

UC Berkeley

UC Berkeley Electronic Theses and Dissertations

Title

An Interactional Account of Online Collective Action

Permalink

<https://escholarship.org/uc/item/8gc9f0gk>

Author

Shaw, Aaron

Publication Date

2012

Peer reviewed|Thesis/dissertation

An Interactional Account of Online Collective Action

By

Aaron Shaw

A dissertation submitted in partial satisfaction of the
requirements for the degree of

Doctor of Philosophy

in

Sociology

in the

Graduate Division

of the

University of California, Berkeley

Committee in charge:

Professor Peter B. Evans, Chair

Professor Marion Fourcade

Professor Coye Cheshire

Professor Yochai Benkler

Fall 2012

An Interactional Account of Online Collective Action

Copyright © (2012), some rights reserved (See [Appendix A](#)).

Aaron Shaw

Abstract

An Interactional Account of Online Collective Action

Aaron Shaw

Doctor of Philosophy in Sociology
University of California, Berkeley

Professor Peter B. Evans, Chair

The diffusion of networked information and communication technologies has facilitated the rise of novel modes of online collective action, collaboration, and public goods production. In this dissertation, I elaborate an *interactional* account of online collective action, emphasizing the role of micro-level social interactions in shaping organizational dynamics and collective behavior. This approach provides a clearer explanation of both the means by which individuals and groups within online collectives establish stable patterns of activity as well as the mechanisms through which those patterns change over time. The argument proceeds through a series of interconnected empirical studies of several different domains of online collective action including crowdsourcing labor markets, Wikipedia, and the U.S. political blogosphere. Across these studies, I find that interactions and interactional dimensions of behavior play a central role in mobilizing, retaining, and organizing participants engaged in online collective action. Interactional motives and incentives not only mobilize participation in online collectives, they also contribute to the emergence and persistence of participation patterns and organizational forms. The character of these inequalities and organizational forms vary widely, likely contributing to the uneven impact of online collectives.

Contents

1	Interactionism and Online Collective Action	1
	Making Sense of Online Collective Action	1
	Previous Accounts of Online Collective Action	2
	Synthesizing An Interactional Account	5
	My Argument and Plan of Analysis	9
	Contrasts with Previous Research	12
	Chapter Outline	15
2	The Effects of Interactional Motivations and Incentives Among Crowdsourcing Workers	17
	Introduction	17
	Relational Incentives & Cooperation	19
	Research Setting and Approach:	
	Online Labor Market Experiments	22
	Motivations and Participation on MTurk	22
	The Experiments	23
	Study #1 – Social Desirability Experiment	24
	Summary	24
	Surveys & Social Desirability	25
	Methods	29
	Results	31
	Discussion	34
	Limitations, Implications & Conclusion	37
	Study #2 – Horserace Experiment	38
	Methods and Materials	40
	Results	47

Discussion of Study #2	52
Conclusions	54
Study #1	54
Study #2	55
Relational Incentives and Online Cooperation	56
3 Differential (and Deleterious) Effects of Status-based Awards in Wikipedia	57
Introduction	57
Background	59
Awards as Status-based Solutions to Collective Action Problems	60
The Everyday Dynamics of Collective Action Online	62
Predicting and Testing the Effects of Status-based Awards on Collective Action	64
Setting	64
Barnstars: Peer-to-Peer Awards on Wikipedia	66
Data	69
Methods	71
Results	73
Discussion	75
Limitations/Threats	76
Conclusions	77
Future Work	78
Implications for an Interactional Explanation of Online Collective Action	79
4 From Incentives to Institutions and Interactional Analysis	82
Recapitulation:	
From Incentives to Institutionalized Interactions	82
Elaboration:	
An Interactionist Analysis of Online Collectives	84
5 Interactional Mechanisms of Governance in an Open Collective: Gatekeep- ing on Daily Kos	85
Introduction	85
Gatekeeping as a Mechanism of Organizational Reproduction and Democ- racy	89

Gatekeeping as an Interactional Process	119
Daily Kos, Online Collectives & The Networked Public Sphere	120
6 Online Collectives in Context: The U.S. Political Blogosphere 2003-2008	122
Introduction	122
Background:	
Blogs, Democracy, and the Public Sphere	124
The Significance of Intra-blog Variations	126
Emergence and Evolution of the U.S. Political Blogosphere	128
Professionalization	129
Formalization	129
Political Integration	130
Two Blogospheres	131
Methods	131
Sample Selection	133
Coding Procedure	134
Statistical Tests	135
Results	135
Discussion	139
Conclusions	142
Implications for Online Collectives	145
7 Conclusions	150
Overview	150
Synthesizing the Argument	150
Key contributions of this work	154
Interactional Approach to Online Collective Action	154
Implications and Future Research	156
A Creative Commons License	158
Creative Commons Legal Code	158
License	158

List of Figures

2-1	The proportion of US participants who selected each motivation using agreement statement-style questions or the list experiment. N = 1132. . .	32
2-2	The proportion of India participants who selected each motivation using agreement statement-style questions or the list experiment. N = 898. . . .	33
2-3	The degree of over or under-reporting of each motivation using traditional agreement statements, compared to the list experiment conditions. For example, compared to using the list experiment estimate as the “expected value,” US participants over-reported that “killing time” was a motivation by 36%.	36
2-4	Performance Distributions - All Conditions	48
2-5	Performance Distribution - All Conditions	48
2-6	Visual Comparison of Treatment Effects	49
3-1	A picture of the “original barnstar” given on Wikipedia.	66
3-2	Example of a barnstar that has been given to Wikipedia founder Jimmy Wales.	67
3-3	A screen shot of Wikipedia founder Jimmy “Jimbo” Wales’ <i>user page</i> on Wikipedia. Wales advertises his receipt of barnstars from his user page and links to a page that contains a complete list of his awards.	67
3-4	Prototypical plot of estimates from Model 1.1, which does not include lag edits, as shown in Table 3.2. Account age, cumulative edits, and lagged edits are each held at their mean. The discontinuity for non-signalers is not statistically significant.	74
3-5	Prototypical plot of estimates from Model 2.1, which includes lagged edits, as shown in Table 3.2. Account age, cumulative edits, and lagged edits are each held at their mean. The discontinuity for signalers is not statistically significant.	75
5-1	Summary Scatterplot: Cheers & Jeers, April 13, 2008	107

6-1	Technology Adoption and Participatory Affordances	137
6-2	Site Governance	138
6-3	User-generated Content Opportunities	140
6-4	Primary Content Authorship and Style	147
6-5	Primary Content Authorship and Style	148
6-6	Summary of Findings	149

List of Tables

2.1	Condition Descriptions and Sample Sizes	30
2.2	Age, gender, and educational level among respondents in the US and India samples. Age is reported as mean with s.d. in parenthesis.	31
2.3	Performance on Individual Questions (All Conditions)	47
2.4	Average Treatment Effects (ATE) on Aggregate Performance	50
2.5	OLS Regression on Aggregate Performance	51
3.1	Descriptive statistics showing differences between users who moved, and did not move their barnstars. ($n = 6,027$)	70
3.2	Zero-inflated negative binomial regression models on a count of edits per week. Models 1.1 and 2.1 are negative binomial count models. Models 2.2 reports the results from the simultaneously estimated logistic regression and the dependent variable is the probability that a user will make at least one edit in the given week.	81
5.1	Types of Gatekeeping on Daily Kos	99
5.2	Summary Data: Cheers & Jeers, April 13, 2008	106
5.3	Key Participants Cheers and Jeers, April 13, 2008	108
5.4	Summary of activity on Cheers & Jeers, 2008	110
5.5	Summary Statistics, Cheers and Jeers, 2008	112
5.6	Network Variables & Graph Level Indices, Cheers & Jeers 2008	113
5.7	Regression Results Daily Kos Cheers & Jeers, 2008 Dependent Variable: Recommendations Received per Comment [†]	113
6.1	Sources of Political Blog Rankings	133
6.2	Technology Adoption and Participatory Affordances	136
6.3	Site Governance	136
6.4	User-generated Content Opportunities	139
6.5	Primary Content Authorship and Style	139

6.6 Mobilization: Calls to Action and Fundraising (Top 65 Blogs Only) 141

Acknowledgements

This dissertation would not exist without the collaboration, advice, support, feedback, copy editing, brainstorming, encouragement, humor, tolerance, and camaraderie of many people. I am deeply grateful to all of them and cannot thank them enough for the numerous ways, both big and small, in which they have enabled and allowed me to make this project happen. I owe extra special thanks to a few people and places, including my:

Advisors, dissertation committee members, and mentors: Peter Evans, Yochai Benkler, Coye Cheshire, and Marion Fourcade. I cannot thank you all enough for the time, commitment, and respect you have given this project.

Research collaborators: Benjamin Mako Hill, Judd Antin, Lukas Biewald, Eszter Hargitai, Vaughn Hester, John Horton, and Daniel Chen.

Colleagues who provided critical feedback and insights: Fred Block, Dana Chandler, Laura Clawson, Henry Farrell, Archon Fung, Dave Karpf, Matthew Keller, Dan Kreiss, Andrew Schrank and Robb Willer.

Beloved friends who supported me in so many ways, especially (in alphabetical order): Abigail Andrews, Lukas Biewald, Catherine Bracy, Nora Broege, Alexina Cather, The Cooperation Research Workshop at the Berkman Center, Ben Gebre-Medhin, Mayo Fuster, Matthew Gilliland, Vaughn Hester, Hannah Hildreth, Christina Knight, Colin Maclay, Jay Martin, Mika Matsuzaki, Adelaida McIntire, and Vaughn Tan.

Funders, including: The Berkeley Sociology Department, The Berkman Center for Internet & Society, the Ewing and Marion Kaufman Foundation, and the Ford Foundation.

Data sources, storage facilities, and research subjects, including the Wikimedia Foundation, the workers of Amazon's Mechanical Turk Marketplace, John Kelley and Morning-side Analytics, and Daily Kos.

Research assistants and contributors of code, copy editing, and other collaborative efforts: Jason Callina, Anita Patel, Laura Miyakawa, Andrew Korzhuev, Justin Keenan, Colleen Ortegon, Silpa Kovvali, and Victoria Stodden.

Institutional homes: The Department of Sociology at UC Berkeley, and the Berkman Center for Internet and Society, where amazing people like Amar Ashar, Carey Anderson, Carolyn Clark, Bill Gentry, Karyn Glemaud, the Geeks, Becca Tabasky, Elsa Tranter, and Belinda White, as well as the faculty, students, and fellows created the perfect environments in which to work.

Physical and spiritual homes: 41st Street in Oakland and the Acetarium in Somerville.

Last, but not least, I am grateful to my entire family, including my Mom, Dad, Eric, Grandma, Nana (who blazed the doctoral trail!), and all the other Shaws, Eastons, Cohens, and Kaloses. Both of my grandfathers, Malcolm Shaw and Kermit Easton, passed away while I was working on this project, and I dedicate it to their love, inspiration, and memory.

Chapter 1

Interactionism and Online Collective Action

Making Sense of Online Collective Action

The diffusion of the Internet and of digital information and communication technologies has facilitated the rise of novel modes of collective action, collaboration, and public goods production, many of which would have been unimaginable a few decades ago. Wikipedia, a freely accessible encyclopedia written entirely by volunteers, is arguably the most widely available and utilized informational resource in human history. Relatively informal organizations without clear boundaries create complex free and open-source software – such as the Apache web server and the GNU/Linux operating system – that provide the foundation of the global financial system and network infrastructure. Through online crowdsourcing platforms, hundreds of thousands of individuals engage in both volunteer and paid micro-scale work, a division of post-industrial labor that may change the way firms and movements have historically distributed large-scale tasks. Likewise, networked movements and participatory media organizations such as blogs have emerged to challenge established political parties and institutions of democratic engagement. These and other instances of online collaboration across different arenas of activity have had disruptive effects. Numerous firms, governments and movements look to transform the way they recruit and harness collective effort. Similarly, scholars have struggled to come up with effective explanations of how and why groups mobilize and work together online.

In this dissertation, I present a series of empirical studies of online collectives in the domains of crowdsourcing, wiki production, and political blogging. In addition to cutting across substantive areas of activity, the analyses draw from a wide range of theoretical and analytical traditions, including social psychology, group process research, political

sociology and communication, studies of computer-supported cooperative work, organizational theory, and social movements research. I do so in order to synthesize some of the distinct contributions of these literatures to the study of collectives as well as to bring something new and distinct to the discussion. The prevailing models and analyses of collective action tend to use individual-level explanations of motivation and behavior. Other bodies of research apply institutionalist or “structural” accounts of the variations between groups. A third area of research focuses on more formal dimensions of group dynamics. To some extent, these approaches have all been revisited and recapitulated as researchers have turned their attention to explaining online collectives.

In contrast, I emphasize the role of *interactional* factors in determining the patterns of participation and organization within online collectives. Briefly put, an interactional account of online collective action emphasizes the role of micro-level social interactions as well as individuals’ orientation toward those interactions in shaping group dynamics and collective behavior. This perspective complements previous social science research into these phenomena, which have tended to emphasize either microeconomic or structural accounts of the factors that shape collaboration or cooperation within particular collectives. Such accounts provide inadequate explanations of both the means by which individuals and groups within online collectives establish stable, differential patterns of activity as well as the mechanisms through which those patterns change over time. An interactional perspective fills these gaps in the existing literature and facilitates a more accurate understanding of arguably the most transformative phenomena brought about through the spread of the Internet and networked digital communication.

Previous Accounts of Online Collective Action

Previous research has focused on three distinct kinds of explanations of online collective action: social psychological and micro-level accounts emphasizing motivations or incentives; structural accounts focusing on socioeconomic and macrosocial variations; and structural accounts underscoring the role of network dynamics or generic group processes. By and large, none of these approaches sufficiently account for the interactional dimensions of group behavior in open collectives. In addition, an analysis of the interactional dimensions of collective action can provide more compelling explanations of some patterns of behavior in online collectives than prior work. Below, I review each of these areas of previous research in greater detail in order to frame my interactional account.

Some of the most influential scholarly explanations of how and why open online collectives work utilize institutional and transaction cost economics as well as social psychological theories of motivation. Specifically, a number of authors have argued that distinct features of digitally-networked information production enable large-scale, “non-market” systems to overcome the obstacles to collective action, public goods creation, and sharing identified by classical economic theory (Benkler, 2002, 2006; Kollock, 1999; Lerner and

Tirole, 2002; Weber, 2004).¹ These claims originated as rejoinders to longstanding debates on “the tragedy of the commons” and collective action failures in the context of public goods creation (Hardin, 1968; Olson, 1965). Explicitly or not, such arguments draw on the strategy pioneered by Ostrom in her analysis of institutional solutions to managing common-pool resources (CPRs) (Ostrom, 1990) as well as the work of Axelrod (1984) and others examining the evolution of human cooperation. As such, these approaches consider collective action online through a two-fold question: Why do individuals make contributions to online collective goods in the absence of financial incentives and how do large numbers of individuals coordinate and sustain their contributions in the absence of either formal organizational structures or markets? Responses tend to emphasize relatively static sets of norms, incentives, and motivational profiles, and to overlook the importance of both the structural dynamics within online communities as well as the interactions between participants.

As a complement to explanations rooted in micro-economic theories of incentives, an extensive body of literature that empirically examines the motivations for participation in collaborative communities online provides more precise specifications of the psychological factors that drive a wide range of individuals to become more or less active members of online collectives. For example, the questions of why individuals contribute to open-source software, peer-to-peer filesharing, social network sites, Wikipedia, blogs, crowdsourcing markets, photo-sharing sites, and question-answering communities have all attracted increasing scholarly attention in recent years (Antin and Cheshire, 2010; Cheshire, 2007; Ghosh and Glott, 2002; Glott et al., 2010; Kraut and Resnick, 2011; Ipeirotis, 2010; Lakhani et al., 2005; Lampe and Resnick, 2004; Lawrence et al., 2010; Nov et al., 2009; Schroer and Hertel, 2009).

In many cases, this line of psychologically-oriented research presumes that differential motivational profiles and orientations towards altruistic or prosocial behavior shape patterns of online participation. This diverges from the work that is more in line with classical microeconomic theory insofar as it explains both how social psychological motivations play a role in driving individuals to join online collectives as well as why some members of some communities contribute so much more than others (I will return to this point below). As a result, these studies provide a much more nuanced and detailed portrait of the range of psychological factors that support robust online collaboration. At the same time, however, they also reproduce many of the limitations of the more microeconomic analyses of motivation and incentives. In particular, both of these approaches remain limited by the methodological individualism characteristic of much psychological research. As a result, many studies in this vein tend not to consider the likelihood that structural, cultural, and historical factors have an interdependent relationship with the psychological dispositions that prevail within individuals and across groups.

¹ The description of these phenomena as “non-market” comes from Benkler and is problematic given the prominence of multinational corporations and individuals residing within wealthy, capitalist democracies in these new modes of production. Benkler maintains that the term is valid due to the fact that pricing mechanisms tend not to obtain in peer production systems.

In contrast with the “economic” and the “social psychological” points of view, there are also two influential and closely related accounts of online collaboration and collective action that adopt a structural approach. The first of these emphasizes macrosocial forces as key determinants of online participation; the second focuses more closely on network and small group dynamics to explain variations in online systems. They diverge from the economic and social psychological explanations of online collective action insofar as they advocate the importance of material social conditions or patterns of collective behavior over intersubjective institutional forces or micro-level attitudes and mental states.

In part, both of the structural approaches to explaining online collaboration *begin* with the widespread observation that strong inequalities of participation are pervasive within online collectives. To be clear, I do not mean inequality in the socioeconomic or demographic sense in which sociologists usually employ the term. Rather, I mean more generic forms of inequality and hierarchy peculiar to participation in open collectives. A concrete example is the unequal rates of contribution that arise in an environment like Wikipedia. A very small proportion of the total population of Wikipedia visitors ever edits the encyclopedia. Among those who edit, an even smaller proportion edits more than once, and an even smaller proportion edit a lot and become “super editors” or heavy contributors (see Kittur et al., 2007; Viégas et al., 2007). The result is the frequently referenced “power law” of participation documented across virtually all forms of online communities and many offline volunteer-based organizations or movements as well (Adamic and Huberman, 2000; Laherrère, 1996).²

Such extreme inequalities of contribution, participation, hyperlinks, and attention are commonplace across the Internet as well as a range of other social environments, and do not necessarily indicate some underlying design flaw or injustice at work. If anything, generic inequalities in online systems require explanation because they stand in contrast with the egalitarian rhetoric, ideals, and potential associated with phenomena like wikis, blogs, and Social Network Sites (SNS). They also constitute an empirical puzzle and should lead us to ask a number of questions about what role they may or may not play in the social environments where they prevail. For example, what forces and mechanisms lead to these kinds of generic forms of inequality within online collectives? How do those forces and mechanisms get reproduced over time? These questions motivate this project and, while the chapters that follow will not provide conclusive answers, I will try to make the argument that interactional dynamics provide at least a partial explanation of the origins of generic inequalities in online environments.

One subset of structural analyses tend to explain the presence and persistence of generic inequalities online in terms of socioeconomic and structural dynamics. This research – an extension of earlier work documenting the persistence digital divides – considers inequalities in terms of both access to online tools as well as their use. Much of this work has

² Power law distributions, also known as “Zipf” or “Pareto” distributions are frequently observed in a wide variety of physical, biological, and social phenomena (see Laherrère, 1996) including distributions of wealth, mountain height, oil deposit size, and more. They are extremely skewed and scale-invariant, with a very tiny proportion of the population occupying the extreme peak of the curve.

argued that socioeconomic and demographic attributes of Internet users explain much of the variation in who possesses the skills and resources to join online collectives as well as the likely impact of those collectives on society as a whole (e.g. Hargittai and Hinant, 2008; Hargittai and Walejko, 2008; Schradie, 2011). This point of view overlaps with a second body of research into the role of network structures and technological infrastructures in online collectives. This research models online collectives in positional terms in order to explain behavioral outcomes such as the distribution of attention, influence, and status among members of particular communities (Adamic and Huberman, 2000; Barabási, 2003; Kittur et al., 2007; Lampe et al., 2007; Salganik et al., 2006; Salganik and Watts, 2008; Viégas et al., 2007). Some authors, such as Matt Hindman (2008), unite both perspectives – the digital divides approach as well as the network dynamics approach – resulting in an argument that tends towards a deterministic explanation of how online collectives work and their impact on various fields of activity (e.g. the public sphere).

The strength of these structural approaches lies in their ability to synthesize accounts of micro-level dynamics of participation within more general meso- and macro-level frames of explanation (e.g., social networks and socioeconomic inequality). At the same time, these analyses tend to efface the concrete means by which such processes take place. For example, understanding that inequalities of skill or access explain variations in participation does not specify how these variations play out at the level of micro-social interactions within particular communities (Hargittai and Walejko, 2008; Schradie, 2011). Similarly, the fact that power laws of attention can emerge nearly independent of the content of specific cultural goods does not provide any insight into the processes by which hierarchies of attention or status emerge or are reproduced (Adamic and Huberman, 2000; Salganik et al., 2006; Salganik and Watts, 2008).

Synthesizing An Interactional Account

A separate current of research emphasizing the role of interactions in shaping individual and collective behavior cuts across the different perspectives I have reviewed thus far and synthesizes aspects of each of them. Borrowing from classical and contemporary theorists of relational sociology, I refer to this line of explanation as an *interactional account* of online collective action (Collins, 1981; Emirbayer, 1997; Goffman, 1967; Tilly, 1999, 2001; Zelizer, 2005). The key aspects of an interactional approach to studying collective action emerge from relational explanations of individual and group behavior. Relational analysis emphasizes the mutually constitutive connections between individual action and social structure, and focuses on social interactions as important sites of both social reproduction and transformation. Emirbayer (1997, 287) articulates the implications of this perspective in the broadest terms:

Relational theorists reject the notion that one can posit discrete, pre-given units such as the individual or society as ultimate starting points of sociological analysis...Individual persons, whether strategic or norm following, are

inseparable from the transactional contexts within which they are embedded...

By “transactional contexts,” Emirbayer refers to the social environments and interactions within which individuals encounter both one and other as well as larger, institutionalized units of social life (organizations, movements, cultural groups, nation-states, etc.). Fundamentally, the sort of interactional analysis I aim to elaborate through this project amounts to an effort to take these contextual dynamics more seriously and thereby avoid the reductive pitfalls of sociological explanations that posit individuals or structures or institutions as somehow independently existing entities.³ I consider such an interactional approach to be consistent with the vision of relational analysis elaborated by Emirbayer and others. However, whereas many distinct modes of sociological analysis fit under the umbrella of relationalism (e.g. social psychology, field theory, group processes research), an interactional research agenda focuses more precisely on interactions as a key unit of social dynamics. Here, the work of Goffman (1967; 1973) serves as the key reference point. In analyzing social interactions, Goffman sought to construct a theory of social relations that could simultaneously accommodate and contribute to micro-level studies of individual behavior, meso-level or organizational studies, as well as macro-social research. This point of view should not be confused with the more totalizing argument that micro-level interactions are analogous to sub-atomic particles out of which larger units of society are somehow formed (see Collins, 1981). Rather, Goffman explicitly positioned his pragmatic interactionism in a complementary relationship to more structural and more psychological accounts of social behavior.

Concretely, adopting an interactional approach to the analysis of collective action and online collaboration means analyzing interactions as the sites of social reproduction within collective action. This entails looking at micro-level processes and behavioral patterns in order to better understand dimensions of larger group dynamics and institutionalization within open organizations. At the same time, I do my best not to lose sight of the realities of social structure and macro-level social forces in the process, emphasizing both how variations in micro-level behavior are often associated with structural variations or at least variations in experience that are dictated by structural conditions.

Most previous research into online collectives has focused on individual motivations and psychological accounts of behavior. Some work has considered the role of institutions and organizations – but usually only from the perspective of analyzing the effects of relatively static sets of norms and rules on individual behavior. Related analyses have considered the role of social structure in these environments. I seek to focus on the ways in which micro-social interactions contribute to the production of effective, successful collective action and distributed collaboration. This means that I examine how interactions effect individual-level motivations and incentives as well as meso-level group

³ Emirbayer (1997) classifies such approaches as “substantialist.”

processes and dynamics. I also consider how interactions factor into processes of social reproduction and governance in the context of open collectives.

The fact that interactional analysis is focused on micro- and meso-level dimensions of social behavior has methodological implications as well. Several empirical methods, such as experiments and ethnographic participant observation, have clear advantages for directly observing interactions (as opposed to the effects or remembrances of those interactions). Online data sources expand these possibilities by exposing both full transcripts of text-based interactions and, in some cases, behavioral trace data in the form of server “logs” recording the actions of individuals using a particular website. As I explain in greater detail below, I combine several of these strategies in my own research in order to access a combination of behavioral, attitudinal, and documentary evidence with which to test and elaborate my claims. The methodological choices derive primarily from the substantive questions and theories driving each chapter rather than any *a priori* preference for a particular mode of inquiry. Nevertheless, I do prioritize using evidence drawn directly from the fields I study over simulated data, formal analytical models, or purely interpretive analysis. This priority partly reflects my personal commitment to and investment in observational data collection, which I believe to be one of the comparative advantages of social scientific research over other modes of inquiry. In the context of an analysis focused on interactional dimensions of social behavior, however, observational data collection has the added advantage of capturing evidence about interactions *in situ*. As some of the chapters will demonstrate, this may give some of my results greater claim to external validity than evidence collected in traditional laboratory environments or through less direct methods of observation.

In the context of studying online collectives, an interactional perspective extends social psychological research to emphasize the importance of interactions and, in particular, the embeddedness of structural and network dynamics as well as individual motivations within the interactions that constitute collectives. Social psychological motivations and interactions matter in two ways: First, the presence and prospect of interactions shape the behavior and perceptions of individuals who participate in online collectives. Second, these interactions also function as the context within which the motives, norms, and practices of individuals as well as groups take shape and evolve. In this way, interactional dynamics contribute directly to the outcome of online collective action both at the level of micro-level motivations and participation patterns as well as meso-level social and organizational behaviors. In turn, these interactional dynamics also play a role in determining the social impact of online collectives.

