these 'causes' has sufficient weight to explain the extent and magnitude of this upsurge, nor sufficient generality to rival

'political opportunities' as a portmanteau explanation for other waves of protest. This might seem disappointing—but then nonlinearity is a corollary of positive feedback. A small change can have a large effect; a single spark can light a huge fire. The task of explanation is not merely to locate exogenous causes; it is also to unravel endogenous processes.

The process reconstructed here is sufficiently general to be applied to other waves of protest. There are several implications. One is the significance of inspiration as a source of positive feedback. The literature on collective action has focused on cases—like revolutions—where the scope of demands encompassed the entire political system. Therefore it has concentrated on interdependence. In the case of 1886, all workers did not share a common fate. If carpenters were successful, for example, that hardly increased the chance that freight handlers would win shorter hours. Yet workers did use the experience—and indeed, even the expectations—of other groups to estimate their own prospects for success. Another implication is the 'spontaneity' of collective mobilization. The literature on social movements has tended to emphasize organization as a precondition for collective action. This is quite misleading if it implies that waves of protest are planned by the leaders of formal organizations. In the case of 1886, the influx of members was unplanned—and for the paramount leaders of the Knights of Labor, unwelcome. Spurred by competition, working-class activists eventually harnessed the enthusiasm of ordinary workers, sustaining it over time and propagating it across space. Organization, like social networks and interpretive frames, can certainly multiply and diffuse collective action. Yet the element of spontaneity remains.

Perhaps my argument has a more general implication for the study of change over time. This paper has emphasized rapid change: the labor movement grew quickly and class conflict emerged suddenly. In social science, however, gradual trends are awarded far greater significance than rapid fluctuations (cf. Nisbet 1969). To an extent this reflects the limitation of historical statistics, which are usually confined to annual intervals. In part, however, this is an intellectual bias—revealed occasionally when 'moving averages' are used to smooth out the inconvenient fluctuations of history. I hope to have shown that rapid change can also be analyzed systematically, without falling back on traditional historical narrative. *Histoire événementielle* is too important to be left to historians. On the other hand, I hope to have provided an explanation for rapid change—a process of positive feedback—which accords with the intuition of a historian.

Appendix: Data for the analysis of strikes, 1881-1936

Logged strike propensity = ln(Strikers / Workers ∗ 100)

Strikers: number of workers involved in strikes and lockouts (U.S. Commissioner of Labor 1906, table iv, pp. 478-9, and table xvi, pp. 736-7; Griffin 1939, table ii, pp. 43-4; Peterson 1937, table 1, p. 21). Workers: total labor force minus agricultural employment (Lebergott 1964, table A-1, p. 510).

Positive change in unemployment =

Unemployment_t / $\text{Unemployment}_{t-1}$ ∗ 100 − 100, or zero, whichever is greater

Unemployment: unemployment rate for the civilian labor force (estimates described below).

Negative growth of money earnings =

Earnings_t / Earnings_{t-1} ∗ 100 − 100, or zero, whichever is smaller

Earnings: annual money earnings (when employed) of nonfarm employees (Lebergott 1964, table A-17, p. 524, table A-19, p. 528).

Absolute rate of price change = abs(Price_t / Price_{t-1}) ∗ 100 − 100

Price: consumer price index (Lebergott 1964, table A-17, p. 524, table A-19, p. 528).

Ratio of Democrats to Republicans in House = Democrats / Republicans ∗ 100 − 100

Democrats and Republicans: Members of the House of Representatives (U.S. Bureau of the Census 1976, vol. 2, series Y204-5, p. 1083).

Margin of victory of President in last election =

$\text{Votes}^{\text{President}}$ / (ÓVotes − $\text{Votes}^{\text{President}}$) ∗ 100 − 100

Votes: popular vote in the Presidential election (U.S. Bureau of the Census 1976, vol. 2, series Y83, p. 1073).

Unemployment

The unemployment series (Lebergott 1964, table A-3, p. 512, table A-15, p. 522) begins in 1890. Jeffrey Williamson (1974, appendix C.3, pp. 302-4) provides figures back to 1870, but his estimation uses an implicit rate (factored into annual earnings) which does not correspond to the explicit series, and it proceeds back from 1900, thus losing ten years of the series. Therefore I construct a new estimate for the unemployment rate of the civilian labor force before 1890, using a similar method to Williamson's. Three proxy series are utilized: (1) the index of manufacturing production used by Williamson (Frickey 1947, table 6, p. 54); (2) the Gallman-Kuznets series of Net National Product (Friedman and Schwartz 1982, table 4.8, pp. 122-7); and (3) Dun and Bradstreet's business bankruptcy rate (U.S. Bureau of the Census 1976, vol. 2, series V23, pp. 912-3). All three are combined because they give contrary indications of the strength of recovery in 1886.

The first step is to detrend each proxy series (s), by applying the regression equation

$$_t = \alpha_0 + \alpha_1 t + \alpha_2 t^2$$

for the period 1870 to 1913. This creates a 'capacity utilization index' defined as

$$c_t = (s_t - \ _t) / s_t$$

Then unemployment (u) is regressed on this index in the equation

$$\hat{u}_t = \beta_0 + \beta_1 c_t + \beta_3 c_t^2$$

for the period 1890 to 1913. The correlation coefficients are respectively (1) .76, (2) .90, (3) .85. Each equation is used to predict the unemployment rate before 1890. The three predictions are combined by taking their geometric mean:

1880	3.2%
1881	1.8%
1882	1.0%
1883	2.9%
1884	5.7%
1885	7.0%
1886	3.9%
1887	4.0%
1888	5.9%
1889	5.8%

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