To illustrate what I mean in terms of individual-level analysis, consider the implied model of behavior adopted by most of the previous microeconomic accounts of online collective action. According to these perspectives, individuals participate in online collectives because they possess a particular configuration of psychological attributes (motives) or because the technical features, rules, and/or norms of a particular community activate a set of prosocial responses within them. A more interactional approach to understanding

individual attitudes and behaviors could focus on how they emerge through discursive and interactive processes (e.g. Cheshire, 2007; Cheshire and Antin, 2008), analyzing the interactions themselves more closely in order to understand the mechanisms by which particular attitudes or motives may determine unequal patterns of participation.

From a structural point of view, an interactional approach generates insights into the foundations of participation dynamics and inequalities that complement existing research into both digital divides and network dynamics. For example, analyses considering socio-economic access divides, the distribution of skills and expertise, or the network positions of participants in online collectives, do not explain the mechanisms by which roles, rules, and norms are established and negotiated within online collectives. Understanding these dynamics of coordination and organization requires some understanding of the diffuse, micro-level interactions through which participants' individual behaviors aggregate into larger-scale social dynamics and structures. Although these interactions happen in contexts fundamentally defined by the structural factors addressed in much existing work, these structural factors alone cannot account for the outcomes or variations across collectives.

Several recent studies have underscored the significance of interactional aspects of individual motivations and organizational governance mechanisms within open online collectives, but this work has not yet been elaborated into a more general framework for thinking about online collective action. For example, O'Mahony and Ferraro (2007) show that, over time, the growth of the Debian Linux community has led the community members to negotiate and implement a steadily more complex boundary-management process, leading to increasingly formalized and hierarchical governance structures. Likewise, previous work analyzing the effects of feedback on individual patterns participation within online collectives demonstrates that individual outcomes are shaped through interactions with both technological interfaces as well as peers (e.g. Cheshire and Antin, 2008; Lampe and Johnston, 2005). In the course of the chapters that follow, I expand some of these earlier findings through chapters that consider interactional dimensions of online collectives from several different angles. In the process, I attempt to fill-in the interactional approach that I have sketched out here.

Before going any further, I should clarify my somewhat idiosyncratic appropriation of the language of collective action. In referring to environments like Wikis⁴, political blogs, and online labor markets as examples of "online collectives." I draw on a number of distinct research traditions, including social psychological and microeconomic work on human cooperation and group processes, organizational theory, institutionalist economics research into common-pool resources, social movement theory, and political sociology. The resulting analysis is something of a misfit hybrid that borrows heavily from a variety of literatures without fully embracing any of them. Fundamentally, I believe that

⁴ In generic terms, a Wiki is any website that utilizes a sort of collaborative editing platform (usually something like MediaWiki, PB Wiki, MoinWiki, or any of a few other common platforms employing similar styles of markup) that facilitates large-scale textual content creation and aggregation along the lines of Wikipedia.

this is an appropriate choice for an analysis of online collectives – as I will refer to them throughout this text – precisely because they blur many of the boundaries between the empirical phenomena that concern each of these bodies of research. In addition, I think that recombining pieces of these distinct research traditions can lead to something of a productive synthesis. As in the traditional anecdote about the blind wise men asked to describe an elephant after touching completely different parts of the animal, these distinct areas of research have circled around many similar issues in their respective efforts to analyze related sorts of human endeavors. A social movement must solve the sort of collective action problems defined by microeconomic theory just as the capacity of a social movement to engage volunteer participation requires a subtle awareness of the individual motivations described in social psychology. Insofar as I enter into dialogue with several of these bodies of work, I do so with an eye towards capitalizing on these overlaps. In the process, I will undoubtedly fail to satisfy the demands of any one area of inquiry, but hopefully I will nevertheless manage to contribute something that is also distinct from any of them – a product of their intersection rather than a deepening and recapitulation of their differences.

My Argument and Plan of Analysis

This rest of this project consists of a series of interconnected empirical studies that elaborate the interactional account of online collective action. The central claim is straightforward: interactions and interactional dimensions of behavior play a central role in mobilizing, retaining, and organizing participants engaged in online collective action. Interactional motives and incentives not only mobilize participation in online collectives, they also contribute to the emergence and persistence of generic participation inequalities and collectives' organizational forms. The character of these inequalities and organizational forms vary widely, likely contributing to the uneven impact of online collectives within broader organizational fields.

The chapters consist of studies of online labor markets, Wikipedia, and the U.S. political blogosphere. My interactional account begins from a simple set of claims supported by experimental studies of workers in the “Mechanical Turk” labor market: participants in even the least social online systems respond to social motivations and pressures. Furthermore, incentives that nudge people towards thinking socially and orienting their behavior around the actions of their peers elicit more high quality contributions to collaborative projects, even in the absence of more substantive interactions. However, as the case of barnstar movers on Wikipedia shows, interactions are not enough to guarantee high-quality or sustained participation.

Interactions also shape and contribute to the reproduction of organizational structures and institutions in which they occur, creating pathways towards both solidified hierarchy as well as more democratic, participatory organization, as in the example of Daily Kos.

That said, the shape and scope of these participatory institutions depend on macro-social (economic, cultural/ideological) factors that often lie beyond the interactions, communities, or platforms themselves. Taking into account the U.S. political blogosphere as whole, I argue that the interactional dimension of participation in online collectives has implications for political and social dynamics beyond the blogs themselves, and can (for example) contribute to divergent formations of the public sphere, as seen in the developments of the left and right blogospheres.

Overall, this argument implies that the creation, character, and evolution of online collectives hinge on interactional factors – both the extent to which a particular collective effectively harnesses relational motivations and incentives given its population of participants, as well as the extent to which the community rules and norms canalize interactions in such a way to reproduce a stable social order with effective mechanisms for exercising contestation and authority.

The overarching theoretical and substantive move (from individual-level modes of explanation towards meso- and then macro-level concerns) is mirrored in my methods of analysis. I begin with experimental work that takes individuals as the unit of analysis and then move on a combination large-scale quantitative observational data collection, ethnographic observation, and content analysis in my consideration of organizational and field-level dynamics.

First, the next two chapters elaborate an explanation of the role of interactional social psychological incentives in online collective action by looking at two very different settings: an online labor market and the English language Wikipedia. For Chapter 2, I draw on the results of a pair of field experiments in Amazon’s Mechanical Turk platform, a distributed “crowdsourcing” market in which individual participants (workers) have no direct interactions with each other in the context of the atomized and isolated tasks they perform. In both a horse-race experiment comparing the effects of multiple incentive schemes on worker performance as well as a cross-national list-experiment analyzing the effects of social desirability bias. I demonstrate how interactional concerns combine with structural factors to determine (and in some cases directly cause) variations in patterns of worker participation. In this analysis, I extend previous research into the role of “future-oriented” cooperative behavior (Keser and Van Winden, 2000) by considering the effect of social psychological incentives beyond settings traditionally conceived of as examples of collective action or prosocial cooperation. My findings – that hybrid financial and social psychological incentives motivate performance in highly atomized, distributed online labor markets, which lack rich social environments – complements previous literature arguing that status, feedback, and hybrid financial incentives can drive contributions to online information markets and collective action (Cheshire, 2007; Cheshire and Antin, 2008; Raban, 2008; Rafaeli et al., 2007; Willer, 2009a).

The effects of social psychological incentives explain why some individuals participate in online collectives, but these incentives also contribute to the emergence of inequalities of

participation and status within online environments. Chapter 3 expands on the Mturk experiments by demonstrating how a particular interactional, social psychological incentive – status-based peer-to-peer awards – generates differential effects. Previous research has suggested that selective incentives like awards can break down for some individuals in settings where institutional norms compete with or contradict the motives of large sub-populations of participants. Following this idea, I use evidence from a large-scale observational study of the effects of peer-to-peer awards among editors of the English-language Wikipedia to demonstrate that social psychological selective incentives promote cooperative, collective action among some individuals, but also bring about lower levels of participation among group members whose motives deviate from those being directly incented. This finding of a significant differential effect undermines existing models of group dynamics and collective action (Cheshire, 2007; Cheshire and Antin, 2008; Willer, 2009a), in which status-based incentives are presumed to generate stable effects across the population of contributors to public goods. Instead, I conclude that differential social psychological orientations – especially with regard to key motivators such as social status – contribute to participation and status hierarchies within online collectives. Differential participation rates associated with differential attitudes towards status awards suggests that status and social psychological orientations feed into participation and status hierarchies. This conclusion also expands structural explanations of inequalities (based on either preferential attachment dynamics, socioeconomic inequalities, or demographic variations, e.g. Barabási, 2003; Hargittai and Walejko, 2008; Hindman, 2008; Schradie, 2011). Both the character of online collectives’ institutions as well as of individual participants’ motivational orientation mediate the effects of structural variations.

In the subsequent two chapters I expand the focus of the analysis to consider the role of interactional processes in shaping the organizational dynamics and field-level social impact of online collectives. The empirical setting for these chapters moves away from individual-level inquiries within online labor markets or wikis and into to the U.S. political blogosphere: a complex, fragmented field of discursive production and mobilization within the “networked public sphere” (Benkler, 2006) of U.S. political media movements and organizations.

In Chapter 5, I consider the consequences of micro-level interactions for social reproduction and transformation within the largest (in terms of active contributors) participatory political blog – Daily Kos.⁵ Using qualitative and quantitative evidence, I argue that individual-level relational practices such as gatekeeping and boundary work constitute the foundation of power relations and governance on the Daily Kos. In this way, relational dynamics fulfill vital information filtering and moderation functions within the community. Micro-level social interactions also serve as distributed sites of norm maintenance and contestation. This interactional account of intra-organizational governance, inequality, and status relations within Daily Kos complements existing structural analyses that emphasize socioeconomic, positional, and technological factors as the primary determinants of participation dynamics among online collectives (e.g. Hargittai

⁵ See: <http://dailykos.com>

and Walejko, 2008; Hindman, 2008; Schradie, 2011). It also extends social psychological (exchange theory) accounts of power in networks by examining how interactional dynamics and generic participation inequalities figure in the construction, reproduction, and contestation of institutions of organizational governance. In this way, my findings reinforce the work from Chapters 2 and 3 (as well as earlier research) suggesting that participation dynamics in online collectives emerge at the intersection of structural forces and micro-level interactions (Barabási, 2003; Lampe and Resnick, 2004; O'Mahony and Ferraro, 2007; Salganik and Watts, 2008). The propensity of some individuals to seek and respond positively to status within a group (Chapter 3), thus plays into the emergence of organizational governance, resulting in a distinctive culture of participation and collaboration within the Daily Kos site.

Finally, in Chapter 6, I consider the macro-social determinants and impacts of online collectives in the context of the field of political blogs within the U.S. around the 2008 Presidential campaign. Expanding on the case study of Daily Kos presented in Chapter 5, I show how cultural and ideological factors shape the distribution of participatory infrastructure across the blogosphere. I also show how structural and the field-level dynamics that have evolved since the first emergence of the blogosphere around 2003 seem likely to counterbalance the disruptive force of participatory blogs over time. This analysis expands on a comparative study of left and right political blogs (Shaw and Benkler, 2012) and contributes to existing debates over the social, political and economic implications of online collective action.

Contrasts with Previous Research

In comparison with previous research, this interactional analysis provides a much more precise and coherent explanation of how micro- and meso-level social dynamics generate variations in open collectives. The interactional approach is thus an important step towards a more cohesive explanation of why some online collectives succeed and achieve sustained collaborations among numerous individuals while so many others fail. Ultimately, I intend to lay the groundwork for a more satisfactory understanding of how online collective action works. I believe that this requires synthesizing an analysis of social structural effects, generic social dynamics, psychology, motivations, and technologies in order to arrive at a meaningful explanation of how and why some collectives acquire the character they do or function in particular ways. An interactional account specifically links up the individual-level behaviors with meso-level relational dynamics of participation and social transformation. In other words, the interactional account occupies the transitional space between micro- and meso- levels of analysis, focusing on the motivations and processes that explain how group-level dynamics emerge and come to form organizational and collective entities capable of producing more macrosocial effects over time.

More specifically, the empirical studies presented here link analyses of participation and

interaction with accounts of individual motivations as well as social structural variations. As a result, my work demonstrates how a group of motivated individuals participating in a shared endeavor wind up creating and reproducing certain patterns, institutions, and social structures through their interactions over time, something which previous work focused on institutional explanations of collective action has not provided. Ostrom's (e.g., 1990) work provides a paradigmatic example in this regard. While she provides rich and nuanced details of organizational routines and institutions and even goes so far as to show how a novel set of institutions arise over time, the institutional elements that sustain these collective endeavors remain more static, fixed entities – *fait accompli* as opposed to evolving products of dynamic processes. In this sense, Ostrom's institutionalist account of commons-based production operates in the "substantialist" vein described by Emirbayer (1997), and does not address how institutions emerge through the interactions of participants and members.

By adopting a relational emphasis on the processes and dynamics of interactions (e.g. in the chapters on Wikipedia, Daily Kos, and the blogosphere), the empirical studies in this project contribute a critical missing element to this earlier body of research: a more precise sense of the mechanisms and procedures through which "actually existing" examples of collective action and public goods production operate.

Generally, the key differences between my work and previous research on online collectives stem from my explanation of the connections between micro-level behaviors and larger group and organizational level dynamics. Micro-economic and social psychological accounts of online and offline collective action (e.g. Kollock, 1999; Cheshire, 2007; Restivo and van de Rijt, 2012; Willer, 2009a) have not explained dynamics of social reproduction effectively because they do not look beyond individuals and small groups as the units of analysis. Predominantly experimentalist, these approaches have two problems. First, they tend not to capture the effects of life-cycles of contribution or longer term generic participation dynamics (cf. Chapter 3). Second, although they can help illuminate whether or not particular design interventions or institutional configurations produce more robust patterns of participation or not, they can say little about the mechanisms by which those patterns and institutions come into existence in the first place. My account fills both of these explanatory gaps – both by focusing on observational data of interactions between actual participants in actual communities, as well as by emphasizing the processual dimension of participants' engagement and context within the communities over time (cf chapters on Wikipedia and Daily Kos).

The relationship between my analysis and Benkler's (2006) account of peer production derives from a similar distinction. While Benkler's earlier work on peer production can provide some generic (transaction cost, institutional) reasons why online organizations may be more efficient than their offline counterparts, he does little to explain variations across online collectives. Benkler's analysis therefore can neither explain how or why some collectives would succeed where others fail, nor how the institutional and technological configurations that support successful collaborations come into being in the first

place. Here, an interactional account focuses on the dynamic processes of collaboration and participation as a means of explaining both institutional formation, transformation, and reproduction. This adds a critical processual dimension that Benkler's initial work on the subject overlooked and or simply did not engage.

More structural accounts of how and why online collectives vary (e.g. Hindman, 2008; Salganik et al., 2006; Hargittai and Walejko, 2008) fail to provide substantive insights into the mechanisms by which collectives cohere, change, and are reproduced over time. These analyses tend to focus on the larger conditions that give rise to particular social formations, but do not explain how particular variations emerge within given communities. In contrast, one objective of this analysis is to begin laying the foundation for more precise identification of mechanisms that determine the success and impact of collectives such as Wikipedia or Daily Kos.

In conclusion, the explanatory benefits of an interactional account consist in providing a clearer analysis of several key mechanisms by which online collectives function. No other accounts can tell you how – even in the presence of sufficiently motivated individuals, right institutions, sufficient structural conditions, adequate technological resources and platforms – online collectives cohere into more stable institutional orders oriented towards the reproduction of stable sets of roles, dynamics, and relations. In these studies I aim to provide a heightened understanding of mechanisms and processes that drive community emergence, change, reproduction; a closer look at how highly unequal distributions of participation and attention survive in these environments and how they tie-in with community change over time; as well as a clearer sense of why certain incentive systems tend towards effective collaboration rather than others.

Chapter Outline

- **Chapter 1: Interactionism and Online Collective Action** – Elaborates what an interactional explanation of online collective action consists of and what such an account adds to existing research in this area. The core contribution lies in integrating an analysis of micro-level interactions with both social psychological approaches to individual-level incentives and motivations as well as some consideration of the structural dynamics and determinants of participation in online collectives.
- **Chapter 2: The Effects of Interactional Incentives and Motivations Among Crowdsourcing Workers** – Presents experimental evidence of the micro-level effects of interactional incentives and motivations among workers in an online labor market. In both a horse-race experiment directly comparing the effects of distinct incentive schemes as well as a cross-national study of social desirability bias, interactional concerns drive patterns and motives of participation among crowdsourcing workers, even controlling for certain structural and psychological factors.
- **Chapter 3: Differential (and Deleterious) Effects of Status-based Awards in Wikipedia** – Examines a core claim of both psychological and economic theories of (online) collective action: that individuals contribute to public goods in response to selective incentives. Based on the results of a study of peer-to-peer status awards on the English language Wikipedia, I argue that selective incentives – even those oriented towards interactional, or status-based distinctions – only motivate a subset of participants, producing a negative effect for others. In this sense, the specific character of these editors’ interactional orientation mediates the impact that a particular selective incentive has on their (prosocial) behavior.
- **Chapter 4: From Incentives to Institutions and Interactional Analysis** – A brief transition section that synthesizes the findings from Chapters 2 and 3 (Part I); introduces the themes and context for Chapters 5 and 6 (Part II); and more generally explains the relationship between the first and second half of the text.
- **Chapter 5: Interactional Mechanisms of Governance in an Open Collective: Gatekeeping on Daily Kos** – Shifts the focus to thinking about online collectives as organizations in order to understand the importance of interactional dynamics for social reproduction and contestation within online groups. In particular, considers how interactional practices such as gatekeeping and boundary work on The Daily Kos provide a foundation for the democratization of community governance at the same time as they fulfill vital information filtering and moderation functions within the community.
- **Chapter 6: Online Collectives in Context: The U.S. Political Blogosphere 2003-2008** – Considers the meso- and macro-level determinants of impacts of my interactional account of online collective action by expanding on the case study

of Daily Kos and examining the trajectory of participatory affordances within the U.S. political blogosphere since 2004. This account builds on a comparative study of left and right political blogs in 2008 and seeks to extrapolate how the relational dynamics at work within communities such as Daily Kos may or may not generate longer-term and larger-scale effects in the context of U.S. political and public spheres.

- **Chapter 7: Conclusions** – Expands on the findings of each of the chapters and considers their implications, both in terms of the larger interactional account of online collective action as well as the impact of the Internet and online interaction for theories of motivation, organization, and politics.

Chapter 2

The Effects of Interactional Motivations and Incentives Among Crowdsourcing Workers

Introduction

The idea that relational, social psychological incentives can drive participation in online environments underpins the account of collective action online that I elaborate in this project. On its surface, the idea seems obvious: of course people's concern about their standing relative to, and in the eyes of their peers compels them to join and contribute to certain kinds of collective endeavors! Indeed, an extensive body of previous research has linked participation in various online collectives and collaborations to participants' desire for status, attention, or the achievement of broad-minded social ideals (see, e.g., Cheshire, 2007). At the same time, almost all of this previous research has looked at the role of relational incentives and motivations in the context of collective action or cooperation as Olson (1965) conceives it, which has primarily sought to explain the production (or failure to produce) public and collective goods. As a result of this focus on empirical settings and laboratory environments where the outcome of interest is some sort of mutually beneficial resource or obviously cooperative behavior that overcomes a collective action problem, the existing research cannot speak to the limits of this propensity of different kinds of people to respond to relational, social psychological incentives. To what extent, if at all, do relational incentives and motives support or affect the performance of collectives engaged in highly atomized, individuated, and decontextualized forms of cooperative work online?

By referring to "relational" social psychological incentives as such, I mean to underscore their interactionist dimension. At some level, all social psychological incentives elicit not

only individuals' concern for their own preferences and actions but also their awareness of the preferences, actions, and judgments of some salient group or set of other people. Concretely, this means that social psychological incentives are relational insofar as they make explicit connections between the actions, judgments, or preferences (real or imagined) of multiple individuals. This is not the same as simply eliciting altruistic or generous behavior towards other people. Rather, relational incentives can elicit a wide range of motivations and behaviors that rest on a foundation of past, present, or future interactions between people (I will have more to say about their relationship to the interactionist aspects of my claims later).

Below, I present the results of two experiments – the first assessing the presence of social desirability bias in self-reports of motivation among workers in an online labor market; the second a horserace experiment examining the effects of a variety of financial, social psychological, and hybrid incentive schemes on worker performance – which together illustrate that relational, social psychological incentives and concerns shape the character and quality of worker participation in one of the least “social” online crowdsourcing environments. Both studies were originally conducted together with collaborators and previous versions have been published as independent papers (Shaw et al., 2011; Antin and Shaw, 2012). In order to accurately represent the collaborative design and implementation of the original studies, I use the first person plural when presenting both projects.

Study #1 tests the preliminary claim that workers in online labor markets participate for more than money. Previous research into worker motivation in Mturk has found money to be the primary motivator by a wide margin, but, as I argue, has been premised on explicit survey self-reports likely to be subject to social desirability bias and therefore misleading. Through a list experiment, an indirect data collection technique designed to elicit opinions subject to such forms of bias, my colleague Judd Antin and I demonstrate that Mturk workers in both the U.S. and India under-report the extent to which they are motivated by non-monetary motives.¹ The results demonstrate the presence of social desirability pressures among the workers, and that the extent and character of this bias varies across the India and U.S. worker populations. By documenting the effects of social desirability bias, the results of this experiment also show that relational concerns influence the perceptions and motivations of Mturk workers.

Study #2 then provides a more direct comparative test of the effects of different kinds of incentives (financial, social psychological, and hybrid) on the quality of worker performance. In this study, John Horton, Daniel Chen and I designed a controlled experimental “horserace” between fourteen different incentive schemes representing prevailing theories of human motivation and labor market incentives.² We then test the effects of these schemes on Mturk worker performance by having workers presented with each scheme complete an identical task for which we possessed validated “gold standard” an-

¹As I mentioned above, the study was published as a stand-alone article earlier this year (Antin and Shaw, 2012).

²This study was also published as a stand-alone article (Shaw et al., 2011).

swers ahead of time. The results show that neither framing the task in terms of purely financial nor purely social psychological incentives produced significant improvements in worker accuracy over the control condition framing. Rather, hybrid, relational incentive schemes that link payoffs to worker's ability to prospectively reason about the behavior of their peers are the only schemes that produce significant improvements in work quality over the control condition. This finding shows that relational incentives – while insufficient on their own to significantly alter the quality of worker contributions – can contribute to the improvement of work performance.

The two studies lay out a rather extreme – in terms of the relative absence of social interactions and institutions presumed to enable effective cooperation – test of the effects of relational incentives and motivations on the behavior of members of an online collective. As a result, the chapter provides an opportunity to extend previous research into “future-oriented” cooperative behavior and motivations for online participation by considering the role of social psychological incentives/motivations beyond settings of prosocial cooperation and collective action. If it shows that relational, social psychological concerns combine with structural factors to determine (and in some cases cause) variations in patterns of worker participation in an online labor market.

This work complements and extends previous research by showing that relational social psychological incentives motivate performance and participation even in the absence of a rich social environment. Together, the two studies lay a foundation for testing the overarching claim that relational social psychological incentives shape the motivations and performance of workers in a crowdsourcing market. They also incorporate tests for whether the effects of relational social psychological incentives and motives may be moderated by a variety of socioeconomic and cultural factors. The key contribution of this chapter to existing research consists of the extension of a relational account of online participation to domains of activity that are not, in the traditional sense, examples of prosocial cooperation. I present empirical, experimental tests of whether the participants in online collectives not typically considered to be either cooperative or collaborative nevertheless exhibit a strong relational orientation in their behavior.

Relational Incentives & Cooperation

As I suggested above, previous social scientific research into the role of social psychological incentives in online participation and collaboration have focused on prosocial behavior and other forms of cooperation that generate collective goods. Kollock (1999) provides one of the earliest examples, elaborating a theory of online cooperation rooted in previous studies of the role of selective incentives and dynamics of gift exchange in promoting the evolution of collective action and prosocial behavior. Much subsequent research would follow this approach by seeking to explain how cooperation and “commons-

based” production online could emerge and attract sustained contributions from decentralized populations connected over the Internet.

Two overlapping lines of work that followed a similar spirit to Kollock’s approach sought to connect the emergence of prosocial cooperation online to explanations of collective action based on microeconomic theories of rational action and social exchange theory respectively. On the microeconomic side, several authors contended that the success of early forms of online collectives such as Linux and Wikipedia resulted from the propensity of individual contributors to derive satisfaction (or utility) from their participation (e.g. Benkler, 2006; Lerner and Tirole, 2002; Weber, 2004). From these perspectives, it mattered little whether or not such individual satisfaction represented an expression of purely selfish desires or not, as the predicted outcome (successful collective action generating publicly accessible informational goods) would be the same in either case.

The research rooted in methods and theories of social exchange provides an explanation of online collective action more consistent with Kollock’s own approach. Exchange theorists have sought to understand when dynamics of reciprocity or altruistic behavior emerge to support the production of common pool resources and other public goods, examples of what they call “Generalized Exchange” (Ekeh, 1974; Yamagishi and Cook, 1993). Through a combination of laboratory and field experiments, such approaches have yielded more precise specifications of the sorts of social psychological incentives – such as peer recognition and social status – that elicit prosocial, cooperative participation within online and offline collectives (Cheshire, 2007; Cheshire and Antin, 2008; Willer, 2009a).

Both the exchange theoretic approach as well as the more theoretical work applying microeconomic theory to online cooperation have received partial support and cross-validation from a diverse body of research into online participation and collaboration based on ethnographic, survey, interview, and observational data collection. This literature is too broad and diffuse to review in a comprehensive manner, but a few comments about it help to underscore the extent to which it also focuses on online cooperation in the context of highly social systems and interactions.

Since the advent of open-source software, collaborative content, “peer production,” crowdsourcing, and social media, there has been significant interest in the question of what motivates people to participate in these systems. The literature on motivations for online participation therefore spans a wide variety of socio-technical systems and practices – open source software (Lakhani et al., 2005; Ghosh and Glott, 2002), Wikipedia (Glott et al., 2010; Schroer and Hertel, 2009), blogging (Nardi et al., 2004), photo-sharing (Nov et al., 2009), and question-answering (Rafaeli et al., 2007), just to name a few. The reasons why individual contributors dedicate themselves to these sorts of projects seem to vary almost as much as the projects themselves, but the patterns across the findings reflect the prevalence of selfish *as well as* altruistic motivations. While some of the variations appear to derive from the norms that prevail in particular projects or contexts, this sort of variation further confirms the existence of a substantial degree of heterogeneity, as well as the

importance of self-selection as a mechanism sorting individuals into communities and projects that are more or less appropriate to their particular skills, cultural dispositions, and motivational profiles.

In other words, many of the results reported in previous studies of online participation and collaboration imply support for the proposition that members of these groups exhibit a relational orientation in their motivations for participation. As I mentioned earlier, I use the phrase “relational orientation,” to describe individual dispositions, affects, or behaviors that reflect concern for, and influence of, interactions with others. In this regard, saying that individuals possess a relational orientation is not so different from saying that the psychological determinants of these individuals’ behavior are, in a fundamental sense, “social.” One objective of the experiments I conduct here is to test the extent to which this proposition may or may not be true by examining the effects of relational motivation and incentives in a context where they seem unlikely to play a very important role.

The social character of relational incentives distinguishes them from other kinds of incentives, such as psychological incentives oriented towards (for example) positive self affect alone (esteem) or monetary incentives oriented towards financial gain. In part, I emphasize that social psychological incentives have a relational quality in order to underscore the connections between previous social psychological research into online collective action; the studies discussed in this chapter; and the broader relational, interactionist agenda I laid out in Chapter 1 (See also Emirbayer, 1997). However, this terminology also clarifies what makes social psychological incentives so powerful in so many contexts.

Although previous research has demonstrated that relational motives and incentives contribute to the participation of individuals in a wide variety of collaborative endeavors online, the question remains whether or under what conditions this relational orientation breaks down. For example, previous research in psychology and behavioral economics has shown that the introduction of financial or extrinsic rewards into otherwise voluntary and/or unpaid activity can “crowd out” participants’ altruistic motives, resulting in collective action failures (e.g. Ariely et al., 2009; Frey and Jegen, 2001). Are relational motives and incentives subject to similar crowding dynamics? In particular, do relational motives and incentives still affect behavioral outcomes in contexts of online collaboration and distributed collective action that lack explicit prosocial dimensions or support for rich social interactions?

Previous observational work has demonstrated associations between participation in paid forms of online cooperation such as information sharing and responses to hybrid “social” and financial incentives (Raban, 2008; Rafaeli and Ariel, 2008; Rafaeli et al., 2007). This work suggests that monetary incentives do not crowd out relational motivations in the context of online collectives, but rather that the two classes of motivation complement each other. An indirectly related study of a large online forum (4chan) suggests that even in the absence of typical social technologies and features (stable user identities, reputations, or formal mechanisms of holding individuals accountable for their statements

and contributions), a robust system of distributed collaborative production nonetheless emerges (Bernstein et al., 2011).

These previous studies find support, on the one hand, for the idea that relational incentives matter even when money is present, and, on the other, that social dynamics can flourish even in the absence of extensive support for supposedly critical technosocial mechanisms of creating and supporting trust among participants. Together, these findings provide the motivation for further investigations into the limits of social incentives and institutions in the context of a particularly atomized and seemingly anti-social distributed online collective: Amazon’s “Mechanical Turk” crowdsourcing labor market.

Research Setting and Approach: Online Labor Market Experiments

The setting for this research is Amazon’s Mechanical Turk marketplace (MTurk henceforth).³ MTurk is a service which allows “requesters” to distribute small chunks of work to thousands of workers around the globe. In exchange for a few minutes or seconds of a worker’s effort on what Amazon calls Human Intelligence Tasks (HITs), Turkers earn small payments which typically range from a few cents to a few dollars. The model is a specific case of an online labor market, in which workers generally perform data processing or other kinds of tasks for money. While some sites focus on skilled work like computer programming (e.g., oDesk, Elance, Guru), Mturk is intended for small, simple and discrete tasks and thus has emerged as one of the most heavily used sites for research purposes.

Several papers in the computer science literature have used online labor markets such as MTurk to conduct experiments (e.g. Kittur et al., 2008; Snow et al., 2008; Sheng et al., 2008). Horton, Rand and Zeckhauser discuss the social science potential of online experiments in these markets, focusing on how to overcome challenges to validity (Horton et al., 2010). There already exists a small literature on crowdsourcing from a social science perspective (Huberman et al., 2009; Mason and Watts, 2009; Horton and Chilton, 2010; Chen and Horton, 2009; Chen, 2010). New tools are also being developed that make experimentation easier (Little et al., 2009).

Motivations and Participation on MTurk

Prior economic, sociological and psychological research offers much theoretical guidance, but little empirical evidence as to the sorts of incentives that elicit the highest

³See <http://www.mturk.com>.

quality work in this kind of environment. Several studies have examined non-monetary motivations for doing work on MTurk, as well as the potential interactions between monetary and non-monetary motivations. Synthesizing a variety of previous studies on crowdsourcing markets, Kaufmann and colleagues (Kaufmann et al., 2011) suggest a motivational model that includes “enjoyment-based motivations” (e.g. fun, passing time, interest), “community-based motivations” (e.g. social interaction, community identification), and “social motivations” (e.g. ideology, social approval). Ipeirotis (2010) finds that sizable proportions of Turkers reported that fun, killing time, and the feeling that MTurk is a fruitful way to spend time were important motivators. Similarly, Buhrmester and colleagues suggest that intrinsic task enjoyment forms a substantive part of many Turkers’ motivation (Buhrmester et al., 2011). Several recent studies have confirmed this suggestion, finding evidence that framing an MTurk task as benefiting a non-profit group (Rogstadius et al., 2011) or as advancing scientific progress (Chandler and Kapelner, 2010) interacts with monetary reward to motivate Turkers.

Dedicated Turkers can earn a significant amount of money by completing HITs. Indeed, MTurk itself highlights the money-making possibilities by prominently inviting visitors to “Make money by working on HITs” on the service’s homepage. According to an informal study, however, most Turkers earn less than \$10 per week (Ipeirotis, 2010). So, monetary incentives remain an essential but complex part of the motivational landscape of MTurk (Mason and Watts, 2009). Especially for long-term Turkers there are also likely to be important non-monetary motivations. The question of how prevalent these non-monetary motivations may be and whether or not they elicit comparable or higher quality effort from workers remains to be answered.

The Experiments

As described above, the two experiments reported below address the extent to which (1) relational factors motivate workers to participate on Mturk; and (2) whether relationally-oriented incentives elicit higher quality work than financial incentives. The design, data collection, manipulations and results for both experiments have been published previously as independent co-authored papers (Shaw et al., 2011; Antin and Shaw, 2012). I reproduce abbreviated versions of them here in order to synthesize the results and support my larger point about the salience of relational motivations and incentives within online collectives. In the case of both experiments, I retain part of the original framing in order to introduce key concepts that figure in the study designs.

Study #1 – Social Desirability Experiment

Summary

In this study we extend research on online collaboration by examining motivation to do work on the crowdsourcing service Amazon Mechanical Turk (MTurk). We address a significant challenge to many existing studies of motivation in online contexts: they are based on survey self-reports, which are susceptible to effects such as social desirability bias. In addition we investigate a second challenge to the extant research on motivation in the context of MTurk: a failure to examine potential differences between MTurk workers (Turkers) from different parts of the world, especially those from the US and India, MTurk's two largest worker groups. Using a survey technique called the list experiment, we observe distinct profiles of motivation and patterns of social desirability effects among Turkers in the US and India. Among US Turkers, we find that social desirability encourages over-reporting of each of four motivating factors we examined. The over-reporting was particularly large in the case of money as a motivator. In contrast, among Turkers in India we find a more complex pattern of social desirability effects, with workers under-reporting "killing time" and "fun" as motivations, and drastically over-reporting "sense of purpose." We conclude by discussing these results and proposing implications for future research and design.

In this study we examine the potential for social desirability bias in the context of Amazon's Mechanical Turk (MTurk). Part online community and part online labor market, MTurk attracts workers (Turkers) from all parts of the world. However, the vast majority of visits to MTurk come from just two nations: the United States and India (Alexa.com, 2011). Although there is likely to be significant within-group variation, in this study we acknowledge the potentially significant contrasts between the two countries and treat them as distinct sub-populations. Theories from cultural psychology and related fields suggests that motivation may vary as a result of the specific socio-cultural, economic, and political environment in which individuals live and work. As a result, we examine both motivational profiles and patterns of social desirability separately for Turkers in the US and in India.

We employ a quasi-experimental survey technique called the list experiment which mitigates social desirability bias. Comparing the results of the list experiment to traditional agreement statement-style questions, we find significant evidence of social desirability bias among both US and India Turkers. Furthermore, our results suggest different patterns of both motivation and social desirability effects between the two groups. These findings contribute to the existing literature in two ways. First, we demonstrate that self-reports of motivation *can* be subject to social desirability bias. In doing so we highlight prior studies' failure to consider the possibility for bias, the need to investigate potential biases in existing findings about online motivation, and the potential for non-optimal

design decisions based on inaccurate findings. Secondly, we reveal interesting dynamics around expectations and perceptions of desirable motivations for performing crowdsourcing work in two distinct participant populations. These dynamics provide further evidence that computer-mediated crowd-work cannot wash away differences between the participants in online collaborative systems, despite the tendency of some researchers and media reports to treat them as a single population, homogenized through the abstraction of distributed work.

Research across online contexts has consistently found that factors such as fun, a belief in ideologies of knowledge production, the desire for social connection, and knowledge development are important motivators for online participation. Most studies of online motivation have relied on self-reports, employing surveys with variations of traditional agreement statement-style questions. However, online surveys are susceptible to response effects that can skew results (Kiesler and Sproull, 1986). In this study we focus on one such response effect – *social desirability bias* – and document its effects on survey self-reports of motivation among participants in a specific crowdsourcing system.

Surveys & Social Desirability

Social desirability bias refers to “the tendency of people to deny socially undesirable traits or qualities and to admit to socially desirable ones” (Phillips and Clancy, 1972). The theory of social desirability bias suggests it is primarily the result of two underlying social psychological processes. First, providing what individuals believe to be socially desirable responses is a form of impression management (Goffman, 1973) — an effort to mold one’s public image and to construct a favorable presentation of self based on expectations, norms, and beliefs about a given context. Secondly, providing socially desirable answers can be a form of self-deception (Nederhof, 1985). In this respect, social desirability is often an attempt to deny one’s “true” attitudes, or mask an underlying belief by expressing a contradictory one. Importantly, answers influenced by social desirability bias should not be considered as merely lies. Social desirability is often subtle, unconscious, and based on implicit attitudes which individuals are not aware of or able to express (Nisbett and Wilson, 1977). Social desirability bias in survey studies is a problem primarily because it can produce inaccurate results which misrepresent the “true” prevalence of attitudes and behaviors. In addition to biasing mean values, social desirability bias can also create spurious or suppressed correlations, mediations, moderations, or other statistical relationships (Ganster et al., 1983). Because of its potentially wide-ranging influences, social desirability bias should be a real concern, especially for research that relies on survey self-reports.

Researchers have found social desirability biases in survey responses on many controversial topics such as immigration, affirmative action, and racial prejudice.⁴ However, the

⁴For a review of the literature on social desirability we recommend (DeMaio, 1984).

effects of social desirability are not limited to hot-button, divisive issues. For example, Adams and colleagues found that social desirability influenced self-reports of physical activity (Adams et al., 2005). Several studies have documented pervasive biases in behavioral and attitudinal scales commonly used in organizational behavior research (Moorman and Podsakoff, 1992; Meade et al., 2007). A large meta-study also found evidence of widespread social desirability effects in scales used for marketing research (King and Bruner, 2000).

Self-Reports of Online Motivation

Few studies have directly examined social desirability effects in self-reports of motivation, and to our knowledge none have done so in online contexts. As a result, little is known about whether social desirability can influence reports of motivations to participate online, and if it can how prevalent or strong the bias may be. Many online systems are designed on the basis of survey studies documenting users goals and motivations. If these studies misrepresent user motivations because of social desirability bias, the result may be non-optimal design decisions which reduce user satisfaction, present barriers to engagement and collaboration, and potentially disenfranchise users.

Survey self-reports of motivation are likely subject to social desirability bias for at least two reasons. First, there are often socially desirable connections between motivations and activities. For example, we may expect that an individual who makes a charitable donation should be motivated by altruism and look favorably upon such behavior. On the other hand, a man who volunteers primarily to meet women may be looked upon unfavorably. Social norms and stigmas can provide powerful cues about the motivations that should normatively be attached to a given activity. Secondly, one's motivation is often interpreted as a signal of other characteristics. For example, in the absence of other information, individuals may ascribe positive characteristics to the charitable altruist and negative characteristics to the date-seeking volunteer.

There is some evidence that, compared to face-to-face interviews, online surveys may be less susceptible to social desirability effects (Kiesler and Sproull, 1986). Computer-mediated interactions can introduce social distance that mitigates social desirability concerns in some contexts. However many users still actively engage in impression management in computer-mediated communication (Kiesler et al., 1984). Furthermore, self-deception effects are likely to be relevant across interaction mediums. As a result, we contend that the presence and character of social desirability bias within online environments is long overdue for empirical investigation.

In sum, our first research question concerns a pervasive and crucial phenomenon that remains largely overlooked:

RQ1: Can self-reports of online motivation be subject to social desirability bias?

MTurk in the US and India

Our primary purpose in this study is to examine the potential for social desirability effects in self-reports of motivation on MTurk. Any serious attempt to do so must begin with an understanding of who Turkers are, and a rejection of the unsupported assumption that Turkers should be considered as a single, homogeneous group. MTurk attracts workers from all over the world, but the vast majority of visits to the site come from just two countries: the United States and India. As of December 2011, 40.8% of MTurk traffic was traced to IP addresses in the United States, while 35.7% of traffic was traced to addresses in India. (Alexa.com, 2011). In a study conducted in 2010, Ipeirotis (Ipeirotis, 2010) estimated that 46.8% of Turkers reside in the US, while 34% reside in India. A meta study by Ross and colleagues also documents what they describe as a trend moving from “a primarily moderate-income, US-based workforce towards an increasingly international group with a significant population of young, well-educated Indian workers” (Ross et al., 2010). These results do not directly indicate the amount of work done by Turkers who hail from each country. However, they are a strong indicator that Turkers from the US and India make up the vast majority of the worker population.

The diversity of MTurk workers contrasts with popular images of crowd-sourcing. According to some media and academic portrayals, phenomena such as online labor markets, crowd-sourcing, and social search represent – at least theoretically – the fulfilment of techno-futuristic fantasies in which globalized, distributed human intelligence is rendered quickly and cheaply available through the click of a few buttons (Zittrain, 2008). Reality, however, has not borne out these fantasies of commoditized brainpower. Rather than the seamless integration of person and machine, the global spread of computer-mediated communication has consistently revealed the difficulties of designing socio-technical systems in the face of the incredible diversity of human experience.⁵ Empirical comparisons between different practices of human computation and the motivations of sub-populations of “human computers” can complement studies focused primarily on system design or evaluation (Quinn and Bederson, 2011).

Cross-cultural research in psychology⁶ underscores the importance of cultural differences for conceptions of self, society, motivation, action, and emotion (Markus and Kitayama, 2003). For our purposes, the most salient aspect of this research is the suggestion that individuals *both* understand the same action differently *and* explain their reasons for pursuing a particular action differently. Based on the extensive laboratory and field evidence supporting cross-cultural psychological differences, comparable patterns likely exist among distinct sub-populations of participants in online communities,

⁵A vast body of research has documented the challenges of designing socio-technical systems for users with diverse socio-cultural backgrounds. One useful high-level entry point is James Scott’s work on “high modernist” utopias (Scott, 1998).

⁶We adopt the narrow usage of the term “cross cultural” to refer to nationality which is common in the field of cultural psychology. In the sociological or anthropological sense, nationality is considered to capture only a small part of an individual’s socio-cultural identity.

crowd-sourcing platforms, and related phenomena.

Findings from studies comparing the experience of workers across national and cultural settings suggest that crowd-sourcing workers from different national groups might face unique pressures and employ unique self-presentation strategies in the context of their particularly atomized and alienated workplace interactions. Ethnographies examining the motivations of IT sector workers in India, for example, depict a distinct environment in which such workers enact a complex set of identities. Business Process Outsourcing (BPO) workers in India encounter culturally specific forms of prejudice and respond in culturally specific ways (Mirchandani, 2004). We anticipate that crowd-sourcing workers in India may engage in similarly distinct behaviors when compared with workers in the US.

The potential for distinct patterns of motivation and social desirability bias among Turkers is even more likely in light of the fact that so much crowd-sourcing work – and especially the paid variety – is perceived in the United States as undesirable, undignified, or both (Mieszkowski, 2006). Furthermore, the power dynamics of a paid labor market introduce an added dimension of inequality between researchers and their subjects: researchers surveying workers in the context of a paid crowd-sourcing platform are, if only briefly, their subjects' employers, creating an environment in which seemingly unobtrusive questions may prove sensitive. Given these circumstances, we anticipate finding social-desirability bias among both workers from the US and India, but that the character of the bias will vary between the two groups.

In addition to the theoretical arguments presented above, support for considering US and India Turkers as distinct sub-populations can be drawn from existing studies of what Turkers from the two countries actually do on the site. For example, research has illustrated that Turkers from different countries tend to produce different quality results participate at different rates and times, as well as with different attitudes and abilities that reflect their social and cultural context (Shaw et al., 2011; Khanna et al., 2010; Ross et al., 2010; Ipeirotis, 2010). Furthermore, the two populations provide distinct responses to survey questions about their motivations for working on MTurk, confront distinct work and employment conditions, and bring very different sets of skills and experiences to bear on their MTurk tasks (Ipeirotis, 2010; Khanna et al., 2010; Ross et al., 2010; Shaw et al., 2011). So, while dividing our analysis on the basis of country-of-origin certainly obscures within-group variation, and captures differences in socio-cultural, political, and economic factors only at a high level of abstraction, even this abstract classification is associated with significantly different patterns of participation.

In sum, there is ample support for considering the two sub-populations of Turkers separately could yield distinct patterns. Our second research question addresses this issue:

RQ2: Is there evidence of similar or distinct profiles of social desirability effects in reports of motivation across MTurk's two primary sub-populations?

Methods

Social desirability is a problem in survey self reports because participants must select specific answers to explicit questions. Researchers have primarily examined two general techniques for mitigating social desirability bias in experiments and surveys: (1) the use of additional survey instruments which measure individual participants' susceptibility to social desirability, and (2) survey and interview techniques which mitigate potential bias through indirect questioning, the use of so-called "proxy" subjects, and other creative techniques (Nederhof, 1985). In this study we employ a type of indirect questioning called *the list experiment* (see, e.g., Kuklinski et al., 1997). The list experiment asks each participant to report only *how many* he selects from a list of possible choices. Some participants will un-problematically select all of the potential choices (e.g. 4 out of 4) or none of them, but others will select 1, 2, or 3 out of 4. In the latter case, the list experiment provides an opportunity for the respondent to express support for his "true" attitudes without explicitly naming them: there is no way for anyone to determine exactly which items were chosen (if any). As a result of this freedom from the actual or implied judgment of others, responses to the list experiment are comparatively free of the pressure of others' actual or imagined judgment. A variety of studies comparing traditional survey questions to the list experiment have demonstrated the effects of social desirability bias and the list experiment's ability to mitigate it. For example, such comparisons revealed social desirability bias in responses to questions about racial attitudes in the American South (Kuklinski et al., 1997), attitudes about immigrants and immigration (Janus, 2010), and the prevalence of vote buying in Nicaragua (Gonzalez-Ocantos, de Jonge, Melndez, Osorio, and Nickerson, Gonzalez-Ocantos et al.).

To assess motivations for doing HITs on MTurk, we asked survey questions using traditional agreement statements and the list experiment. First, we asked randomly selected participants to make a binary choice to agree or disagree with four motivation statements. We selected statements on the basis of a variety of prior survey research on motivations for doing work on MTurk. For a summary of this research, we suggest (Kaufmann et al., 2011). The four statements were: "I am motivated to do HITs on Mechanical Turk. . ." (1) "to kill time," (2) "to make extra money," (3) "for fun," and (4) "because it gives me a sense of purpose." List experiment participants were randomly assigned to one of five groups. In a control group participants were shown a list of all 4 motivations described above and given the following instructions: "How many of the following would you say is a motivation for you when you do HITs on Mechanical Turk? Please respond only with a number between 0 and 4." In the four treatment groups, participants were shown a list of only *three* motivations – each of the four motivations was absent in one group – and asked to respond with a number between 0 and 3. In each treatment condition, the mean response tells us how many of the 3 motivations participants selected. The mean in the control condition describes selection of the same three motivations plus a single additional motivation. Therefore, the difference in means between each treatment group and the control can be attributed to the addition of that single item to the list. For example, if participants in the control condition selected an average of 2.8 out of 4 items,

Condition Name	N	
	US	India
Agreement Statements	194	156
List Experiment Control	184	159
List Experiment “Sense of Purpose”	183	152
List Experiment “to Kill Time”	181	142
List Experiment “Fun”	179	152
List Experiment “Make Extra Money”	189	137

Table 2.1: Condition Descriptions and Sample Sizes

while participants in a treatment condition selected 2.4 out of 3 items, all things being equal we can estimate that, in the absence of social desirability bias, 40% (i.e. $2.8 - 2.4$) of participants would select the 4th item. Because of the indirect manner of calculating this value, the final result of the list experiment should be interpreted as an estimate or expected value for the proportion of people who would select a motivation in the absence of social desirability bias.

The general lack of social presence in the MTurk user interface makes it a conservative test for social desirability bias effects in online collaborative settings. Social desirability bias is magnified by the actual or perceived presence of others when answering questions. In the context of MTurk, however, there are few user-to-user interactions or signs of social presence. This reduced social presence in a computer-mediated context should make social desirability effects less likely (Kiesler and Sproull, 1986). If we observe social desirability effects among MTurk workers nonetheless, it will increase our confidence about observing them in other contexts with greater social presence.

Data Collection & Sample

A secondary benefit of our focus on MTurk is that it is possible to collect survey responses from Turkers using the service itself (Kittur et al., 2008). In July 2010 we recruited 1200 US-Based Turkers into our study, and in November 2010 we recruited 1216 India-based Turkers. Recruitment of specific or random users is not possible on MTurk, so our sample is composed of individuals who chose to respond to our request for survey responses. Participants were paid 5 cents for completing the survey, which took approximately 30 seconds to complete. Each user within each of the two sub-population samples was randomly assigned to one of six experimental conditions and restricted to participating only once.⁷ In addition to questions about motivation, in each condition we asked users about

⁷To enforce condition assignment, country location restrictions, and the single-use restriction we employed a third-party service called CrowdFlower (<http://crowdfower.com>).

their gender, age, education level, and frequency of completing HITs. Although random assignment should eliminate the potential influence of other individual differences between participants, we nonetheless followed the method used in (Janus, 2010), and included these co-variates in a series of OLS regression models to assess potential influences of demographic differences between conditions. No significant differences were found across conditions which suggests that, within the US and India samples, random assignment successfully mitigated the potential confounding effects of demographic factors. Our analysis directly compares results across treatment (list experiment) and control (agreement-statement) groups *within* the samples of US and India Turkers.

We do not conduct hypothesis tests for significant differences between US and India Turkers because the list experiment provides only group-level (rather than individual-level) data. As a result it is not possible to compare the two samples. However, we do present the results from the two groups side-by-side and make descriptive observations between them.

Results

Out of 1200 US responses, 68 (5.6%) were removed because they were invalid or incomplete, leaving a final valid sample of 1132. A higher proportion of responses in the India sample were invalid. Out of 1216 India responses, 318 (26%) were removed, leaving a final valid sample of 898. The higher rate of low quality work provided by India Turkers is consistent with prior research (Khanna et al., 2010; Shaw et al., 2011). Rates of invalid responses between conditions were not significantly different from random in either of the two samples (For the US sample, $\chi^2 = 5.84, p = 0.32$; For the India sample, $\chi^2 = 6.68, p = 0.25$). Invalid-response rates were also consistent across conditions for the combined samples ($\chi^2 = 8.32, p = 0.14$). Table 2.1 illustrates sample sizes in each of the six conditions for both US and India sub-populations.

Examining first the US sample, a comparison of the two survey methods showed that a smaller percentage of respondents said they were motivated by each factor in the list

	Age	Gender		Education	
		Female	Male	College Degree	Graduate Degree
US	32.7(11.6)	60.7%	39.3%	51.6%	14.2%
India	29.3(8.9)	36.2%	63.8%	84.1%	53.6%

Table 2.2: Age, gender, and educational level among respondents in the US and India samples. Age is reported as mean with s.d. in parenthesis.

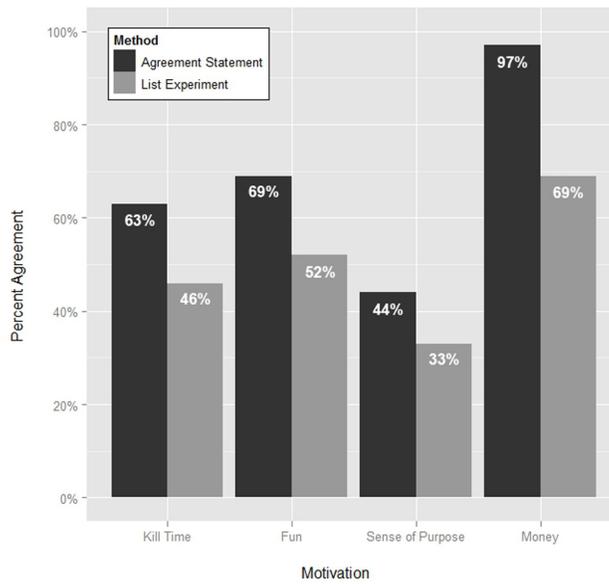


Figure 2-1: The proportion of US participants who selected each motivation using agreement statement-style questions or the list experiment. N = 1132.

experiment compared to the agreement statements. Figure 2-1 provides a visual representation of these results. Pearson’s chi-square tests showed significantly *smaller* proportions among US participants in the list experiment for “killing time” ($\chi^2 = 10.19, p < .01$), “fun” ($\chi^2 = 10.89, p < .001$), and “money” ($\chi^2 = 53.82, p < .001$), and a moderately significant difference for “sense of purpose” ($\chi^2 = 3.47, p = .06$). The differences in proportions between the two methods were also quite large: 17% for both “killing time” and “fun,” 11% for “sense of purpose,” and 28% for “money.”

The India sample showed a substantially different pattern. Figure 2-2 provides a visual representation of these results. Pearson’s chi-square tests showed significantly *larger* proportions of agreement among India participants in the list experiment for “killing time” ($\chi^2 = 40.71, p < .001$) and “fun” ($\chi^2 = 16.04, p < .001$) and significantly *smaller* proportions in the list experiment for “sense of purpose” ($\chi^2 = 132.83, p < .001$). There was no significant difference between the two techniques for “money” ($\chi^2 = .38, p = .53$). Again, the differences in observed agreement between the two methods was large: 37% for “killing time,” 23% for “fun,” and a remarkable 64% for “sense of purpose.”

Several aspects of our findings are notable. First, social desirability bias appears to encourage US Turkers to over-report the number of factors that motivate them. Participants in the agreement-statement condition from the US sample reported an average of 2.7 out of 4 motivations, while participants in the list experiment conditions reported only 2.1 out of 4 motivations on average. So, across conditions most US Turkers still reported being motivated by at least two factors, and each of four the motivations remained salient for a sizable proportion of our sample. However, accounting for the effects of social

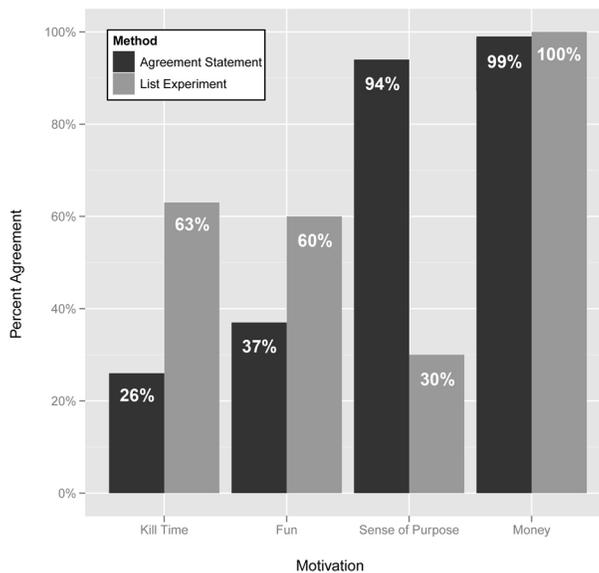


Figure 2-2: The proportion of India participants who selected each motivation using agreement statement-style questions or the list experiment. N = 898.

desirability, in each case that proportion was reduced.

We also found evidence of social desirability bias in our sample of Turkers in India, but the results do not suggest a uniform pattern. Participants in the agreement-statement condition over-reported “sense of purpose” and under-reported “killing time” and “fun.” Results suggest no social desirability effects in reporting of money as a motivator. In contrast with the US sample, workers in the India sample reported approximately the same number of average motivations across the agreement-statement and list experiment conditions – 2.6 out of 4 compared with 2.5 out of 4 respectively. As with the US sample, all motivations were salient for at least some India participants, regardless of the measurement method used.

Examining MTurk’s two key sub-populations separately allows us to observe potential differences in motivational profiles and social desirability biases between the two. The differences we observe are likely the result of a number of factors, including (but not limited to) gender, age, and class. However, building on the research discussed above, we argue it is likely that macro-scale socio-cultural, political, and economic factors, as captured broadly by nationality (India or US) also help to account for observed differences between the two groups. The specific causes, mechanisms, and implications of these patterns merit further investigation and comparison.

Figure 2-3 illustrates the degree to which the agreement statements elicited over or under-reported agreement with each motivation compared to the theoretically more accurate value obtained by accounting for social desirability with the list experiment. Within the

US sample, agreement statements modestly over-reported three of the four motivations compared to the list experiment: “killing time” (36% over-reported), “fun” (32% over-reported), and “sense of purpose” (33% over-reported). The magnitude of over-reporting was largest in the case of “money” as a motivation (40% over-reported). So, more than for other types of motivations, social desirability appears to encourage individuals to say that money is a motivator even though that may not be the case.

Turkers in India showed larger and more variable social desirability effects compared to US Turkers. Within the India sample, agreement statements under-reported 2 motivations — “killing time” (-142%) and “fun” (-62%), and dramatically over-reported “sense of purpose” by almost 200% compared to the list experiment. Results showed no social desirability bias related to money as a motivator, as effectively all participants in both conditions agreed that it was an important motivator.⁸ So, in the case of Turkers in India, social desirability appears to encourage individuals to over-state the importance of “sense of purpose” as a motivator, and under-state the importance of both “killing time” and “fun.”

Discussion

The recent rise of computing metaphors such as the “cloud” and the “crowd” have, perhaps, encouraged a stereotype of faceless and undifferentiated Internet users mindlessly performing tasks in isolation. Similar views are particularly prominent in the case of crowdsourcing work which itself tends to be comparatively featureless, repetitive, and unskilled. However, the robust evidence of diversity in opinions, perspectives, and backgrounds among users testifies to the failure of large-scale socio-technical systems to abstract out the relational foundations of online and offline life. In this study we turn a particular spotlight on the diversity of workers on MTurk, investigating whether Turkers from different countries might be influenced by distinct economic, socio-cultural, and political environments, and thus express different motivations and social desirability effects for doing work on the site. In finding evidence of social desirability bias in US and India workers’ self-reports of their motivations for participating on MTurk, we find evidence that relational concerns shape Mturk workers’ self-concept.

Demographic differences between the samples of US and India Turkers likely contribute to the variations in reported motivation and social desirability bias we observe across the two groups. As we discussed above, while random assignment *within* each national group assures that demographic attributes were also distributed randomly across the list experiment and survey conditions, the nature of the MTurk platform and our study design made it impossible to ensure random distribution *across* the two groups. As a result,

⁸Values for the list experiment conditions are estimates based on the tabulation of the responses across each permutation of answers (see the Methods section, above). The point estimate in this case was actually 103%, but since this is an artifact of the mathematical procedure, we report the maximum possible value of 100%.

we cannot identify the precise cause(s) of the differential presence of social desirability bias across MTurk workers in the US versus those in India. However, while the nature of our experiment precludes explicit statistical comparison between national groups, treating them as distinct sub-populations does allow us to observe the different contours and characteristics of the data.

While social desirability did not alter the rank-order of motivations between the agreement-statement and list experiment conditions, the consistent over-reporting of motivation in the US sample is an important finding in itself.⁹ This finding is suggestive of our participants' desire to appear highly motivated to others, as well as their belief that clearly articulating those motivations is socially desirable. The finding that at least some US Turkers over-state their motivation is particularly interesting given (largely unsubstantiated) media reports suggesting that many Turkers are individuals with lots of discretionary time (e.g. stay-at-home parents, security guards) For these Turkers and others, social desirability pressure may come from an expectation that behavior should be well-reasoned, from the tendency to ascribe positive characteristics to highly motivated individuals, and from the desire to express intrinsic interest in work (even rote side-work). Economic theories of rational choice as well as social psychological theories such as the theory of planned behavior rely on similar assumptions that human action is (or normatively should be) intentional and thoroughly considered. An individual is assumed to have established preferences, as well as known desired goals or outcomes for her behavior. While many scholars have argued that these normative models are incomplete and inaccurate, their prevalence in education and popular culture may have created social pressure among US Turkers to appear well-reasoned and highly motivated.

Again, our findings provide no direct information about why we should observe such distinct patterns of over- and under-reporting in the India sample, but previous research suggests potential explanations. Transnational IT work in India involves complex negotiations of identity as well as strategies of self-presentation that attempt to disguise experiences and values perceived to be inconsistent with foreign employers' or clients' desires (Derné, 1994; Mirchandani, 2004). This may explain respondents' perception that "sense of purpose" is more desirable than "killing time" or "fun," even though the latter two appear to be important to many. Here again, our results may signify a form of self-deception in which some India participants attempt to mask their genuine motivations for doing work with the motivation they believe is socially "correct." The relatively high status sometimes accorded to BPO and call-center work in India may likewise contribute to the perception that workers who want to kill time or have fun are insufficiently serious and dedicated about their (desirable) jobs.¹⁰ Requesters in the U.S. or elsewhere may ultimately find these sorts of motives inoffensive.

⁹The apparent proportional "consistency" of the bias does not diminish its importance. In the context of a multivariate analysis of these results, the inaccuracy of survey responses means of each motivation could produce spurious or suppressed correlations, mediations, moderations, and other statistical relationships (see Ganster et al., 1983).

¹⁰Note also the higher average education level of the workers in our India sample versus the US sample.

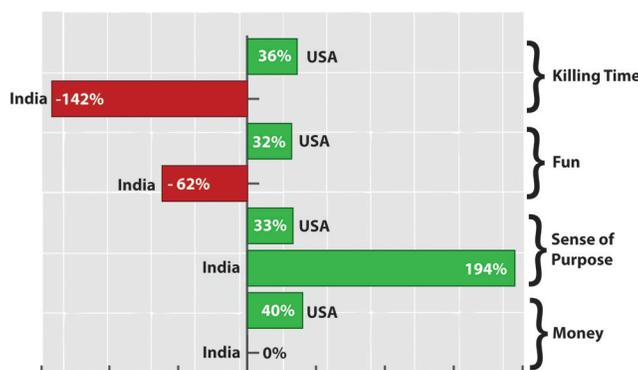


Figure 2-3: The degree of over or under-reporting of each motivation using traditional agreement statements, compared to the list experiment conditions. For example, compared to using the list experiment estimate as the “expected value,” US participants over-reported that “killing time” was a motivation by 36%.

The Almighty Dollar (or Rupee)?

The over-reporting of monetary motivation among the US workers in contrast to workers in India raises particularly interesting questions in the context of MTurk. Upon its release in 2004, some reports painted MTurk as a “virtual sweatshop” (Mieszkowski, 2006), assuming that most HITs would be completed by workers in the developing world for whom even a few dollars could be a lot of money. However, according to web-tracking firm alexa.com, as of December 2011 nearly 50% of visits to the site were from users in the United States (Alexa.com, 2011). Our research builds on popular press reports (Mieszkowski, 2006) and prior studies (Ipeirotis, 2010; Mason and Watts, 2009) that have illustrated the complex relationship between monetary and non-monetary motivations in crowdsourcing work. Our contribution is to provide strong evidence not only that both types of motivation are important, but that participants’ motivations are often in tension with their perceptions about the motivations that others would look favorably upon.

In addition, our results indicate that money may be a motivator for fewer US Turkers than previously thought. The presence of an especially strong social desirability effect for reports of monetary motivation also suggests that US Turkers believe that money is the reason they *should* complete HITs. In the context of an online labor market like MTurk, workers shape their responses to conform with imagined expectations they attribute to job requesters (even researchers) or to the creators of MTurk who promote money-making as the primary reason to use the service.¹¹ Alternatively, they may be

¹¹Half of the MTurk website’s landing and login page is dedicated to workers, and the largest, boldest, and blue-est typeface is reserved for the phrase “**Make Money** by working on HITs” (See: <http://mturk.com>; original emphasis).

influenced by the popular perception that crowdsourcing is an undesirable, “low class” form of labor, and likewise assume the popular belief that it would be undesirable to cast such labor as a fulfilling, fun, or personally satisfying way to spend one’s time. However, given prior studies showing that task framing interacts with monetary motivation (Rogstadius et al., 2011; Chandler and Kapelner, 2010), it is likely that the specific type of task, the beneficiary of the work, and other contextual factors would moderate these issues. Further research is necessary on this issue.

Limitations, Implications & Conclusion

Our study is subject to a number of important limitations. First, as we noted earlier, our data does not allow us to make structured statistical comparisons between US and India sub-populations. Our discussion is based on treating them as separate groups, and observing similarities and differences in the data. Demographic differences between the two samples probably account for at least part of the differences we observe; however, it is unlikely that gender or age alone (for example) could explain the differences. Furthermore, factors such as gender and age are inextricably tied to the socio-cultural, economic, and political foundations of crowd-work in India and the US. Macro-social conditions also inform the types of people to whom crowd work is available and attractive.

Secondly, we note that our study is limited only to the unique socio-technical context of MTurk, and it would be inappropriate to generalize our findings beyond this context. Furthermore, our method is more descriptive than explanatory, which limits the ability of our findings to contribute to theories of social desirability in online motivation. Only through in-depth examination in mixed-methods studies will we learn how accurate our estimates are or how they may generalize to other crowd-sourcing and online collaborative systems.

We believe, however, that our findings strongly inform RQ1: reports of online motivation *can* be subject to social desirability bias. This finding demands that more attention be paid to the issue of social desirability in other contexts. Our findings also suggest that survey results in other online settings, especially those with greater social presence and a wider array of potentially sensitive topics at stake, could reflect some degree of social desirability bias in the reporting of online motivation. With respect to RQ2, the cross-national comparison indicates that the precise contours of social desirability depend on the context of interaction, the task at hand, and the populations involved.

With respect to the questions of whether and to what extent relational concerns affect MTurk workers motivations for participation, Study #1 offers substantial evidence that social pressures shape worker self-reports of motivation. This finding suggests that even in a highly atomized environment like MTurk, social pressures and relational concerns shape the self-concept of workers. The results of Study #1 do not, however, speak to the question of whether such relational concerns can provide an effective foundation

for incentivizing work of high quality. The subsequent study builds on these results to construct a direct comparison of the effects of different incentive schemes – some financial, some relational, and some hybrid – on worker performance.

Study #2 – Horserace Experiment

In this second study, I present the results of a controlled experiment that directly compares the effects of fourteen different incentive schemes within the context of an online labor market. The incentive schemes encompass a wide variety of existing economic, psychological, and sociological research into human cooperation, labor, motivation and behavior. In collaboration with John Horton and Daniel Chen, I test the effects of these incentives using a single, non-expert content analysis task, for which we obtained validated answers prior to administering the experiment. I then compare the aggregate performance of workers in the different treatment conditions in order to determine which incentive schemes elicit the most accurate judgments in comparison to the control condition.

Whereas Study #1 demonstrated that relational concerns affect the self-concept and self-reports of motivation among workers in an online labor market, Study #2 tests whether relational, social psychological incentives can alter worker performance more or less effectively than other kinds of incentive schemes. Below, I elaborate on what makes some of the specific incentive schemes used in the experiment relational and others not, but the key idea I want reiterate from the introduction to this chapter is that relational incentives make explicit connections between individuals' actions and their past, present, or future interactions with others. Relational incentives have proven effective in other online contexts oriented towards collective action and collaboration (e.g. Cheshire, 2007; Cheshire and Antin, 2008). This study addresses the question of whether or not relational incentives can prove effective in a setting like Mturk, which places online workers in a highly atomized and anti-social environment.

Obtaining Quality Work

In online labor markets, the usual rules of labor supply generally apply: more money attracts more workers on both the extensive margin (i.e., more workers are willing to participate at all) and the intensive margin (i.e., workers that participate work longer or produce more). However, attracting more workers does not necessarily lead to better work. While earlier work (Von Ahn and Dabbish, 2004; Ipeirotis, 2010; Snow et al., 2008; Hopkins and King, 2010; Downs et al., 2010) has focused on techniques for filtering and processing judgments of inexperienced human raters, we focus on how to produce better judgments in the first place.

Some work has already been done in this vein. A recent experimental paper by Chandler and Kapelner (Chandler and Kapelner, 2010), conducted in MTurk, looked at how knowledge about the purpose of a task affected quality and labor supply. US-based subjects who knew they were labeling cancer cells in an image produced more output than those who did not. Interestingly, they found no evidence of similar effects for non-US workers. The same authors also recently conducted an experiment in which they demonstrated that slowing down the presentation of survey questions increased comprehension (Kapelner and Chandler, 2010).

Content Analysis

In some kinds of research, human judgments can be evaluated against objective, correct answers. This is the case for tasks such as image labeling or character recognition, where accurate automated techniques remain costly or unavailable. In others, human judgments are important precisely because they incorporate subjective perceptions, which may be central to the topic of study. This is the case for many types of content analysis tasks, where researchers aim to identify certain qualities or patterns in textual materials that evade automated detection. In both objective and subjective variants, the challenge of developing techniques to aggregate individual judgments as well as to assess their precision and accuracy has given rise to several different methodological techniques, some of which we review as background to the method we used in this study.

Useful methodological approaches to this type of problem have emerged among scholars conducting content analysis of textual materials. Until recently, content analysis techniques have relied on multiple researchers implementing a qualitative labeling or coding scheme of the same text(s), and then using specifically adapted correlation statistics to evaluate inter-rater (or intercoder) reliability (Krippendorff, 2003; Cohen, 1960). The primary advantage of these approaches lies in the ability to measure empirically the reliability of seemingly subjective observations. The cost of such precision, however, is often quite high in terms of time and labor, making such analysis prohibitively expensive when the scale of data collection and analysis grows large. Recent work by Hopkins and King has demonstrated that machine-learning tools and techniques can overcome these limitations while retaining high confidence in the precision and accuracy of results (Hopkins and King, 2010).

Our Approach

A variety of papers across the social sciences have studied human motivation. This literature is far too voluminous to summarize here; much of it is also captured by folk wisdom or even in management clichés. What is certainly not known is the relative merits of different motivations and how they apply in online contexts. For example, does offering

workers more money improve effort and hence quality? This lack of knowledge motivated this study, in which we created a large number of treatment groups and recruited a vast number of subjects. While this “kitchen sink” approach creates some problems of analysis, it does afford our observations greater breadth of comparison. We review the different motivational frameworks in greater depth below.

Our Task

For our task, we asked subjects recruited from MTurk (“Turkers”) to complete six closed-ended, qualitative content analysis questions using an online survey interface. All subjects in all treatment groups (except one of the control groups, which only answered demographic questions) were directed to analyze the Kiva.org website and then presented with the same six questions in the same order and with the same answer choices. The questions asked subjects to conduct content analysis similar to that used in an earlier study by Shaw and Benkler (Shaw and Benkler, 2012) to assess US political blogs. For any questions, workers could choose to leave a blank response.

Overview of Results

Our results varied by question as well as by treatment condition. On the two easiest questions, the Turkers uniformly performed much better than random guessing and only a couple of the treatments seemed to produce any (small) effect at all. By contrast, the results for the three difficult questions varied more widely. In one case, the Turkers’ performance was much worse than chance. At the same time, the variance in responses to these questions also revealed stronger treatment effects. Aggregating the results from each condition across all five questions, the Turkers performed better than chance. More importantly, a few treatments proved to be markedly more effective than the others, producing significant improvements in average answer quality when compared against the control condition. We discuss the experimental design, data collection and results in greater depth below.

Methods and Materials

Content Analysis Task

In order to establish a reliable standard against which to judge the performance of the workers, we also administered the same questions about the same website through an identical web interface to a group of five research assistants prior to conducting the experiment. On all of the questions included in the study, at least four of the five research

assistants gave identical responses, suggesting a high degree of intercoder reliability. Independent of the research assistants, one of the authors also collected his own answers to the questions, agreeing with the prevailing answer provided by the research assistants in every case. We used these responses as validated (i.e., gold standard) answers to each question.

The first two questions followed a multiple choice format, in which subjects were asked to identify whether (1) a privacy policy; and (2) “avatars” or other visual representations of user identities were present on the site. For both of these questions an “uncertain” answer choice was also available. The third and fourth questions asked subjects to assess how frequently members of the site engaged in specific behaviors (ranking or rating (3) content and (4) other users) using a five point scale ranging from “Very frequently” to “Very rarely or never.” Finally, the last two questions asked subjects to identify whether specific features related to (5) social networking and (6) revenue creation were present or not on the site. In these last two, subjects could check boxes to select any combination of answer choices from a pre-defined list.

The first of the six questions (about whether or not the site had a privacy policy) was presented prior to treatment. We report the results for this pre-treatment question but do not include it as part of our outcome performance measurement. A copy of the questions as they appeared in the experimental interface is available on Horton’s website.¹²

The dependent variable of our study was the number of correct answers to the five post-treatment information-seeking questions per subject.¹³ We considered blank responses incorrect answers for all questions. After coding responses to identify which ones each subject answered correctly (i.e., in agreement with the gold standard response), we aggregated the number of correct answers per subject. The outcome measure is therefore an integer (count) with a value between zero and five. As we describe in further detail below, the subjects recruited through MTurk performed better than chance - estimated as random guessing between all available answer choices for every question - on four of the five post-treatment questions.

The demographic questions asked subjects to provide their age; gender; country of residence; education level; language skills; employment status; household size; and internet skills. We included them to increase precision in our treatment estimates as well as to verify that our randomization was valid (we discuss the rationale for this choice in further detail below).

¹²<http://goo.gl/9CVa5>

¹³In the case of the checkbox questions – numbers (5) and (6) – we coded any response including the gold standard answer as correct. Obviously, in the case of a question where we did not know the correct answer ahead of time, a much different process would be needed to identify the best response. As such filtering processes were not the focus of this study, we refer consideration of this topic to the work of others (Snow et al., 2008).

Conduct of the experiment

Recruitment was conducted through the MTurk online labor market, where we advertised a brief information-seeking task. Recruitment materials included a description of the study as well as a set of example questions, all of which were included in the actual job, but none of which were among the post-treatment questions included in our outcome variables of interest. Subjects were not informed that they were participating in a study at the time of recruitment so as to preserve the “natural” environment of the field experiment in the online labor market. In the task description, we explained that workers would be paid \$0.30 for completing the task. Given the length of the assignment and the fact that workers could only complete our job once (many jobs on MTurk allow workers to return multiple times), this payment rate was comparable with many other jobs posted to the MTurk marketplace.

Upon agreeing to accept the task on the MTurk website, subjects were instructed to click a hyperlink pointing to a private server at an anonymized URL. While we were not able to collect data on how many individuals saw our recruitment materials, once a worker accepted our task, their unique MTurk user ID was assigned randomly to one of the treatment or control conditions and (together with their IP address and the information about treatment assignment) stored by a database on our server. As a result, we were able to use these different pieces of stored identifying information to block individual subjects from completing the study more than once or from being exposed to more than one of the experimental manipulations. While there is some possibility that individuals could possess more than one account on the MTurk platform and thereby might have circumvented these protections, such behavior is expressly prohibited by the site’s terms of service and Amazon actively polices violations (indeed, one of the authors of the study had the somewhat embarrassing experience of losing his MTurk account as a result of attempting to create multiple user names in order to test a pilot version of an earlier study). Furthermore, the payoff for circumventing the system protections on our job (which required a little more than 2000 unique judgments) were very low in comparison with some of the large scale jobs on the site which frequently elicit hundreds of thousands or even millions of individual judgments. As a result, we feel confident in the integrity of both the randomization as well as the different treatment conditions.

Once Turkers clicked through to our server, the experimental instrument was administered through a web-based survey interface. Subjects were presented with a single page containing the version of the instrument corresponding to their treatment assignment. Each version of the instrument began with some general instructions about the task, and (in all conditions except for the demographic control) a link to the URL of the site that would serve as the topic of the questions (Kiva.org). These were followed by several pre-treatment questions about the site. Then, we introduced the experimental manipulations (usually consisting of a block of text) followed by the post-treatment questions and any treatment-specific materials. Finally, the instruments concluded with a series of demographic questions.

Overview of Treatments: Social Psychological, Financial, and Hybrid Incentives

The experimental manipulations we introduced consisted of framing the information-seeking questions in distinct ways using a series of social psychological, financial, and hybrid incentives. Together, these incentive schemes encompass a number of salient theories of human motivation drawn from several social sciences. Generally, the social psychological incentives emphasized non-monetary rewards or punishments for performing our task whereas the financial incentives offered monetary rewards (bonus payments) for good performance or punishments (lost bonus payments). Hybrid schemes combined social psychological and financial incentives.

In total, we tested fourteen different incentive frameworks and compared subject performance in each condition against a control condition that involved no framing incentives beyond the baseline compensation offered for completing the job. We also included a second control group in which subjects responded only to the pre-treatment and demographic questions used in the other conditions. All subjects who completed the task were given the baseline compensation. Because of some technical complications, we paid all subjects the largest amount they could have received from their experimental treatment in order to avoid under-paying any deserving subjects.

I describe all control and treatment conditions in further detail below. For each of the conditions (listed in bold) I note in parentheses whether it is relational (social psychological), financial or hybrid and include the full treatment text. The purely relational schemes sought to contextualize the task with reference to the judgments, attention, or performance of others (workers or task requesters). The purely financial schemes offered direct payoffs or penalties based solely on a worker's individual performance. Hybrid schemes, by contrast, tied financial payoffs or penalties to some relational element (the judgment, attention, or performance of other workers). Where appropriate, I also include references to relevant studies in which comparable incentives were found to effect behavioral outcomes.

Control Conditions

Control Workers were presented with all pre-treatment, post-treatment and demographic questions.

Demographic Workers were presented with pre-treatment and demographic questions only.¹⁴

¹⁴Whenever possible, the demographic questions were taken verbatim from the 2005 codebook of the World Values Survey (2009). As we described later in the paper, we also borrowed two questions about Internet-use skills from Eszter Hargittai (2009b).

Treatment Conditions

Tournament scoring (relational) “For some of the following five questions, you will be in competition against another worker. After this HIT is completed, we will compare your accuracy on these questions against the accuracy of another worker who we will select at random. We will report the results of the competition to you when we process your payment.”

Cheap Talk – Surveillance (relational) “After this HIT has been completed, your answers to these questions will be reviewed for accuracy.”

Cheap Talk – Normative (relational) “It is your job to provide accurate answers to these question. It is important that you do your job well.”

Solidarity (hybrid) “For some of the following five questions, you have been assigned to the Red team. You and your teammates have the opportunity to earn bonuses based on your collective performance. After the HIT has been completed, we will verify the answers that you all submitted for these questions (independent of the website you are analyzing) and compare your team’s performance with another group of workers completing this HIT. If your team wins, you will all receive a bonus.”

Humanization (relational) “Before you complete the questions, I just wanted to thank you again for doing this work. My name is Aaron.”¹⁵

Trust (relational) “Thank you for completing the first set of questions. Here is your confirmation code, which you may paste into the field on the original HIT page at any time to receive payment. We trust that you will still complete the questions below to the best of your ability. Your confirmation code and payment for this HIT will not change based on the answers you submit.”¹⁶

Normative priming questions (relational) “Before answering the next set of questions about the website, we want to ask you a few questions about yourself and your attitudes about work.”¹⁷

¹⁵This treatment text was accompanied by a photo of one of the authors.

¹⁶In order to make this treatment condition consistent with the design of all other conditions, all workers were asked to submit a completion code when they finished the job. In every condition except this one, we provided these completion codes once the task had been finished and the answers to all questions submitted to our server. Compensation was not conditional on submitting the completion code in any of the conditions.

¹⁷This text was followed by a series of questions drawn from the General Social Survey inquiring about subjects’ agreement with statements indicating positive attitudes towards responsibilities and hard work. The statements, in order, were “People who don’t work become lazy”; “Work is a duty toward society”; “Work should always come first, even if it means less free time”; “Work is a person’s most important activity”; “I see myself as someone who does a thorough job.”

Reward Accuracy (financial) “After this HIT has been completed, we will verify the correct answers for at least one of the following five questions. For each ‘trap door’ question we will increase your total pay by 10% if you answered it correctly. You will not receive this bonus if you do not answer the ‘trap door’ question(s) correctly.”

Reward Agreement (hybrid) “After this HIT has been completed, we will review the answers for at least one of the following five questions. For each of the questions we review, we will reward you for agreeing with the answers provided by the majority of other workers who complete this HIT. The reward will be a bonus of 10% for every agreement.”

Punishment Accuracy (financial) “After this HIT has been completed, we will verify the correct answers for at least one of the following five questions. For each one of these ‘trap door’ questions we will penalize you 10% of the bonus that you would have received if you answered it incorrectly.”

Punishment Agreement (hybrid) “After this HIT has been completed, we will review the answers for at least one of the following five questions. For each of the questions we review, we will penalize you if you disagree with the majority of other workers who complete this HIT. The penalty will be a deduction of 10% from the total bonus you could have earned if your answer had agreed with the majority.”

Promise of Future Work (financial) “After this HIT has been completed, we will review the performance of each worker on the following five questions. If you perform better than average, you will have the opportunity to work on future jobs with us.”

Bayesian Truth Serum or BTS (hybrid) “For the following five questions, we will also ask you to predict the responses of other workers who complete this task. There is no incentive to misreport what you truly believe to be your answers as well as others’ answers. You will have a higher probability of winning a lottery (bonus payment) if you submit answers that are more surprisingly common than collectively predicted.”¹⁸

Betting on Results (financial) “For the following five questions, you will have the opportunity to win bonuses. After completing the questions, we will let you bet a portion of your payment on the accuracy of your responses.”

¹⁸The design for this treatment comes from Prelec (2004), who used a near identical method in an effort to elicit honest opinions from their research subjects. After data collection, the responses were subsequently weighted based on the aggregate predicted distributions of the respondents. For our own purposes, we were merely interested in the question of whether presenting our task in a similar way would have a meaningful effect on qualitative information seeking. The results we present do not involve any of the weighting procedures used by Prelec. We refer interested readers to the original paper for more detailed information about this technique.

Data Collection

The experiment ran from June 2 through September 23, 2009. During that time, we collected a total of 2159 unique subjects, of whom 2055 completed the study and 104 dropped out after treatment assignment. Because we used a random treatment assignment function (instead of stratified random assignment), the distribution of subjects across conditions was unequal, ranging between 113 and 167 subjects per condition. Applying Pearson's χ^2 test to a contingency table with the counts of attriters and compliers across all of the treatment and control groups suggests that attrition was not significantly different from random ($p = 0.919$).

We also ran a regression of all the demographic covariates against treatment condition to test whether our randomization worked. The model was not significant and none of the variables had a significant association with treatment assignment. As a result, we conclude that randomization was successful.

Following the completion of data collection, we discovered that database storing our records from the study had stored inaccurate values for three of the subjects. As a result, we excluded the results from these three subjects from all subsequent analysis, with the exception of the calculation of the total number of subjects assigned to each treatment group used to generate our estimates of treatment effects (see below).

Statistical Analysis

In all of our estimates of treatment effects, we correct for the increased probability of Type 1 errors when conducting multiple hypothesis tests in an experiment with many treatments by using the single-step Bonferroni correction to adjust our p-values (Shaffer, 1995; Hsu, 1996). This correction has the advantage of simplicity as well as strong control of the Familywise Error Rate (FWER) in a context where the comparisons being tested are unordered (Rosenthal and Rubin, 1984).¹⁹

We used Intention-To-Treat (ITT) estimators to calculate the average effect of each treatment compared against the control condition. What this means practically is that subjects that quit after assignment to a group were still included in calculations as answering incorrectly. ITT estimators have the advantage of correcting for potentially confounding effects of attrition and avoiding the bias introduced into the analysis of many randomized experimental results by regression estimates (Freedman, 2008a,b).

¹⁹We calculate these corrections using the “`multtest`” package in R.

Results

Performance on Individual Questions

Looking at the percentage of correct responses per question across all conditions (except demographic control), subject performance varied significantly from chance (random guessing among the available answer choices) for all five questions (see Table 2.3).²⁰ On four of the five, subjects performed better than chance, whereas the question about revenue streams elicited performance that was significantly worse than chance.

Table 2.3: Performance on Individual Questions (All Conditions)

	Actual % correct	Predicted % correct (random guessing)
Avatars	73.2	25
Soc. network features	62.8	50
Revenue streams	47.6	50
User rank/rate	28.7	20
Content rank/rate	25.6	20

χ^2 test indicates all differences significant ($p \leq 0.05$)

Comparing the percentage of correct answers across questions and across experimental conditions reveals fairly consistent performance from each treatment group despite the substantial variation across questions (see Figure 2.4).²¹

Aggregate Performance (All Five Questions)

Figure 2-5 illustrates aggregated worker performance across all five questions and all experimental conditions. On average, subjects did significantly better than chance, which would have yielded a mean of approximately 1.58 questions correct. The actual distribution of responses is strikingly close to normal, with a slight concentration at 2 and a mean of 2.38.²²

²⁰We used χ^2 tests for goodness of fit to calculate these comparisons between the distribution of correct responses and predicted probabilities of producing correct answers through random guessing for each question.

²¹We did not conduct hypothesis tests comparing average treatment effects for each question. Such question-level effects were not our primary outcome variables in part because of the specificity of the content of each question and the fact that we looked at responses only from a single website. See the Discussion section below for additional consideration of this topic.

²²This mean reflects only the performance of compliers - not the full set of subjects exposed to treatment. This corrected (ITT) sample mean was 2.26.

Figure 2-4: Performance Distributions - All Conditions

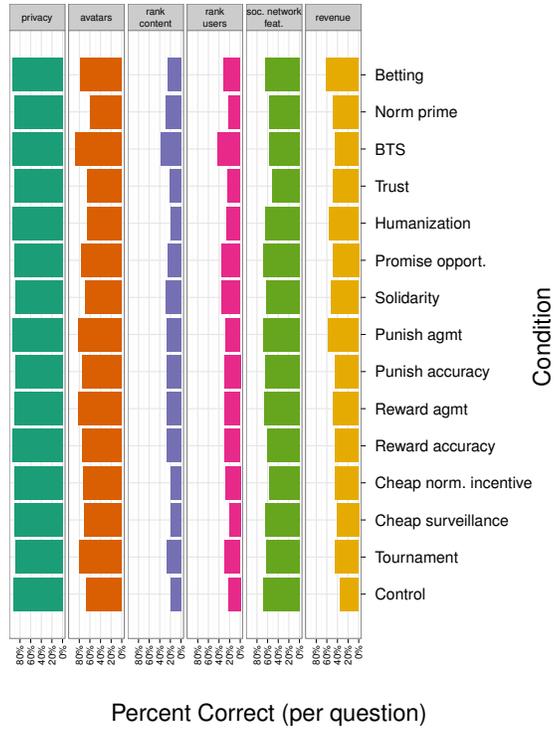


Figure 2-5: Performance Distribution - All Conditions

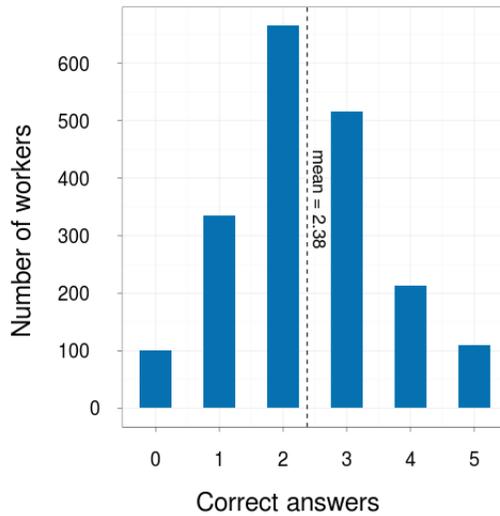
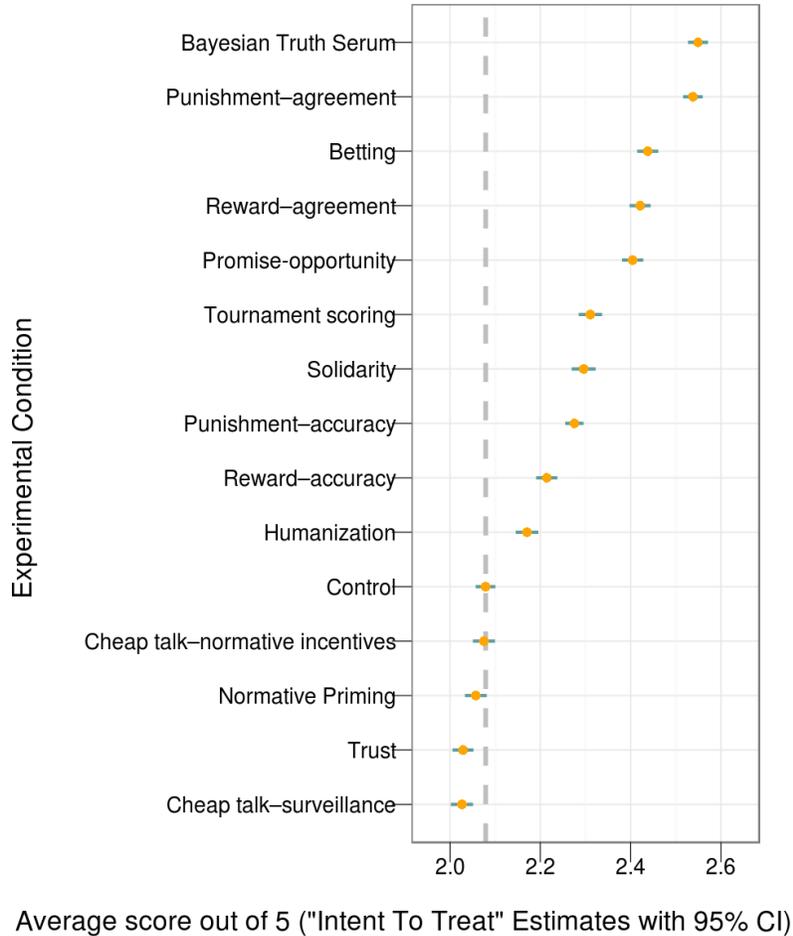


Figure 2-6: Visual Comparison of Treatment Effects



The results of our ITT estimation of average treatment effects (ATE) are visualized in Figure 2-6 and reported in detail in Table 2.4.²³ To facilitate the readability of the table, we order all treatment conditions by the absolute size of their estimated effects and only report $p \leq 0.05$.

As described above, we used the “simple” Bonferroni correction for the difference of means comparisons between each treatment group and the control condition. The results suggest that only two of our treatments produced a significant improvement in worker

²³The ITT estimate of the ATE captures the mean difference in aggregated performance between the subjects in each treatment condition and the subjects in the control group. The estimates themselves are identical with the results of a linear regression on the same data. The standard errors are different as are the underlying p-values (Freedman, 2008a,b). As discussed above, all p-values have been corrected using the simple Bonferroni correction procedure (Shaffer, 1995; Hsu, 1996).

Table 2.4: Average Treatment Effects (ATE) on Aggregate Performance

	Mean	ATE [†]	Std. Err.	p-val. [‡]
Control	2.079	NA	NA	NA
BTS	2.549	0.471	0.132	0.017
Punish-agmt.	2.538	0.459	0.131	0.015
Betting	2.438	0.359	0.137	
Reward-agreement	2.421	0.342	0.135	
Promise-opportunity	2.404	0.326	0.138	
Tournament scoring	2.310	0.232	0.142	
Solidarity	2.296	0.217	0.149	
Punish-accuracy	2.275	0.197	0.131	
Reward-accuracy	2.214	0.136	0.139	
Humanization	2.171	0.092	0.142	
Trust	2.029	-0.050	0.137	
Cheap talk-surveil.	2.027	-0.052	0.131	
Normative Priming	2.057	-0.021	0.142	
Cheap talk-norm.	2.075	-0.003	0.141	

[†] ATE calculated using Intention-to-Treat (ITT) estimators.

[‡] p-values reported ≤ 0.05 .

performance over the control: Punishment-agreement and Bayesian Truth Serum. In each case, the effect was approximately .5 above the mean outcome in control (2.08). Both were significant at $p \leq 0.05$.

Post-hoc Demographic Analysis

To evaluate whether any demographic factors may have affected our estimates, we ran an ordinary least squares (OLS) model on the dependent variable (aggregate performance, or score out of five), incorporating the full set of demographic control variables together with the treatment assignments. The results of this “full” model (not reported here) suggested that three covariates may have had a significant association with subject-performance despite the randomization: web-use skills²⁴, household size, and country of residence. To zero-in on any potentially confounding effects of these variables, we ran a second model that included only the outcome, the treatment conditions, and these three

²⁴To measure this variable, we borrowed a survey item from an instrument designed, validated, and implemented by Eszter Hargittai in several of her studies (Hargittai, 2009b). The item asks subjects about their understanding of two web-browsing tools: “tabs” in an internet browser and RSS feeds. Hargittai found that both items correlate highly with independent measures of web-browsing and Internet skill.

covariates.²⁵

The second model (reported in Table 2.5) suggests a significant, negative association between performance on our outcome measure, poor web skills and residence in India (both covariates were significant at the $p \leq 0.001$ level after correcting for multiple comparisons). Remarkably, the point estimate of the association between residence in India and the outcome variable dwarfed any of our estimated treatment effects. Again, treatment conditions and covariates are sorted by point estimate size to facilitate readability.

Table 2.5: OLS Regression on Aggregate Performance

	Estimate	Std. Err.	p-value [†]
(Intercept)	1.851	0.153	0.000
India resident	-0.739	0.068	0.000
BTS	0.596	0.138	0.000
Punishment-agreement	0.482	0.137	0.008
Betting	0.437	0.139	0.031
Promise-opportunity	0.398	0.139	
Tournament scoring	0.358	0.143	
Reward-agreement	0.310	0.139	
Solidarity	0.291	0.144	
Reward-accuracy	0.232	0.139	
Punishment-accuracy	0.230	0.133	
Web skill	0.147	0.024	0.000
Humanization	0.136	0.141	
Cheap talk-normative	0.131	0.140	
Household size	-0.048	0.018	
Trust	0.047	0.138	
Normative Priming	0.039	0.138	
Cheap talk-surveillance	0.035	0.147	

Adjusted $R^2 = 0.127$

[†] p-values reported ≤ 0.05 .

²⁵The fact that country of origin was significant suggested a result consistent with previous findings about the differences between workers from India and the US (Ipeirotis, 2010). As a result, we re-coded country of residence as a binary variable, indicating whether workers self-reported as residing in India or not.

Discussion of Study #2

Our results suggest a significant, positive effect of two hybrid social psychological and financial treatment conditions - Punishment for disagreement with other subjects, and “Bayesian Truth Serum” (BTS) - on worker performance in a qualitative content analysis task on MTurk. Several of the purely financial incentive schemes produced large point estimates of treatment effects, but were not significantly different from the control condition. None of the purely social psychological incentive schemes altered performance significantly. This suggests that workers in the MTurk environment may not respond to these sorts of motivational levers.

Even though the two most effective conditions – BTS and Punishment for disagreement – both include financial components the fact that they alone succeeded does not imply a ringing endorsement of monetary incentives over social psychological incentives by the workers on Mturk. Rather, the challenge of these results lies in explaining why these particular hybrid incentive schemes appeared to work where so many schemes others did not.²⁶

We contend that the most likely explanation of these results hinges on the fact that both the BTS and Punishment-disagreement conditions tied worker payoffs to their ability to prospectively reason about the performance of their peers. However, what specific mechanisms can account for these effects in each condition?

When compared with the other treatments and control conditions, BTS likely had two effects: (a) it created some confusion among subjects about how exactly they were being evaluated; and (b) it created an incentive for subjects to think carefully about the responses of other subjects. The combination of confusion and cognitive demand probably elicited greater engagement with the question, and this engagement in turn probably drove better performance. In the case of BTS, we should underscore that the treatment effect is not due to any manipulation of the responses or the predictions provided by the subjects regarding the distribution of responses. In this regard, we did not follow Prelec’s original design and use the BTS to adjust or filter subjects’ answers (Prelec, 2004). Instead, we simply used it as a contextual manipulation. Given that we did not provide much information about the BTS design to the subjects performing the task, it also seems unlikely that they would have understood the analytical mechanisms proposed by Prelec.

The effect of the Punishment-disagreement condition raises a distinct set of concerns insofar as it closely resembles the Reward-agreement condition. In theory, both conditions ask workers to perform a similar set of calculations about the likely responses of other

²⁶One of the anonymous CSCW reviewers suggested comparing the financial incentives versus the social incentives in another way by grouping the conditions into clusters and estimating treatment effects between the different clusters. While our research design supports this line of inquiry, we choose not to pursue it here because we did not conduct any preliminary testing to validate our classification of the different treatments into one or the other group.

Mturk workers. However, the key difference between the two stems from the role of punishment and reward in the context of relational contracts in online labor markets. In Mturk, punishment of workers by requesters is consequential in a way that rewards is not: workers can be banned from the site if their work is rejected by requesters. As a result, even though we did not claim we would block any worker as part of the Punishment-disagreement condition, by demonstrating our willingness to punish we may have inadvertently suggested that there could be consequential results (like rejection) to poor performance on that particular question. In contrast, the language of rewards and bonus payments used in the Reward-agreement condition would not carry any of these connotations.

It is noteworthy that although the Reward-agreement condition did not have significant effects, it did produce one of the larger point-estimates, suggesting that prospective reasoning by subjects about their peers may have played an attenuated role in that group as well. However, the point estimates for the Betting and “Promise of future opportunity” conditions were similar to that for Reward-agreement (and also not significantly different from the control condition). Both of these conditions asked workers to engage in prospective reasoning, but entail completely different mechanisms from the agreement-based treatments.

We also find a strong association between residence in India, web skills, and task performance. This implies that culturally specific knowledge and experience online may mediate workers’ ability to perform the sort of qualitative information-seeking task we asked them to do here.²⁷

At the same time, we do not believe that these demographic factors undermine our findings with regards to the effects of Punishment for disagreement and Bayesian Truth Serum. While the association between web skills, residence in India and our outcome variable were quite strong, the point estimates for the effects of these two treatment conditions hardly changed and remained significant at the $p \leq 0.01$ level. This suggests that the effects we observed for the treatment conditions (at least the significant ones) were robust and supports our earlier claim the randomization worked as a means for distributing these sub-populations evenly across the different treatment groups.

²⁷ As a comparison across Mturk workers in India and the US was not part of our original research design or hypotheses, we chose not to compare treatment effects across the two populations in a more purposive manner. Nevertheless, our findings here, coupled with the findings of Study #1, strongly suggest that future research should conduct further cross-national comparisons of workers in online labor markets and other settings. Based on our results, we anticipate significant differences of motivation and performance along these lines.

Conclusions

Study #1

The findings from Study #1 support the overall conclusion that relational concerns figure into the motivations of participants in online crowdsourcing labor markets.

These findings have several advantages over previous studies of motivations in online labor markets. Many prior studies have used non-survey techniques such as behavioral/experimental tasks and qualitative interviewing to assess motivation. These methods, however, generally do not allow researchers to capture as large or as diverse a sample as surveys do. Despite this important benefit of surveys, the results of the list experiment cast a shadow of doubt on prior studies which have used direct questions to assess motivation in MTurk. For example, Ipeirotis' (2010) demographic survey found that "very few Indian workers participate on MTurk for 'killing time'." The list experiment results suggest this finding was likely an artifact of social desirability bias, and that the majority of Turkers in India are at least partly motivated by "killing time." Likewise, accounting for the effects of social desirability, approximately 60% of Turkers in India appear to do HITs at least partly because they think it's fun, while only 20% reported fun as a motivation in Ipeirotis' study.

The results reported here strongly suggest that future studies of motivation in online environments should take account of social desirability bias. The list experiment is just one method for doing so, and techniques for addressing social desirability bias and other response effects have been under development for at least 30 years (Nederhof, 1985). In addition, the different patterns of motivation and bias across US and India Turkers underscore the importance of cross-national and cross-cultural studies of online motivation. As socio-technical systems become more global, researchers must strive to understand the differential foundations of motivation for participation, and consider how those motivations may influence divergent patterns of activity.

The results of this list experiment on Mturk also provide another example case in which asking users to explicitly state their motivations can produce inaccurate and incomplete data (Nisbett and Wilson, 1977). Interviews, interactive games, and other behavioral data will provide complementary information that can be used to better understand the stated and unstated preferences of participants in online systems. A program of rigorous and creative research will be necessary to develop a thorough understanding of motivation in online contexts and inform the intelligent design of incentive systems.

Despite the immense popularity of crowdsourcing and other forms of online collaboration, it is likely that current systems are only beginning to realize their potential. Efforts to expand the reach of online collaboration to previously under-served and under-represented populations are already underway (Khanna et al., 2010). Understanding the

path forward for designing effective and engaging systems of online collaboration — including crowd-sourcing systems — will depend on developing clear, accurate, and nuanced views of users and their motivations. As researchers and practitioners inform ongoing development with investigations of user motivation, it will be essential to consider social desirability and other response effects in order to maximize the transformative potential of online collaboration.

Also, this study offers compelling evidence that monetary incentives represent just one part of a complex motivational array behind paid online work. Incentive systems that rely solely on paying participants in online cooperative systems, ignoring other key motivations such as fun and providing a sense of purpose would likely fail. Similarly, the comparative dimension of this particular study illustrate how collaborative systems that seek to engage workers or collaborators from diverse backgrounds may benefit from context-specific adaptations to sub-populations with divergent attitudes about money or employment. While national boundaries proxy for macro-scale cultural differences in this experiment, there are numerous sub-groups within both the US and India and, as a result, studies of any large-scale online collective engaged in collaborative activity (e.g. Wikipedia, Linux) would benefit from explicitly identifying and comparing important sub-populations and their perspectives on motivation and activity. I will return to this point in Chapter 3.

Finally, and most relevant to my overarching concerns, Study #1 shows how relational concerns figure into MTurk workers' self-reports of motivation, indicating that social pressures and social psychological processes more generally continue to influence worker behavior even in the context of a highly isolated platform for online participation. The fact that workers respond differently in aggregate to questions about their motivations when provided with the opportunity to do so in a way that obscures their individual preferences suggests that relational concerns play an important role in shaping their behavior.

Study #2

Study #2 extends the findings of Study #1 and compares the impact of financial, hybrid, and relational incentives on worker performance. The findings show that future-oriented, relational incentives that ask workers to consider the performance of their peers while also incorporating financial components elicit higher quality work on average than other sorts of incentive schemes. These findings were significant despite substantial variation introduced by the cross-national subject pool and differences in subjects' web-use skills, suggesting that, to some extent, the effects of the incentive schemes were independent of structural, socioeconomic factors. These findings extend previous work demonstrating an association between hybrid social psychological and financial incentives and participation in online information sharing (Rafaeli et al., 2007; Raban, 2008) by revealing a causal dimension in this relationship.

The results of the horse-race experiment suggest that workers on Mturk have a wide range of abilities and that some task framings may elicit higher quality performance than others. It is worth emphasizing that this study design does not utilize any of the quality-control techniques discussed elsewhere for filtering data generated in Mturk and similar environments (e.g. Von Ahn and Dabbish, 2004; Ipeirotis, 2010; Snow et al., 2008; Hopkins and King, 2010; Downs et al., 2010; Chandler and Kapelner, 2010; Kapelner and Chandler, 2010). As a result, these findings should not be interpreted as providing a basis for any general claims about the utility (or lack thereof) of MTurk for reliable data collection. Indeed, incorporating additional quality control techniques on top of the effective treatment conditions reported in this study could amplify quality improvements beyond those reported here and in prior studies. Subsequent research is needed to determine the effects of interactions between the worker characteristics, motivational framing, and other interface design manipulations.

Relational Incentives and Online Cooperation

Together, the results of these experiments imply that relational motivations and incentives shape the character and quality of participation in the Mturk labor market. The findings extend previous studies documenting the effectiveness of relational incentives in other cooperative and collaborative online environments. In particular, the finding that Mturk workers respond to relational incentives matters given the extent to which the rules and norms of the MTurk marketplace favor atomistic and antisocial interactions, financial incentives, punishment-oriented consequences and arm's-length relational contracting over more personalistic or interactive modes of exchange.

Most importantly, the two experiments demonstrate how relational dynamics permeate even the most seemingly atomized or asocial online environments and therefore provide fundamental support to a wide variety of forms of decentralized, networked collaboration. These findings are significant precisely because the online crowdsourcing platform – in contrast with other sorts of (more typically studied) online collectives – presents workers with a highly atomized experience. Despite this environment, workers continue to demonstrate peer-oriented concerns and work more effectively when presented with incentives that harness this interest in and concern for the behavior of their peers. These findings therefore complement existing studies of online participation, exchange, and motivations in the context of financial, social psychological and hybrid incentives.

Chapter 3

Differential (and Deleterious) Effects of Status-based Awards in Wikipedia

Introduction

Despite the capacity of interactional selective incentives and motivations to drive participation in online collectives, they do not always produce uniform, or even positive, effects. In the previous chapter, I have shown that interactional concerns and incentives affect the quality and quantity of work performed in an online labor market (MTurk). In this chapter I consider a case in which interactional selective incentives – in particular, status-based awards – produce not only an unequal, but also negative impacts on the rates of participation among some of the most highly committed and accomplished members of one of the most successful online collectives: the English language Wikipedia.

As with the preceding experiments, the empirical evidence I present to support these claims builds from the social psychological and economic research into collective action and prosocial cooperation. This previous work on collective action and the provision of public goods has primarily focused on selective incentives as solutions to free rider problems and the “tragedy of the commons” (e.g., Axelrod, 1984; Hardin, 1968; Olson, 1965; Ostrom, 1990). More recently, literature on online forms of collective action, such as the production of free and open source software and peer-to-peer filesharing, has built on this earlier work (Benkler, 2006; Kollock, 1999; Lerner and Tirole, 2002; Weber, 2004). Willer (2009a) claims that groups can drive collective action by rewarding individual contribution to public goods with increased status or recognition, positing a sociological mechanism for the provision of public goods. In the formal elaboration of this “status theory of collective action,” Willer posits a “virtuous circle” where contributors are rewarded with status among group members and, in response, are motivated to contribute more. The theory rests on an interactional foundation insofar as it hinges on (1) “peer-to-peer” status dynamics among group members; and (2) status-based awards and

recognition explicitly communicate the opinions, judgments, and expectations of other community members.

By focusing on social recognition and status as a driver of contributions to public goods, Willer's theory extends findings from earlier studies of awards (Frey and Neckermann, 2008; Neckermann et al., 2009). One limitation of this line of research has been the prevalence of laboratory-based empirical evidence. More recently, however, Restivo and van de Rijt (2012) conducted a field experiment in which they find that status based awards cause increased contribution rates among members of the same online collective I analyze here (Restivo and van de Rijt, 2012). Taken together, these studies appear to provide a clear indication that relational incentives – and specifically Willer's "status theory" – provide an important motivational lever for building effective collective action capable of generating sustained public goods production.

Despite the potential of peer-recognition and awards to motivate prosociality, many contributions to real public goods occur anonymously or in settings where norms may prevent status-based awards. This suggests that not all individuals or groups may respond to status-based incentives equally and that Willer's theory (and those like it) may provide, at best, an incomplete account of collective action that only obtains to certain individuals under certain conditions (see also Andreoni and Petrie, 2004). Along these lines, theoretical work in economics attempts to distinguish social signaling and status from more altruistic "warm glow" as the drivers behind individual contributions to public goods. (Bénabou and Tirole, 2006).

In this paper, we present a large-scale observational test of these competing explanations of the role of status in collective action and whether, in the presence of a reputation-based award, individuals who do not signal status in the context of collective action behave differently from those who do. We analyze evidence from a real community producing a real public good using peer-to-peer awards given by Wikipedia editors to each other. Our results suggest that those Wikipedia editors who choose to display their awards publicly see no significant change in their editing behavior whereas those editors who do not display their awards actually see a decline in their contributions. This finding of a significant differential effect of a peer-to-peer, status-based award on contributions to a public good contradicts Willer's theory and extends previous laboratory and field studies of awards (Restivo and van de Rijt, 2012; Willer, 2009b). We then present preliminary evidence that a dynamic of temporary fatigue (burnout) explains the outcome among editors who display their awards publicly, whereas editors who do not display awards appear to experience temporary "crowding out" immediately after receiving the awards. We propose several explanations for the observed difference between editors who display their awards and those who do not, including differential levels of egotistical altruism (status signaling), group identification, and project commitment. We conclude by considering the implications of these findings for theories of collective action and peer production.

These findings have complex and contradictory implications for theories of collective action and, in particular, for the interactional account of online collectives I have proposed.

On the one hand, the fact that not all individuals in online collectives respond positively or equally to the same status-based award undermines the idea that interactional mechanisms alone drive public goods production. However, consistent with Benkler's (2012) theory of the "interdependence of motivational vectors," this does not mean that such incentives cannot work under appropriate institutional and organizational conditions. The fact that so many previous, experimental and field-based studies have found that status-based awards and recognition have positive effects implies that situations where awards work really do exist (Cheshire, 2007; Cheshire and Antin, 2008; Frey and Neckermann, 2008; Neckermann et al., 2009; Restivo and van de Rijt, 2012; Willer, 2009a). In addition, our results suggest that status-based awards can reinforce or sustain contributions for many individuals, such as those barnstar recipients who chose to display their awards publicly. At the same time, our findings imply that not all interactional selective incentives are created equal and that status-based awards can elicit differential as well as reduced levels of contribution among highly-committed members of an online collective. This result suggests that interactional incentives can contribute to the emergence of unequal rates of participation among members of a collective, and may help to explain the persistent findings of participation and status inequalities across online collectives (e.g. Kittur et al., 2007; Lampe et al., 2007; Viégas et al., 2007). I conclude the chapter by considering these implications.

Background

Social scientific inquiry into collective action has historically centered around the so-called "tragedy of the commons" (Hardin, 1968). According to this formulation, individuals refuse to contribute to collective goods unless provided with some rational "selective incentive" for doing so (Axelrod, 1984; Olson, 1965). Absent these incentives, the marginal cost of contribution outweighs the marginal benefit, driving individuals to free ride on the contributions and efforts of others. This is also the underlying vision proposed in "institutionalist" solutions to collective action problems (Ostrom, 1990).

Research on collective action on the Internet has built upon this foundation in a context where the "non-rival" qualities of immaterial products like software or music complicate and add new dimensions to collective action problems (Benkler, 2006; Cheshire, 2007; Kollock, 1999; Weber, 2004). Scholars have suggested that solutions to collective action problems online are a function of both the attributes of the informational goods being produced (which can assume more granular and modular forms (Benkler, 2006)) as well as properly aligned reputation-based incentives and rewards to motivate contributors (e.g. Cheshire, 2007; Kollock, 1999; Lerner and Tirole, 2002). Even though this research implies that online groups may benefit (in comparison with offline groups) from both the reduced transaction costs and the intangible character of the goods being produced, it also supports the view that the psychological mechanisms that motivate participants and sustain contributions do not vary once collective action moves online. Indeed, subsequent

laboratory studies have confirmed this position, suggesting that even though precise rates of cooperation (in social dilemmas) may vary slightly between online and offline samples, the dynamics of cooperation remain stable (e.g. Horton et al., 2010).

Our work investigates the character and differential effects of reputation-based selective incentives involved in eliciting collective action. Generally, selective incentives are presumed to possess stable effects across individuals and groups. In debates about collective action and the production of public goods, tangible incentives like money have received the bulk of scholarly attention. More recently, sociologists, behavioral economists and social psychologists have also suggested that status and peer recognition motivate contributions (Andreoni and Petrie, 2004; Kollock, 1998; Restivo and van de Rijt, 2012; Willer, 2009a). We build on this latter stream of research.

Awards as Status-based Solutions to Collective Action Problems

Among the different modes of conferring status and peer recognition, awards represent a particularly common form by which groups attempt to encourage contributions to public and private goods (Frey and Neckermann, 2008; Neckermann et al., 2009). Nevertheless, awards and their effects have attracted relatively little empirical attention (Frey and Neckermann, 2008). Part of the reason for this may be that it is not always easy to identify the precise mechanism by which awards affect behavior. As Frey and Neckermann 2008, 5-6 point out, awards can, in theory, motivate by producing a good feeling for the recipient; by conferring the positive opinion of a principal whose judgment is highly valued by an agent; by conferring prestige or status within a collective; through competition; or because of the material or immaterial benefits associated with winning the award. Nevertheless, both popular thinking and popular practice suggest that awards are intended to incentivize the kind of behavior for which they are distributed in the first place (Kohn, 1999).

In the sociological literature, Willer (2009a) has elaborated a more general “status theory of collective action.” According to this view, the conferral of awards and other forms of peer-recognition serve to elicit future contributions to the collective, resulting in a virtuous cycle:

Status and other social and material benefits are awarded to individuals for contribution to collective action to the extent that individuals successfully signal their motivation to help the group. *These status rewards in turn increase that motivation, leading to greater giving and more positive views of the group.* (Willer, 2009b, p. 24, emphasis added)

This explanation, based on Willer’s findings from a series of laboratory studies, argues that a repeating pattern of contributions and status conferral can result in sustained al-

truistic behavior.¹ More recently, a controlled field experiment conducted on Wikipedia found support for Willer's claims, demonstrating that the conferral of informal, peer-to-peer awards elicited heightened levels of contribution among encyclopedia editors (Restivo and van de Rijt, 2012).

Together these studies show that awards can help solve collective action problems and enable groups to produce public goods by conferring status upon and reinforcing desirable behavior of motivated contributors. In this way, the status theory of collective action has intuitive appeal because it resonates with the prevailing norms of public recognition that surround contributions to public goods. The recognition of high contributors is frequently very public and, in some cases, functions as a status signal visible beyond the boundaries of the particular community in question. For example, in the context of fundraising for the arts or academia, donors' frequently receive public recognition in proportion to their contributions, and the largest donors often have their name attached to a building, job title or even an entire organization. This recognition represents both an honorific expression of gratitude as well as an explicit incentive to elicit subsequent contributions.

At the same time, a status-based explanation of collective action cannot account for the possibility that some contributors in some contexts may neither seek nor desire public recognition. Within a particular collective, there may be participants who seek status through contributions and, upon receiving recognition for their efforts, use such recognition as a "costly signal" of their underlying group motivation and achievements within the community (Bénabou and Tirole, 2006; Hanaki et al., 2007; Willer, 2009b). For these individuals, Willer's virtuous cycle may obtain. However, there may also be participants who – for any number of reasons – do not respond to the conferral of public recognition and awards with increased contributions. This second group might contain individuals who are either more purely altruistic, less group motivated, less committed to the collective, or simply less concerned with receiving acknowledgement for their contributions. For some of these individuals, whose behavior is more consistent with a purely altruistic model of cooperation, contribution alone may provide its own reward. Several economic theorists have described this internal sense of gratification as a "warm glow" and argue that it may motivate prosocial behavior as status conferral among those who do not seek status or who do not wish to signal status in conjunction with unselfish behavior (e.g. Bénabou and Tirole, 2006). Research from social psychology and behavioral economics suggests that such "pure altruists" may even experience public recognition or the conferral of extrinsic status-based awards in exchange for contributions as undesirable, "crowding out" their intrinsic unselfish motivation to contribute to the collective in the first place (Deci and Ryan, 1985; Frey and Jegen, 2001). Bénabou and Tirole (2006) also suggest that the existence of those engaging in prosocial behavior in "cheap" forms of

¹To clarify, Willer proposes that this mutually reinforcing pattern forms part of a larger feedback loop that incorporates other factors such as the perceived and actual level of each individual's group motivation. We focus on only two components of Willer's theory here: status conferral and its effects on contributions to a collective good.

order to appear altruistic or good may reduce the value of prosocial behavior as a signal and decrease activity from individuals with mixed motives. Finally, these individuals may simply not hold as deep a sense of commitment to the collective or may not identify with it to the same degree as other award recipients. For these people, receiving the award may just not mean as much as it does to those who value their membership and participation in the collective more profoundly and who thus have a greater degree of group motivation (Willer, 2009a; Ridgeway, 1982).

Elsewhere, Benkler (2012) draws on experimental economics and psychology to theorize the practical effects of the fact that particular psychological foundations of prosocial action may be both interdependent and distributed unevenly throughout populations. In the context of complex institutional, legal, and social conditions, he argues, prosocial behavior may be “crowded in” just as effectively as it may be “crowded out” depending on the particular sub-populations and circumstances involved. Benkler’s (2012) position underscores that any empirical variations between individuals who signal status through awards and those who do not may be supported by a variety of social psychological, organizational, or cultural mechanisms. For example, a particular community or group may possess norms devaluing public recognition for good deeds. Likewise, some individuals or groups may experience elevated levels of group identification and commitment. In others, selection pressures could promote concern for acknowledgment and public recognition independent of individual preferences. Whatever the causes or mechanisms at work, however, the threat to the status theory of collective action should be clear: status-based recognition and awards may either not affect, or even undermine collective action among some individuals and groups.

The Everyday Dynamics of Collective Action Online

One challenge of conducting an observational field study of collective action results from the gap separating mathematical models and laboratory findings from the everyday dynamics of participation in an established peer production community like Wikipedia. An extensive sociological literature has theorized, modeled, and experimented on the dynamics of collective action (e.g. Coleman, 1973; Marwell and Oliver, 1993; Oliver, 1993), but most of this work speaks to the mechanisms through which groups overcome initial obstacles to collective action and achieve an equilibrium of ongoing contributions. In contrast, numerous studies of peer production communities have described the behavioral patterns characteristic of “actually existing” collectives or organizations engaged in the sustained production of public goods. Much of this research has revealed surprisingly stable dynamics of participation across multiple communities and multiple studies, many of which have salient implications for understanding the likely impact of status-based awards on participation.

Although a thorough juxtaposition and theorization of peer production participation dynamics in the context of sociological perspectives on collective action and group pro-

cesses lies beyond the scope of this paper, some of the most striking examples include the emergence and persistence of contributor lifecycles; selection into social roles; actively coordinated behavior; and feedback loops of attention (e.g. Bryant et al., 2005; Ciampaglia, 2011; Fisher et al., 2006; Gleave et al., 2009; Lampe et al., 2007; Ortega and Gonzalez Barahona, 2007; Panciera et al., 2009, 2010; Viégas et al., 2007; Welser et al., 2011; Wilkinson, 2008; Wu et al., 2009). The *periodicity* or *cyclicity* of participation in online communities appears to derive from a combination of biological and geographical factors (Golder and Macy, 2011) coupled with relational, group processes like social learning and burnout (Maslach and Jackson, 1981). Members of online communities not only appear to join and contribute to projects in predictable ways, but also to experience relatively similar trajectories over the course of their “career” or “life course” of contribution on a particular site (Panciera et al., 2009, 2010; Wu et al., 2009). Part of the regularity of these patterns also relates to the persistent sorting of new entrants into relatively well-defined *social roles* within each community (Gleave et al., 2009; Fisher et al., 2006; Kittur et al., 2007; Lampe and Resnick, 2004; Lampe et al., 2007; Welser et al., 2011). These processes appear to be driven partly through dynamics of self-selection, but are also the result of active *coordination*, training, recognition, and recruitment by existing members of sub-communities within the larger group (Kittur et al., 2009; Viegas et al., 2007). Heavily coordinated behavior emerges across peer production communities, providing evidence of active leadership and management as well as organic mechanisms through which community members facilitate a division of labor and attention. As in many large-scale social systems, distributions of attention are extremely unequal, reflecting the underlying effects of *feedback loops* and preferential attachment (Wilkinson, 2008; Wu et al., 2009).

Such generic processes and dynamics of participation, all of which have been documented repeatedly across a wide variety of online groups and communities engaged in collective action of various kinds, radically complicate any attempt to model the impact of status-based awards on individual behavior. Indeed, in the context of a real peer production community, we anticipate that the underlying patterns of contribution will explain most of the variation in individual activity. Nonetheless, given the robust experimental and analytical evidence that status-based awards produce positive effects on collective action, we anticipate that awards will also have some marginal benefit in the case of peer production communities, many of which incorporate some system of awards, badges, or other status-based peer recognition already (Kriplean et al., 2008; Oktay et al., 2010). Differential effects, to the extent that they exist, will likely reflect not only variations in underlying psychological dispositions, but also the influence of some of the generic group dynamics and social processes (such as role selection and life cycles of participation) discussed here.

Predicting and Testing the Effects of Status-based Awards on Collective Action

In the rest of this paper, we construct an observational test of whether awards produce consistent, positive effects in a real peer production community where individuals have the choice of whether or not to display awards publicly as “costly” status signals. We also include preliminary tests to help differentiate between several explanations of any potential variations between these status “signalers” and “non-signalers,” including whether or not the conferral of awards appears to “crowd out” motivations to contribute, or impact either short- or long-term attrition differentially across the two groups.

Consistent with the laboratory studies conducted by Willer (2009a) and Frey and Neckermann (2008), as well as the field experiment Restivo and van de Rijt (2012) performed on Wikipedia, we anticipate that the conferral of a status-based award *should* result in an short-term average increase in the number of contributions to the encyclopedia *within subjects*. It is also possible that receiving an award may drive individuals to increased contributions over a longer time-horizon, although previous research, which has examined only the short-term effects of awards, has less to say about this question. With regard to the possibility of varied motivations across sub-populations of contributors (Bénabou and Tirole, 2006) as well as the effects of motivational interdependence (Benkler, 2012), we expect to see differential effects of awards on contributions depending on whether individual subjects behave more like “status-signalers” or “non-signalers.”

Given the strong regularities of participation documented in previous studies of online collectives and peer production, we also expect that the effects of awards on individual behavior “in the wild” (if they appear at all) will be related to underlying patterns of contribution. Here, the field experiment conducted by Restivo and van de Rijt (2012) provides the most reasonable basis for estimating likely effects, since they performed their randomized, controlled study on actual Wikipedia editors who had achieved high levels of contribution comparable to previous award recipients.

The sections that follow further develop the intuitions behind these predictions by providing a more detailed introduction to Wikipedia as well as the ways in which status-based awards are conferred among Wikipedians.

Setting

The English language Wikipedia serves as the empirical setting for our study. Wikipedia is an online community of volunteers whose goal is to collaboratively produce a large encyclopedia, which is then made freely available over the Internet (Reagle, 2010). Founded in January 2001, Wikipedia has, over the last decade, become the subject of growing academic scrutiny and thousands of published studies (Okoli and Schabram, 2009). Scholars

have described it as one of the most important public goods as well as the most widely and highly cited example of the possibilities of online “peer production” (Benkler, 2006). Roughly, the sixth most-visited website in the world, approximately 400 million unique visitors come to Wikipedia each month.²

Billed as “the encyclopedia that anyone can edit,” Wikipedia is published and created using “wiki” software (Leuf and Cunningham, 2001). Wikis allow website visitors not only to read content but also to participate by adding, removing or changing text, images, or multimedia resources. In this way, Wikipedia is designed to be open to contributions from both identified and anonymous users over the Internet (it is not necessary to login or maintain an account in order to edit). The site has attracted millions of contributors – many of whom choose to remain anonymous – who have written millions of articles in hundreds of languages.³

On the English Wikipedia, over 15 million individuals have accounts and have made almost 500 million “edits” or discrete contributions to the encyclopedia.⁴ Most accounts make only a small number of edits and fewer than twenty percent of Wikipedia users with accounts make more than ten – a large article might be the product of thousands of discrete edits.

Although most readers of Wikipedia visit articles, most contributors make edits to “behind-the-scenes” portions of the site. For example, each article page (for example, the article on cats – <http://en.wikipedia.org/wiki/Cat>) has a corresponding web page for discussion – called a *talk page* – where contributors can raise questions, hash out disagreements, and coordinate work (<http://en.wikipedia.org/wiki/Talk:Cat>) (Viégas et al., 2007). Similarly, there are pages for coordinating project-wide work, categorizing articles, and for discussing policies and guidelines for contributors. Although largely invisible to the casual visitor to Wikipedia, the activity on these pages account for the large majority of edits to Wikipedia.

Each Wikipedia contributor has a publicly visible record of contributions as well as the ability to create a publicly accessible homepage called a *user page*. Every user page is automatically linked to from many behind-the-scenes areas of Wikipedia, including lists of recent contributions and discussion pages where the contributor has made an edit. By the norms developed across wiki communities, user pages serve as a public-facing identity for each contributor, and are generally created and maintained by the “owner” of the page alone. Although users vary in the degree to which they update their pages, updates for regular contributors and active community members tend to be frequent.

²Visitor data from Google AdPlanner (<http://google.com/adplanner>) and Ranking data from Alexa <http://alexa.com> (both sites Accessed October 21, 2011).

³In the terms used by Wikipedia participants (“Wikipedians”) and the Wikimedia Foundation, which maintains much of the formal organizational, technical and financial infrastructure of the site, each separate encyclopedia is thought of as its own Wikipedia. In turn, the different Wikipedias constitute part of the wider “family” of Wikimedia sites that includes other collaboratively edited online resources such as a dictionary (Wiktionary) and more (See <http://www.wikimedia.org> for more).

⁴Data from <http://en.wikipedia.org/wiki/Special:Statistics> (accessed October 25, 2011).



Figure 3-1: A picture of the “original barnstar” given on Wikipedia.

In addition to a user page, each Wikipedia editor also has a personal page for receiving messages from other users on Wikipedia – referred to as a *user talk page*.⁵ User talk pages act as inboxes or as a personal discussion forum. Unlike the topic-focused “talk pages” associated with each article, *user talk pages* provide a venue for direct person-to-person communication. Like all other pages on Wikipedia, *user talk pages* are publically viewable and editable. By well-established convention, messages are listed chronologically and are never edited nor removed, although older messages can be “archived” where they are moved to less visible – but still public – pages.

Barnstars: Peer-to-Peer Awards on Wikipedia

As part of the general foment of behind-the-scene activity, many Wikipedians engage in the distribution of “barnstars” – awards which aim to recognize and reward good work.⁶ Each award consists of a small images of a decorative iron star as can be seen in Figure 3-1. Barnstars can be given by any contributor to Wikipedia to any other. They can be given at any time and for any reason and there are no technical restrictions on barnstar giving or receipt. Indeed, research in computer science on barnstars suggests the awards have been used by Wikipedians to recognize a wide variety of contributions (Kriplean et al., 2008).

To give a barnstar, a Wikipedia contributor sends a message to another user by editing the that person’s *user talk page*. This message will contain a picture of the barnstar and, by convention, an explanation or justification for the award. An example of a barnstar, as it is given, appears in Figure 3-2. In this case, the Wikipedia editor *The Great Llama* has given a barnstar to Wikipedia founder Jimmy “Jimbo” Wales for “founding Wikipedia” and other contributions. These messages are placed on the recipient’s *user talk page*,

⁵Even anonymous users who do not create accounts have persistent user and user talk pages which are automatically linked to their contribution history through their numerical Internet address or IP.

⁶A history and many details on barnstars can be found on the Wikipedia page on the topic: <https://secure.wikimedia.org/wikipedia/en/wiki/Wikipedia:Barnstars>



Figure 3-2: Example of a barnstar that has been given to Wikipedia founder Jimmy Wales.



Figure 3-3: A screen shot of Wikipedia founder Jimmy “Jimbo” Wales’ *user page* on Wikipedia. Wales advertises his receipt of barnstars from his user page and links to a page that contains a complete list of his awards.

ensuring that the user will be notified with a message at the top of their screen that they have new messages and which makes it very likely that the recipient will see the award. Placed on the talk page, the award remains visible other Wikipedia contributors, but – as the traffic on active user talk pages will quickly bury it under subsequent messages – much less likely to be seen.

Several characteristics of Barnstars make them uniquely suitable for the purpose of our analysis. Barnstars are neither all alike nor are they the only kind of awards within the Wikipedia community. Other Wikipedia awards, however, lack the peer-to-peer element of barnstars and tend to recognize pre-defined achievements (e.g. a contributor who has made many edits or maintained an active account for a certain number of years earns the right to display a “service medal”). In Wikipedia, Barnstars represent a form of “pure” social award insofar as their receipt cannot be anticipated or expected and in that they are not limited exclusively to a particular committee or sub-community within the site. These qualities also make barnstars an effective instrument for analyzing the effects of awards on editor behavior.

One important practice around giving and receiving barnstars allows us to identify a behavioral measure of whether Wikipedia contributors who receive them choose to utilize them as status signals or not. As mentioned above, both social norms and written discus-

sion of barnstars require that the awards be distributed via user talk pages. However, after receiving a barnstar, many users choose to take an additional step of copying the barnstar message from their user talk page to their more visible user page. The barnstars that have been “moved” are often displayed prominently at the top of user pages. Analogous to the creation of trophy cases, some users who receive multiple awards even go so far as to create separate pages, hyper-linked from their user page, to showcase the full collection of their barnstars.

Returning to our previous example, Wikipedia co-founder Jimmy Wales listed the barnstar in Figure 3-2 on one such page which he has linked to prominently from the top of his personal user page. As shown in Figure 3-3, Wales includes a picture of his barnstar on his page along with text that explains that it is “one of Jimbo’s many barnstars.”

Publicly displaying barnstars on one’s user page is a common and socially accepted practice on Wikipedia, but it is neither automatic nor obligatory. Each user must make a decision to display a barnstar by manually copying and pasting each barnstar from their user talk page “inbox” onto their public-facing user page. Although many active users display their barnstars, a large number do not and there is no strong norm on Wikipedia reinforcing either the moving, or non-moving, of barnstars onto the user page.

Indeed, we have found the proportion of Barnstar recipients who choose to display their awards is just over half of all barnstar recipients. We exploit the parity of these “mover” and “non-mover” sub-populations in order to identify and compare users who utilize their awards as status signals (by moving and displaying their barnstars) versus those who, for whatever the reason, choose not to do so.

The following sections provide additional information about our data set, data collection methods and the methods of analysis. Before discussing the data, however, it is important to clarify that this behavioral measure of “status signaling” cannot disentangle the many possible motives behind the decision to move a barnstar or not. Barnstar recipients who display their awards publicly may not actually intend to signal status within the community of Wikipedia editors, but may simply feel stronger group identification or be responding to some perceived external pressure to behave like other barnstar recipients (e.g., a famous Wikipedian like Jimbo Wales). They may also be responding to subtle institutional norms that operate within sub-communities of editors we cannot observe or identify with our analysis. Likewise, the fact that some individuals may, in fact, display the awards in order to signal status could be driven either by a desire to enhance their standing within the community (“group-signaling”) or by a desire to manage self-affect (“self-signaling”) (Bénabou and Tirole, 2006). Such distinctions are critical for understanding and modeling prosocial behavior and collective action more precisely, but do not undermine the utility or importance of comparing barnstar movers and non-movers as a means of testing the validity of the status theory of collective action and the related experimental findings that appear to support it.

Data

Our dataset consists of all revisions to English language Wikipedia between 2001 and 2009, published as a raw, full-text “database dump” by the Wikimedia Foundation.⁷ The full-text dump of the English Wikipedia include 5.6 terrabytes of data broken up into 460 million discrete contributions or “edits.”

Variable	Measure
<i>Dependent</i>	
EDITWEEK	Count of number of discrete contributions in a week
<i>Question Predictors</i>	
BARNSTAR	Dummy for receipt of first barnstar.
MOVER	Dummy if editor ever displays a barnstar publicly.
<i>Controls</i>	
Lagged EDITWEEK	Log edits from the previous week ($t - 1$).
Cumulative EDITS	Log cumulative edits over the lifetime of the editor.
WEEK	Number of weeks since first barnstar receipt.
AGE	Number of weeks since editor created their account.

Using the full text of every edit to every page by every contributor to Wikipedia, we build edit histories for every editor in Wikipedia. For each user, we tabulate edits to create an edit total for each week after the editor makes their first edit (EDITWEEK). Of course edits can vary in size – one edit might add a full article while an other might delete a comma – edit count is a common measure of contribution to Wikipedia among social scientists (e.g. Zhang and Zhu, 2010) and is used by Wikipedians to determine levels of contribution necessary for enfranchisement in Wikipedia projects including election of board members of the Wikimedia Foundation – the non-profit organization that supports the project.⁸ Other research has shown that “edit counts” are an excellent predictor of whether users will be granted lateral authority within the project through instatement as an “admininstrator” or “bureaucrat” in the project (Burke and Kraut, 2008).

Because barnstars are given on user talk page and then moved to user pages, we use custom software to search through the history of these pages in Wikipedia to identify each barnstar. First, we identified, by hand, the unique textual signre of each barnstar given on Wikipedia and created a list of patterns which match every barnstar while avoiding false positives. Second, we compared each revision of each page to its previous revision to determine if a given revision added text that matched the pattern of barnstar.

⁷Downloads for a large variety of historical and current dumps from the Wikimedia Foundation of English Wikipedia are available online freely for research use at <http://downloads.wikimedia.org>.

⁸https://meta.wikimedia.org/wiki/Board_elections/2011/en

When we identified a barnstar, we also looked for a similar pattern in a subsequent edit to the barnstar recipient’s talk page through an edit made by the recipient. If a user received a barnstar and subsequently made an edit to their talk page that added the barnstar, we identify the user in question as having “moved” their barnstar. As discussed above, We treat an individual’s decision to display a barnstars on his or her user page as an indication that the recipient is publicly signaling status to other Wikipedians. Because we believe that first awards will have a larger effects, because subsequent awards may reflect a “piling on” or copy-cat behavior, and to simplify analysis, we presents results of first-time reciept of barnstars only.

	Movers	Non-movers
Age (weeks)	178.63	183.89
Weeks before first Barnstar	62.34	78.2
Cumulative Edits	2446	2010
Edits in 5 weeks before barnstar	79.98	49.74
Edits in 5 weeks after barnstar	83	45.01
Difference 5 weeks before/after barnstar	3.02	-4.74

Table 3.1: Descriptive statistics showing differences between users who moved, and did not move their barnstars. ($n = 6,027$)

Our software identified 7,790 barnstars distributed on Wikipedia before January 2010 to 6,027 unique recipients. Barnstar recipients made a median of 2,269 edits to Wikipedia and had participated in the project for just over one year weeks before reciept of their first barnstar. In this, Barnstar recipients represent some of the most active editors on Wikipedia; only 0.05% of registered editors have made more than 1,000 edits.

The edit histories of barnstar recipients reveal several patterns characteristic of the life-cycle dynamics found in previous research as well as a dimension of peer-to-peer awards unreported in earlier studies. First, we observe that that barnstar recipients tend, on average, to demonstrate an initial period of escalation, during which they contribute at an increasing rate. This is followed by a peak and decay, with substantial variation emerging both in the timing and rate of decline. Secondly, these highly-committed Wikipedians contribute in a pattern resembling waves – while they maintain relatively high edit counts throughout their “career” contributing to Wikipedia, the rate of edits per week tends to oscillate semi-regularly, producing repeating series of local peaks and valleys. Most important and surprising, we see that first barnstars are, on average, conferred almost exactly at local maxima of editing, coinciding almost perfectly with the aforementioned peaks.

This tendency of barnstar recipients to get their barnstars at local maxima of contribution suggests one important way in which the behavior of Wikipedians giving and receiving awards “in the wild” varies radically from the conditions of the Restivo and van de Rijt (2012) field experiment we reviewed earlier. In that study, barnstars were distributed at a relatively insignificant (and identical) point in time to editors selected to participate in the

study and then randomly assigned to receive the award. Presumably, these editors were not all at local maxima in their contribution history, reflecting the fact that the conferral of the award had no relationship to their behavior at that particular moment. In this way, the conditions of the field experiment contrasted sharply with the natural, extraordinary circumstances under which awards tend to be given and received.⁹ These tendencies towards cyclical editing and award conferral around local maxima of contribution have several implications for our analysis, which we discuss below.

Table 3.1 reports descriptive statistics for groups of movers and non-movers separately. On average, both movers and non-movers are extremely active contributors to Wikipedia with more than 2,000 edits, have participated in the site for a bit more than year, and are making more than 10 edits per week in the 5 week period leading up to the receipt of their first barnstar. Even before receipt, there is evidence that movers are different from non-movers. On average, they have made 20% more edits, participated for several months less, and have been somewhat more active in the periods around receipt of their first barnstar. The final row of Table 3.1 provides the clearest foreshadowing of our results and shows that while movers edited 3 edits more, on average, in the 5 week period after their receipt of a barnstar, non-movers edit nearly 5 edits less.

Methods

In order to test for the presence of differential effects of awards on the behavior of barnstar movers and non-movers, we model the impact of barnstar receipt on editing rates in a window of time around Wikipedians' receipt of a first barnstar.¹⁰ Our dependent variable is a count of edits per week (EDITWEEK). To aid interpretation, EDITWEEK is centered on each users receipt of their first barnstar (0 = the week in which the first barnstar occurred). Our key predictors are two dummy variables indicating whether the editor in question has received a barnstar (BARNSTAR), whether the user subsequently moved their barnstar (MOVER). The interaction between those dummies models the difference in the average effects of barnstars between movers and non-movers. We use an interrupted time-series model to examine edits over a window of plus-or-minus 5 weeks from users' receipt of their first barnstar.¹¹

To ensure that all barnstar recipients in our data set know that they have received their barnstar, we limit our sample to individuals who have made at least one edit to their

⁹However, given that the findings reported by Restivo and van de Rijt (2012) was consistent with the predictions of Willer (2009a) and that the design of Willer's studies manipulated the possible relationships between the extent of subjects' contribution, group motivation, and recognition, we do not feel that this design constraint provides an adequate basis to discount any of the results.

¹⁰We focus on the effects of first barnstars, but also control for the total number of barnstars each editor has received.

¹¹We have also found very similar results with a 10 and 20 week bandwidth.

own *user talk page* after the receipt of their barnstar. To ensure that we are also only considering users who have opportunities to display their barnstar (but choose not to do so), we also limit our sample to users who have made at least one edit to their *user page* after receiving their first award.¹²

We use zero-inflated negative binomial regression to model our data in part because it provides a preliminary test of whether or not barnstars are associated with elevated rates of “burn out” among movers and non-movers, and in part because our outcome is an overdispersed count with many zeros. Since our dependent variable is a count, Poisson count models would provide an appropriate starting point for analysis; however, EDITWEEK contains many zeros (weeks in which individual editors make no edits to the encyclopedia). This overdispersion violates Poisson regression’s assumption that the dependent variable have equal mean and variance, making negative binomial regression – which relaxes these assumptions – a more appropriate analytic strategy.

Of substantive concern is that many of the zero values of EDITWEEK are the result of individuals leaving the project and either “burning out” or having their motivations to contribute “crowded out” by the conferral of an extrinsic award (Bénabou and Tirole, 2006; Benkler, 2012). In either case, this dynamic of burning out or crowding out would constitute a qualitatively distinct process from the one that is leading other individuals to contribute more or less (but still more than zero) edits following the receipt of their first barnstar. This concern provides a conceptual justification for using zero-inflated negative binomial regression, which models these two processes separately: first, fitting a logistic regression which estimate whether individuals will edit at all, and second, fitting a negative binomial count model to estimate the extent to which individuals who edit will do so.

Ex ante differences between movers and non-movers shown in Table 3.1 provide reason for concern that unobserved factors that lead to a decision to move also lead to different behavior afterward. Although, we cannot completely eliminate the possibility of this type of endogeneity, and while a perfect set of controls are impossible in the largely anonymous context of Wikipedia, we have included a series of powerful covariates to attempt to address these concerns.

First, in order to model life-cycle effects (e.g., users may edit at a high rate as they first become involved in Wikipedia and then decrease as they move onto other projects or burn out) we include a quadratic specification of a time-varying measure of age, in weeks, of each user’s account in Wikipedia (AGE).¹³ Additionally, we include a time-varying measure of the cumulative number of edits that each user has made in all previous weeks of editing.

Of course, users have complicated life-cycles and often edit in punctuated bursts over long periods of time. By limiting our analysis to a short window of over a month on

¹²Our results are robust to the inclusion of these individuals.

¹³Higher order specifications did not significantly improve the fit of the models.

either side of barnstar receipt, we avoid the effect of such patterns. Additionally, we take advantage of the fact that users' editing activity in any given week is strongly predicted by the number of edits they have made in the immediately preceding week by including a version of EDITWEEK which is lagged by one week.¹⁴

Another important concern is collinearity from repeated measures of a single user's editing activity. Some editors simply edit more, on average, than others and therefore introduce the risk that this may lead to correlated standard errors and biased estimates. In response, we fit random-intercept models that use an error covariance structure that takes into account clustering of edits within-users. Both the estimates and the standard hypotheses are essentially unchanged in these models, so we report the simpler fixed effects models above. Hurdle, non-zero-inflated negative binomial models, and log-linear models also provide similar estimates, suggesting that our results do not depend strongly on the specification of the model.

Results

We present the results of models with and without the measure of lagged edits. Model 1.1 in Table 3.2 presents the results of our first model and *does not* include lagged edits. We also use this model to generate a plot of prototypical edits-per-week for signalers and non-signalers over the time window in Figure 3-4. In the model results, we see an overall pattern of differential editing between signalers and non-signalers, with the contribution rate for both sub-populations peaking in the same week as first barnstar receipt. Throughout the window of analysis, signalers tend to contribute at a slightly higher weekly rate than non-signalers, with the significant difference between the two groups captured in the "Mover" variable and visualized as the persistent gap between the blue and red lines in the prototypical editor plot. We also find significant associations between the outcome – edits per week – and several of the other editor-level covariates: logged cumulative edits, week (time from first barnstar receipt – linear and quadratic terms), and account age (linear and quadratic terms). Most importantly, among the key variables discussed earlier, we see a significant discontinuity in edits per week at the time of barnstar receipt for signalers, but not for non-signalers (the model results show the slight discontinuity in the plot to be insignificant).

Table 3.2 also presents the results of the second model (2.1), which *does* take lagged edits into account. As with model 1.1, we use the results of model 2.1 to generate a plot of prototypical edits for week for both sub-populations and display this information in

¹⁴This association between edits and lagged edits turns out to be so strong that we are investigating whether it would be appropriate to use some additional technique to account for autocorrelation structures in the data (such as ARIMA models). At the moment, the difficulty with this approach is that it is unclear to us whether (1) the multilevel model for change does not account for autocorrelation issues already; or (2) our data meets the assumption of "stationarity" required by ARIMA.

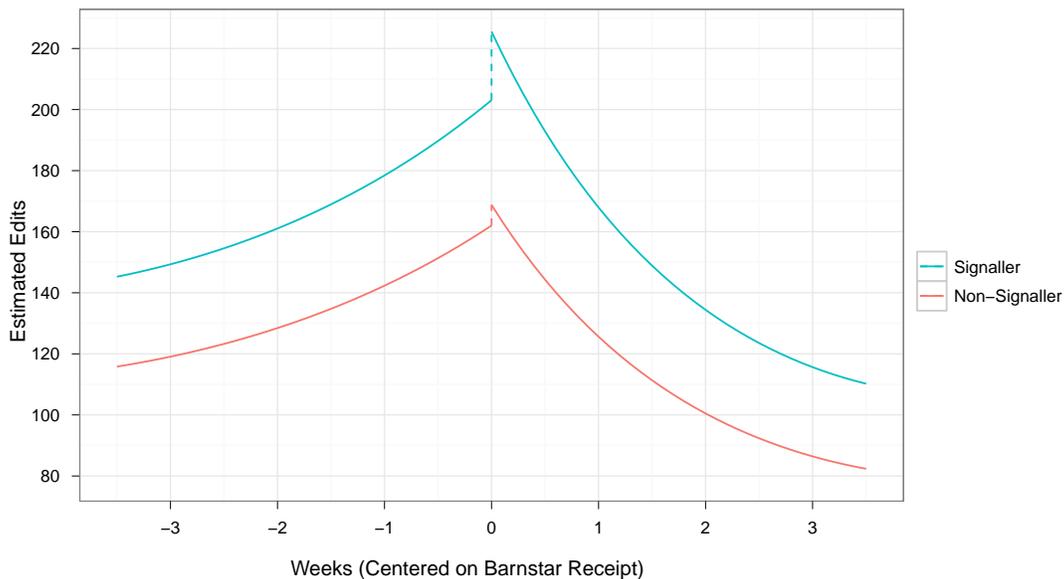


Figure 3-4: Prototypical plot of estimates from Model 1.1, which does not include lag edits, as shown in Table 3.2. Account age, cumulative edits, and lagged edits are each held at their mean. The discontinuity for non-signalers is not statistically significant.

Figure 3-5. We once again observe a pattern of differential editing by signalers and non-signalers with a peak of editing behavior at the week of first barnstar receipt and signalers contributing at a higher rate throughout the window of analysis. The introduction of the lagged edits variable reveals that an editor’s number of edits in a given week tend to be very strongly associated with their edits in the previous week.

The results for the covariates carried over from the first model prove robust, with editor account age and weeks from first barnstar receipt again associated with edits per week. The biggest difference between model 1.1 and model 2.1 emerges around the key variables – the relationship between the week of Barnstar receipt for non-signalers (“Barnstar”) and signalers (“Barnstar x Mover”). The addition of the lagged variable appears to flip the sign of the coefficient, however closer inspection reveals that the underlying relationships between the variables are almost identical. Barnstar receipt for *non-signalers* has a significant negative association with edits, whereas it has only a weak, negative association for *signalers*. For prototypical median contributors, a signaler’s edit rate immediately following the receipt of a first barnstar will decrease by approximately 4–5 edits per week (or 3–4% less) than a non-signaler’s edit rate.

Model 2.2 represents the second, logistic portion of the Zero-inflated negative binomial model and examines the probability of editor persistence around the time of first barnstar receipt (with lagged edits included). The results of the model appear in Table 3.2. As with the previous models, we find persistent differential editing patterns across the population

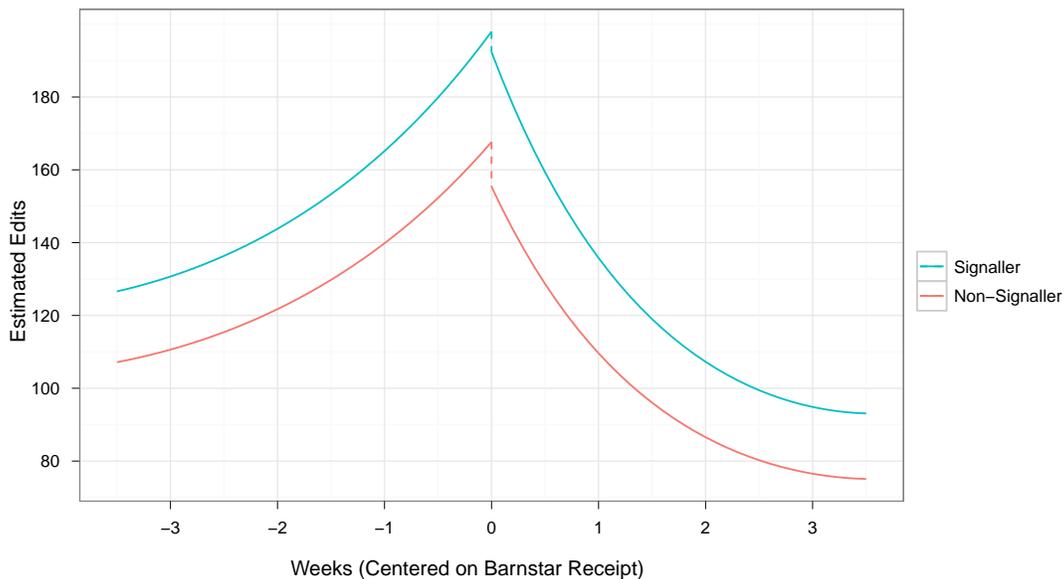


Figure 3-5: Prototypical plot of estimates from Model 2.1, which includes lagged edits, as shown in Table 3.2. Account age, cumulative edits, and lagged edits are each held at their mean. The discontinuity for signalers is not statistically significant.

of signalers and non-signalers, with signalers being slightly less likely to cease editing at any point in the window of analysis. Here, however, we find no significant differential effect of first barnstar receipt. In other words, while both sub-groups appear to have an increased likelihood of ceasing to edit in the weeks following the reception of their first barnstar, the pre- and post-Barnstar differences for each group are roughly the same.

Discussion

The results of our models indicate several key findings. First, as mentioned above, these analyses demonstrate that barnstars occur at local peaks in editing behavior for both signalers and non-signalers. This suggests an important distinction between awards conferred within collectives or organizations “in the wild” versus those distributed in most laboratory environments: the behavior that attracts the award may be part of a pattern and that pattern may be intensive, short-lived, or otherwise subject to burn-out in a way that no amount of public recognition can completely overcome. All barnstar recipients experience at least a short term decline in contributions during the weeks immediately following the receipt of their first barnstar such that four weeks after the barnstar they make fewer edits per week than they did four weeks prior to the barnstar. We discuss the implications of this aspect of barnstars further below.

Second, we find support for a differential response to awards among those barnstar recipients who display their barnstars publicly and those who do not. Both of the models estimating EDITWEEKS show that signalers see a smaller decrease in their contributions immediately after receiving a first barnstar than non-signalers. As discussed in the results from model 2, the edit rate of a prototypical median signaler will decrease by 4-5 edits/per week (3-4%) less than that of a prototypical median non-signaler.

Third, the probability of ceasing to edit in a given week ($P[\text{Edits}=0]$) is consistent across signalers and non-signalers. This supports the idea that receiving a first barnstar is not associated with differential patterns of burnout among signalers and non-signalers. In addition, because the logistic component of the models reveal that a distinct dynamic obtains for the probability of ceasing to edit in comparison with the predicted number of edits for those who continue to edit at all, these results lend post-hoc support to our decision to model predicted edits and persistence as distinct processes through the zero-inflated negative binomial technique. It also suggests that even though signalers and non-signalers differ in some ways, these differences do not persist in all areas of their behavior. As a result, we believe this reinforces both the importance as well as the credibility of the differential behaviors we do observe in the case of predicted edits following first barnstar receipt.

Limitations/Threats

Several potential threats to the validity of our findings merit discussion and further investigation. First, an obvious limitation to our analysis derives from the constraints of our strategy from identifying the differences between signalers and non-signalers. Any editor may be less likely to move a barnstar to their user page if they do not actively maintain a user page before they receive their award. As a result, less active non-signalers may be even less likely to signal than other non-signalers who do maintain a user page, whether or not they are aware of receiving the barnstar in the first place. Although we mitigate this threat by only including editors who edit their user pages at least once after receiving their first barnstars, this does not completely eliminate the underlying concern.

The second, related threat concerns our decision to identify the difference between signalers and non-signalers through their decision to move or not move their barnstars. Again, we attempt to minimize the likelihood that any of the editors in our sample were unaware of the award by restricting our sample to users who have made edits to both their user and talk page and find identical results. In addition, we use controls for cumulative and lagged edits to account for the underlying variation in editor activity, thereby minimizing the likelihood that variations in activity level alone drive any of our results. Nevertheless, these analytic procedures do not overcome the constraints of our identification strategy completely. As we have discussed above, the decision to move a barnstar to a user page may mean different things to different editors and, as a result, any observed variations across the sub-populations of movers and non-movers may capture the effects

of distinct “motivational vectors” (Benkler, 2012), such as group motivation and identification, commitment level, social desirability pressures, or the influence of tacit norms.

Perhaps the most important threat to the validity of our results has to do with the possibility that the difference between signalers and non-signalers exceeds their attitudes to social awards and encompasses some other, unobserved source of variation in their behavior. For example, signalers and non-signalers may tend to engage in different styles of editing (e.g., anti-vandalism) that correspond to different editing patterns. These patterns or tendencies – rather than the individuals’ responses to receiving a barnstar – might drive the differential outcomes we observe in our models.

Conclusions

On the basis of these results, we conclude that awards do not elicit increased contributions to public goods and collective action in the context of Wikipedia, even among highly committed individuals. In addition, the post-barnstar differences in editing behavior we observe between status-signalers and non-signalers indicates that peer-based awards, while perhaps effective in eliciting contributions to public goods for certain individuals under certain conditions, prove ineffectual and even counterproductive in others. This study also speaks to the importance of complementing field and laboratory experiments with observational studies.

Perhaps most striking, we find no evidence that the awards overcame very active Wikipedia editors’ underlying tendency towards reduced numbers of contributions in the weeks immediately following the receipt of their first barnstar. As suggested earlier, this finding of a strong periodicity or “lifecycle” pattern in contributions to a public good speaks to the power of generic participation dynamics and group processes within specific organizational environments. In part, we suspect that this has to do with the institutionalized characteristics of barnstars: since these awards tend to be given in close proximity to local maxima of contributions, it seems probable that they are used to recognize some already-completed project, and that award recipients therefore feel compelled to regress to a more modest rate of participation following their achievement.

The fact that our findings so sharply contradict previous laboratory and field studies of status-based awards requires additional explanation from both substantive and theoretical points of view. While neither signalers nor non-signalers appear any more or less likely to cease editing altogether after they receive their first barnstars, the overall decline in contributions that follows first barnstar receipt among both groups appears robust on the basis of our analysis. These findings partially undermine Willer’s status theory of collective action for status signalers and reject it completely in the case of non-signalers. We offer distinct explanations in each case. For signalers, our data demonstrate that, given an underlying pattern of editing behavior in which barnstars are received at local maxima of contribution, these awards do not elicit a significant change in participation.

Among these individuals, who already contributed at slightly higher rates than their non-signaler peers prior to receiving their awards, the barnstar does not effect their underlying tendency to drop-off in subsequent weeks.

Contrastingly, the evidence of a discontinuous, significant decline in contributions immediately following barnstar receipt among non-signalers suggests the presence of crowding out. Though we are unable to provide conclusive evidence of crowding out (or to identify a particular causal mechanism driving such behavior), we believe that the observed decline in post-barnstar contributions by the non-signalers in our study lends preliminary support to the idea that status-based awards can actually prove detrimental to cooperation. The fact that non-signalers do not display their barnstars publicly also suggests that their post-barnstar behavior could be related to distinct patterns of group motivation in comparison with their peers.

These outcomes prove consistent with theories emphasizing distinct and multidimensional motivational vectors behind prosocial behavior (e.g. Bénabou and Tirole, 2006; Benkler, 2012). The significant differential effects we observe in the case of barnstars on Wikipedia undermines the idea that a single behavioral or psychological model can adequately encompass all collective action participants. This finding supports the idea that motivations are “non-separable” to the extent that differential sub-population effects and particular organizational or institutional environments may heighten or mitigate the impact of particular interventions intended to promote prosocial cooperation.

Future Work

Future research should address the concerns and limitations of this study. The variation we observe between movers and non-movers may be more precisely accounted for through the collection of additional observational data (attitudinal, demographic, etc.) about the population of barnstar recipients. It may also be possible to replicate this result in a laboratory environment or a field experiment, where additional procedures could enhance the internal validity of the measures.

In the short term, we aim to incorporate additional measures and covariates that will enhance the sensitivity of the tests reported here. For example, Willer’s theory would predict that barnstar recipients who get awards from high status editors would edit even more. We plan to develop several measures of status – some based on formal positions of authority in the community and others based on more latent (e.g. network), behavioral measures of status – in order to test this theory across the two sub-populations identified in the current design (signalers/non-signalers).

Secondly, we also believe that barnstar effects may not be captured effectively in the *quantity* of edits alone, but may alter the types of work that editors engage in after they receive their awards. In this regard, not all kinds of editing work are created equal, and it may be

possible that editors who receive barnstars subsequently gravitate towards more or less time-consuming, difficult, or controversial work depending on what sort of behavior has been rewarded through the award.

Third, we also plan to incorporate analysis of multiple barnstars into our models. We predict decreasing returns to multiple barnstars and differential effects across signalers & non-signalers among those who receive multiple awards.

Finally, we plan to perform a survival analysis to model signaler and non-signaler longevity. Here, we predict that signalers will be likely to continue to edit longer, but perhaps not differently than their non-signaler peers.

Implications for an Interactional Explanation of Online Collective Action

Further research will be necessary to explore whether and to what extent these responses to status-based awards may occur in other kinds of online collectives. At the same time, Wikipedia represents one of the foremost examples of successful public goods production on the Internet and there is no obvious reason to believe that similar dynamics of crowding and burning out in response to recognition and awards *could not* apply to participants in other, less successful online collectives engaged in similar activities.

As alluded to in the introduction, the results of this study undermine any simple account of the effects of interactional incentives and mechanisms of online collectives. While this study cannot empirically differentiate between psychological and institutional levels of analysis (i.e. I do not know whether something about the dispositions of Wikipedians or something about the norms of Wikipedia accounts for the results described above), the fact that barnstars appear to elicit differential, and sometimes negative responses among highly committed Wikipedia editors illustrates how social psychological selective incentives (such as status-based recognition and awards) interact with both interdependent motivational vectors, institutional norms, and selection pressures within a particular group or organizational environment. The outcomes observed here – including reduced contributions among some barnstar recipients – also suggest that the same interactional mechanisms that drive participation and public goods production among some community members, simultaneously de-motivate others and contribute to the emergence of intra-group inequalities of participation.

If interactional incentives and awards do not produce stable effects, it becomes that much more critical to understand the processes through which institutional orders emerge and are reproduced or contested within different online collectives. This study of awards on Wikipedia has not addressed this topic explicitly, but it does suggest that interactional analysis could provide a promising avenue for investigation along these lines. Since the

differential effects of interactional mechanisms appear to contribute to participation inequalities, it may be the case that practices such as peer-to-peer recognition, discursive interactions, norm enforcement or contestation also contribute to the formation of institutional orders through which particular kinds of activities or individuals may acquire elevated positions relative to the community as a whole.

In the next chapter, I consider this question of the interactional foundations of participation and status inequalities within online collectives in greater depth through an analysis of the political blog Daily Kos. Even though Daily Kos is a very different kind of community than either Wikipedia or Mechanical Turk, many of the same questions and interaction dynamics obtain. As a result of the political and contentious character of the community activities, the site provides a useful opportunity to observe how relational dynamics and interactions shape not only the factors that determine who contributes, but also the relative rates of participation and status dynamics that stabilize throughout online collectives over time.

	1.1 Edits		2.1 Edits		2.2 P[Edits=0]	
	Estimate	<i>t</i>	Estimate	<i>t</i>	Estimate	<i>t</i>
Intercept	0.48 (0.04)	11.53	1.13 (0.04)	30.07	-0.42 (0.18)	-2.36
EDITWEEK	0.14 (0.03)	5.74	0.20 (0.02)	9.12	-0.59 (0.12)	-5.15
EDITWEEK ²	0.01 (0.00)	3.29	0.02 (0.00)	5.87	-0.07 (0.02)	-4.04
BARNSTAR	0.04 (0.04)	1.13	-0.08 (0.03)	-2.34	0.48 (0.18)	2.63
MOVER	0.23 (0.01)	16.27	0.17 (0.01)	13.41	-0.30 (0.06)	-4.90
ln EDITS (Cum.)	0.67 (0.00)	179.07	0.38 (0.00)	91.74	-0.07 (0.01)	-5.16
ln EDITS (Lagged)			0.35 (0.00)	113.25	-1.16 (0.02)	-61.08
AGE	-0.01 (0.00)	-53.91	-0.01 (0.00)	-36.30	-0.00 (0.00)	-1.74
AGE ²	0.00 (0.00)	30.70	0.00 (0.00)	20.02	0.00 (0.00)	1.94
WEEK × BARNSTAR	-0.47 (0.03)	-16.95	-0.60 (0.03)	-24.34	1.16 (0.13)	8.79
WEEK ² × BARNSTAR	0.02 (0.01)	4.76	0.04 (0.00)	8.20	-0.01 (0.02)	-0.24
BARNSTAR × MOVER	0.06 (0.02)	3.46	0.05 (0.02)	2.86	0.10 (0.09)	1.22

Table 3.2: Zero-inflated negative binomial regression models on a count of edits per week. Models 1.1 and 2.1 are negative binomial count models. Model 2.2 reports the results from the simultaneously estimated logistic regression and the dependent variable is the probability that a user will make at least one edit in the given week.

Chapter 4

From Incentives to Institutions and Interactional Analysis

Recapitulation:

From Incentives to Institutionalized Interactions

The preceding studies offer a counterpoint on the role of relational motivations and incentives in online collectives. Chapter 2 demonstrated that even in highly atomized online collectives like Mturk, relational concerns and social psychological incentives help explain worker motivation and provide effective means of improving worker performance. Chapter 3 then explored the limits of relational selective incentives in Wikipedia, demonstrating that status-based awards can fail to produce effects or even generate negative outcomes depending on characteristics of the environment and the award recipients.

Overall, these two chapters show that relational concerns and incentives impact participation dynamics in online collectives, but that individual characteristics as well as institutionalized practices can mediate this impact. Systematic variations along socioeconomic, cultural, and structural lines persist (as in the case of Mechanical Turk workers), in addition to variations that may reflect underlying attitudinal differences (such as the propensity to signal social status by displaying a barnstar) in combination with group-oriented motivation or norms.

As a result, even though a relational analysis can explain a great deal of the variation in participation in online collectives, the extent to which relational mechanisms determine individual and group-level participation depends on an interplay of institutional and structural factors. The case of barnstars on Wikipedia makes it particularly clear that institutionalized practices and routines (such as lifecycles of editing) can overwhelm the expected effects of social psychological incentives which had previously proven effective

in laboratory and even field experiments. But this finding raises more questions than it answers: how do institutionalized patterns of interaction and practices arise within online collectives? How are these patterns reproduced? What factors determine the emergence and persistence of institutionalized practices?

As I discussed in Chapters 1 and 3, previous research has addressed some related questions about the emergence and reproduction of institutionalized practices in the context of online collectives. In particular, studies of the rise of a bureaucratic elite and the negotiation of norms of collaboration in Wikipedia provide insights into how institutionalized governance and patterns of participation have arisen and evolved over the course of the encyclopedia's history (Bryant et al., 2005; Kittur et al., 2007; Reagle, 2010; Welser et al., 2011). Several studies of governance and leadership in the context of free and open source software projects have also illustrated the importance of practical norms and routinized interactions among community members (O'Mahony and Ferraro, 2007). Additional research has described the emergence and persistence of stable patterns of participation in online collectives underscore how generic group processes can cohere into institutionalized social structures (e.g. Bryant et al., 2005; Fisher et al., 2006; Gleave et al., 2009; Lampe et al., 2007; Ortega and Gonzalez Barahona, 2007; Panciera et al., 2009, 2010; Viégas et al., 2007; Welser et al., 2011; Wilkinson, 2008; Wu et al., 2009).

Together these studies speak to the question of why, for example, barnstars “in the wild” don't seem to work as the existing research on relational, social psychological incentives and status-based awards (e.g. Restivo and van de Rijt, 2012; Willer, 2009a) predicts they would. The key is that relational incentives do not operate in a social vacuum. Rather, a complex of contextual factors – such as cultural and socioeconomic variations as well as institutionalized roles, routines, norms, and governance procedures – structure the processes of social reproduction within online collectives, resulting in conditions within which individuals, sub-populations, and even entire groups may or may not respond to particular sets of incentives and motivations. Furthermore, the non-random way in which awards are distributed in a community like Wikipedia can reinforce the impact of these factors, resulting in behavior that deviates substantially from the predictions derived by even a carefully designed and well-executed field-experiment.

In Part II of this dissertation, I explore both of these issues – the emergence of institutionalized practices through social interactions as well as the ways in which broader social variations structure the formation of particular kinds of online collectives. I also turn away from online labor markets and wikis to consider a third sort of online collective: political blogs. While I explain the logic and implications of this shift in further detail below, the key reasons lie in the greater organizational diversity and scope of analysis afforded by a study of political blogs.

Elaboration:

An Interactionist Analysis of Online Collectives

Part II will examine processes of institutional formation and reproduction in online collectives through a pair of studies on the U.S. political blogosphere. The overarching objective is to better explain how institutions within collectives emerge as products of both micro-level social interactions among participants (group dynamics) as well as existing social structure and cultural institutions. In this way, the subsequent two chapters will follow a similar counterpoint structure as the previous two, demonstrating the unique contributions and limitations of an interactionist perspective to existing explanations of online collectives.

In Chapter 5, I begin by developing a relational and interactionist explanation of institutional emergence and social reproduction through a study of the large participatory political blog, Daily Kos. The core argument of this chapter is that critical functions of institutional production, contestation, and reproduction (such as gatekeeping and community governance) within the Daily Kos organization take place by means of micro-level social interactions and relational work.

Then, in Chapter 6, I pursue the implications of this relational interactionist account. In particular, I examine how differentiation of institutions and organizations of online collectives may structure opportunities for interactions. The chapter expands on the case study of Daily Kos to present a broader study of the U.S. political blogosphere, and in particular, the place of large-scale participatory, collaborative collectives within it. I focus on three related developments across the organizational field of the U.S. political blogosphere: the historical irruption and then stabilization of the blogosphere; the professionalization and bureaucratization of major blogs; and, finally, the emergence of “two blogospheres” and other elements of cross-ideological variation.

Part II contributes to my overall argument by illustrating that online collectives function through a complex interplay of micro-level interactions, but that the scope and opportunities for these interactions are shaped by a combination of social and cultural factors that effect the conditions under which online collectives arise and take shape.

Chapter 5

Interactional Mechanisms of Governance in an Open Collective: Gatekeeping on Daily Kos

Introduction

Numerous micro-level discursive interactions constitute the day-to-day activities of on-line communities engaged in peer production and related collective endeavors. At the same time, the relationship between these micro-level interactions and the broader organizational or institutional attributes of the collective as a whole remain somewhat murky. Why do large-scale online collectives, which depend so deeply on participation of hundreds or thousands of individuals, consistently reproduce extreme status and participation inequalities? How do these inequalities relate to mechanisms of organizational governance such as boundary maintenance and norm enforcement that are so critical to the operation of more formal organizational types?

In this chapter, I address these concerns through a mixed-methods analysis of the dynamics of interaction and social reproduction within a large-scale open political community online. Specifically, I focus on practices of *gatekeeping* in the U.S. political blog, Daily Kos.¹ Arguably the largest and most prominent participatory political blog in the U.S., Daily Kos embodies several core aspects of the practices engagement and participation characteristic of open online collectives. The massive scale of participation on Daily Kos creates a set of coordination and information filtering problems which the site, as a community organization, “solves” through a distributed system of content moderation and filtering. In contrast with earlier modes of media production and with more exclusive forms of blogging, this system does not rely exclusively on the actions of individual elites

¹See: <http://dailykos.com>.

in key choke-points of bureaucratic authority to perform centralized gatekeeping roles. Rather, Daily Kos *also* relies on the collective wisdom of its community of participants to filter the content contributed by their peers. In this sense, Daily Kos relies on formal, organizational hierarchies as well as less formal inequalities that emerge through discursive persuasion.

The key organizational dynamic Daily Kos's system of distributed filtering and moderation emerges as a pattern of *decentralized gatekeeping*, whereby practices of boundary work and social closure take on a more collective aspect than in previous forms of media production and political organization. In contrast with "traditional," centralized gatekeeping, which proceeds through actions by elite members of a collective or organization, decentralized gatekeeping, consists of more diffuse, small scale interactions between community members. Once aggregated, these small scale interactions feedback into the status hierarchy of participants, enhancing the ability of high-status and more experienced members of the community to regulate access to privileges and agenda-setting responsibilities on the site. At the same time, decentralized gatekeeping also functions as a means by which regular members of the community can assume limited authority and legitimately contest norms. Decentralized gatekeeping, as an interactional form of boundary maintenance therefore facilitates hierarchical forms of control at the same time as it enables an important degree of democratic deliberation and bottom-up governance throughout the community.

In both centralized as well as decentralized gatekeeping site participants tend to negotiate status and influence on an *interactional*, discursive basis, rather than on the basis of bureaucratic hierarchy or formal organizational structure alone. As a result, not only content, but also people become the targets of gatekeeping. In this way, decentralized gatekeeping practices contribute to the negotiation and reproduction of status inequalities within Daily Kos that reinforce the site's mechanisms of information filtering and mobilization.

Such patterns of organization and gatekeeping behavior matter for several reasons. First, and most relevant to my earlier claims about the value of interactional dimensions of online collective action, centralized and decentralized gatekeeping encompass a set of interactional practices by which the members of the Daily Kos community manage their internal status relations and power inequalities to produce something like coherent organizational behavior. In this regard, the discursive interactions that happen among Daily Kos contributors are broadly characteristic of other online groups and provide preliminary insights into the nature of online collective action more generally.

Secondly, the surge in online modes of collective action, collaboration, and engagement suggests that Daily Kos and other formally open, online-centered movement organizations represent new "laboratories of democracy" in the Tocquevillian sense. As an increasing number of social movements, political parties, and private firms adopt online tools for collaboration and collective action, the organizational and behavioral dynamics of these online collectives become more relevant for the study and practice of public

engagement. If the adoption of these tools bring with them novel organizational governance practices or disciplinary mechanisms, these phenomena portend a broader transformation of the organizational basis of knowledge production and democratic politics. They also shed light on other, offline environments – such as political parties or social movement organization meetings – in which relational, discursive mechanisms play a role in determining hierarchies of status and influence as a collective seeks to mobilize consensus around a common objective.

Finally, another reason why online gatekeeping matters has to do with the sort of partisan movement organization – engaged in media production, mobilization and information dissemination – that Daily Kos exemplifies. Online modes of political participation have spurred overlapping debates about the Internet’s potential to transform political engagement and the public sphere (see Benkler, 2006; Hargittai, 2010; Hindman, 2008; Karpf, 2012, 2008b; Schlozman et al., 2010; Shaw and Benkler, 2012; Zukin et al., 2006). In these debates, the institutional and organizational dynamics internal to online communities engaged in political action have not received sustained analytical attention. An extensive body of existing research on democratic engagement, media, and the public sphere has demonstrated that such organizational and institutional dynamics play a central role in determining both the success or failure of movements as well as the socio-political implications of particular forms of organization and media production (Andrews et al., 2010; Benson and Neveu, 2005; Fisher, 2006; Schudson, 1989, 2002; Skocpol, 2003). Likewise, the flow of attention, influence, and status in online political organizations will shape the networked public sphere as well as the future of democratic politics. As the blogosphere has grown and become a stable part of the political ecosystem in the U.S. over the past five years, the processes by which ideas and individuals achieve visibility within blogs and related online movements remain opaque. This chapter examines gatekeeping processes within one of the largest, most dynamic political blogs with the objective of opening up a wider debate about democratic movements, digital media, and the politics of news and information production in the contemporary era. I will pursue this issue more fully in the subsequent chapter, but begin to introduce some relevant themes and topics of debate below.

Organizational Dynamics of Online Collectives

In organizational terms, Wikipedia, Daily Kos, and other participatory online collectives have a great deal in common with what organizational theorists have called “open” network and community organizations. (Adler, 2001; Neff and Stark, 2004; Ouchi, 1980; Powell, 1990). Some research has analyzed dimensions of control within these organizational types in the context of online collectives such as the groups that produce Free and Open Source Software (O’Mahony and Ferraro, 2007). However, as I discussed in Chapter 1, most explanations of how these online communities work draw primarily on institutional and transaction cost economics as well as social psychological theories

of motivation. Specifically, Benkler, Lerner and Tirole, and Weber have all argued that distinct features of digitally-networked information production enable large-scale, “non-market” systems to overcome the obstacles to collective action, public goods creation, and sharing identified by classical economic theory (Benkler, 2002, 2006; Lerner and Tirole, 2002; Weber, 2004).² These claims originated as rejoinders to longstanding debates on “the tragedy of the commons” and collective action failures in the context of public goods creation (Hardin, 1968; Olson, 1965).³ As such, their authors view the fundamental puzzle of commons-based production online as a two-fold question: Why do individuals make contributions to online collective goods in the absence of financial incentives and how do large numbers of individuals coordinate and sustain their contributions in the absence of either formal organizational structures or markets? Their answers to these questions emphasize relatively static sets of norms, incentives, and motivational profiles. As a result, they overlook the importance of both the structural dynamics of participation within online communities as well as the interactions between community members.

The limitations of these earlier accounts of online collective action underscore the value of an interactionist approach. Dynamics of social reproduction, governance, and institutionalization within online collectives all entail a complex set of *relational processes* emerging through the interactions of community members, who actively manage organizational boundaries. For example, the work of O’Mahony and Ferraro shows that, over time, the growth of the Debian Linux community has led the community members to negotiate and implement a steadily more and more complex boundary-management process, leading to increasingly formalized and hierarchical governance structures (O’Mahony and Ferraro, 2007). Somewhat paradoxically, these formal and exclusionary structures are combined with direct democratic institutions which work to preserve the project’s formal openness. The preservation of certain kinds of direct democracy thus appears to support the cultivation of formal organizational structure. The pattern adheres loosely to Michels’ “Iron Law of Oligarchy” and reproduces a similar sort of emergent hierarchy to that identified in Freeman’s critique of the tyrannical “structurelessness” of the 1970s U.S. Feminist movement (Michels, 1915; Freeman, 1973).

Such questions of organizational governance reconnect this line of research with analyses of online social movement organizations and democratic political mobilization. Several previous studies have argued over whether the emergence of networked, politically-engaged collectives collaborating over the Internet have transformed the structure and dynamics of the public and political spheres (Benkler, 2006; Boczkowski, 2010; Hindman, 2008; Shirky, 2008). However, among this body of research, only Karpf offers a typology of networked political organizations or a theoretical framework for thinking

²The description of these phenomena as “non-market” comes from Benkler and is problematic given the prominence of multinational corporations and individuals residing within wealthy, capitalist democracies in these new modes of production.

³Explicitly or not, such arguments drew on the strategy pioneered by Ostrom in her analysis of institutional solutions to managing common-pool resources (CPRs) (Ostrom, 1990).

about the evolution of such communities in relation to existing political movement organizations (Karpf, 2008b, 2012). For Karpf, political organizations with strong online organizing components hold much in common with their pre-Internet counterparts, but the lower communication costs enabled by digital technologies have facilitated less hierarchical intra-organizational structures. The transformation of infrastructure has in turn brought about a generational shift as new advocacy organizations on the U.S. left have embraced these possibilities.

The literature on movement organizations' use of networked technologies and strategies has a blindspot when it comes to providing more general accounts of how these supposedly "new" practices of less hierarchical mobilization proceed. For example, Karpf theorizes about the "phases" of growth that the new generation of Internet-savvy organizations pass through, but he does not analyze this process in much depth, nor does he explain the relationship of the organizations' internal dynamics to their apparent "product:" a complex social system that generates and disseminates a vast amount of information. Online collectives engaged in political mobilization constitute novel sorts of institutions, movement organizations, and fields of power with characteristics that resemble their purely "offline" predecessors (Benson and Neveu, 2005; Schudson, 2002). Closer consideration of the micro-social dynamics of networked movement organizations and communities can therefore speak to the mechanisms of influence and agenda setting in these environments as well as the means which open online collectives function as efficient information processing systems.

Gatekeeping as a Mechanism of Organizational Reproduction and Democracy

Gatekeeping represents one particularly salient mechanism of interactional social reproduction that has not received adequate attention in the context of discussions of the organizational dynamics of online collectives. Along with Google and sites that sort and filter information by means of algorithms, Daily Kos embodies a key aspect of the broader shift towards distributed, social information processing online: decisions about which information and individuals acquire greater visibility often emerge through the aggregation of numerous individual judgments as opposed to the evaluation of managers or editors. In this context, where attention becomes an increasingly scarce resource subject to intense competitive pressures, social mechanisms of agenda setting and influence acquire enhanced importance. Gatekeeping – and in particular, what I call decentralized gatekeeping – represents one such mechanism. Empirical analysis of gatekeeping in online collectives and movements can therefore better ground existing accounts of the group and organizational dynamics at work in networked communities.

As a concept, gatekeeping has a long history in research on group processes research and news production. Early studies of gatekeeping focused on individuals who held extraordinary control over flows of goods, ideas and attention within families, groups, or society

as a whole (Lewin, 1947). Over time, gatekeeping research turned to the role of elites within newspapers, television and other information-producing professions. Practices of gatekeeping by editorial staff inside news-making organizations have historically drawn special attention as the quintessential examples of how institutional, cultural, and organizational dynamics influence what in fact becomes “news” in the first place (White, 1950; Schudson, 1989).

More recent gatekeeping research has likewise focused on journalism and media production, but has shifted to consider the role of institutions, processes, and the structural dimensions of social relations in driving the movement of information and access to resources (Barzilai-Nahon, 2008, 2009; Clayman and Reisner, 1998; Shoemaker and Vos, 2009). A few studies have specifically examined gatekeeping in the context of online collectives and communities (Barzilai-Nahon, 2008, 2009; Keegan and Gergle, 2010). In addition, several studies have explored analogous processes to gatekeeping that structure the dissemination of information in networked environments. Boczkowski’s ethnography of networked newsrooms in Argentina illustrates how the adoption of online publication, content aggregators, and the intensified competition for reader attention in a flooded information marketplace have transformed the organizational practice of newspaper production, resulting in less diverse content (Boczkowski, 2010). Hindman’s analysis of “Googlearchy” argues that the combined effects of power laws of attention together with many Internet users’ increasing reliance on algorithmic information filtering produces an extremely small elite capable of dominating the networked information ecosystem (Hindman, 2008). In contrast, Benkler and collaborators have argued that the presence of such power laws do not eliminate the possibility that the Internet *could* be used to democratize political communication, but that the actually existing conditions of online discursive production require further study (Benkler, 2006; Shaw and Benkler, 2012).

From a theoretical perspective, none of the existing research has explained the ways in which gatekeeping or related processes form part of the diffuse dynamics of contention and negotiation that go into managing open online collectives. In these environments, the struggle for attention and influence among the numerous participants means that gatekeeping is as much about inequalities in the attention and influence that accrue to particular *people* as well as to particular types of content. In other words, gatekeeping in open collectives becomes a means of constructing normative boundaries around legitimate discourse and action, and restricting the voice of those who do not adhere to the norms. In this aspect, gatekeeping constitutes a specific form of relational boundary work in the service of elite “status closure” (Tilly, 1999, 2001, 2006; Weber, 1978; Zelizer, 2005). Such relational work encompasses the diverse repertoire of practices through which individuals and groups define, imitate, contest, and reconstruct social categories. These practices also serve as the everyday mechanisms through which categorical inequalities, social movements, and economic exchanges cohere into larger structures (Tilly, 2006). As part of a broader repertoire of organizational governance practices, relational boundary work among the participants in online collectives simultaneously drives the emergence

of formal hierarchy at the same time that it enables the preservation of open, democratic institutions.

At its core, decentralized gatekeeping consists of numerous, micro-level interactions between individuals engaged in a particular collective endeavor. Through the aggregation of distributed, relational exchanges, which draw on existing rhetorics, norms and codes of behavior, these individuals participate in the stabilization and reproduction of larger scale social dynamics (Collins, 1981; Goffman, 1967). Over time, this process results in wider patterns of path dependency and creates institutionalized impediments to sudden shifts in the social order. Thus, with or without the central points of control through which traditional practices of gatekeeping proceed, organizations or communities constituted through distributed social interaction have a tendency to generate the sorts of deeply entrenched hierarchies and structures identified in earlier work on democratic, open or “structureless” organizations (Freeman, 1973; Michels, 1915; O’Mahony and Ferraro, 2007).

The dynamics of coordination and organization in large-scale online communities that generate, filter, and disseminate information on a massive scale offer a compelling arena for research into networked gatekeeping. Despite the growing number of sites on the Internet that fit this description – examples include Daily Kos, Reddit, Digg, and Slashdot – only a few studies have attempted to characterize the social dynamics of information filtering within these sorts of networked communities.⁴ My work on Daily Kos contributes to this body of research by extending theories of centralized, elite-level gatekeeping to incorporate an analysis of the decentralized, relational practices of social information filtering and production pursued in large networked communities. A relational perspective focused on diffuse micro-level interactions expands existing theories of gatekeeping beyond the traditional focus on central choke points of control.⁵ The central points within organizational hierarchies or networks traditionally identified as the locus of gatekeeping activities remain significant, but (in the context of open or network organizations) gatekeeping practices also occur throughout a collective. In this sense, some kinds of gatekeeping may function as a distributed form of deliberation, participation and social control rather than a purely top-down form of coercion.

Research Design and Methods

In order to analyze gatekeeping practices in Daily Kos, this study combines qualitative observation with a statistical analysis of a large sample of comment threads on the site from 2008. The next section of the paper introduces the site and presents an overview

⁴Several exceptions exist (e.g. Lampe and Resnick, 2004; Lampe et al., 2007).

⁵Barzilai makes a related point, but she is more concerned with shifting the focus of analysis (to “the gated”) rather than the idea that gatekeeping itself may have decentralized as well as centralized forms (see Barzilai-Nahon, 2008, 2009).

of some of the formal rules and technologies that govern interactions between participants. This section establishes a baseline understanding of the system of community governance that operates throughout the site as well as a sense of the site history and its prevailing culture. In particular, I focus on the mechanisms by which the community engages in distributed content moderation and filtering, an activity that accounts for a large proportion of user-to-user interactions on the site.

Building from the overview, I use qualitative evidence to build the case that gatekeeping happens through centralized and decentralized mechanisms on Daily Kos. I conducted six months of qualitative observation of the Daily Kos site between March and November, 2008. During this time, I maintained a user account that I used to access posts and comment threads. I also contributed several posts of my own, comments, and diary recommendations. At regular intervals on almost every day during this period, I logged into the site, read the most recent front page stories, skimmed user comments and recommendations, and reviewed several of the recent and recommended user diaries. Fieldnotes that I produced on the basis of these experiences provided the basis of a preliminary analysis, which I later refined and corroborated through the use of the site's searchable archive. Based on this data, I analyze a series of events surrounding the 2008 Democratic party presidential primary elections. During this period, the divide between supporters of Hillary Clinton and Barack Obama within the Democratic party as a whole gave rise to numerous arguments and conflicts among Daily Kos participants. Such an intense period of contentious debate thus provided an ideal opportunity to observe how the community enforced norms and constructed boundaries. In several ways, these events illustrate that gatekeeping practices emerge through everyday user-to-user interactions, giving rise to inequalities and hierarchies among the participants.

Following the inductive elaboration of the idea of decentralized and centralized gatekeeping, I construct a statistical test for relationships between measures of commenting and recommendation behavior that would signal the presence of decentralized gatekeeping. The data consist of a large sample of comment threads and recommendations taken from a subset of posts on the site, a daily political humor series called "Cheers & Jeers" (or C & J, henceforth). C & J represents one of the most stable and well-established sub-communities within Daily Kos. Therefore, while it is not necessarily representative of the site as a whole, it occupies a privileged position within the community culture and provides a window into the sorts of norms and values that prevail among an exceptionally active group of Daily Kos participants.⁶ I use the full set of C & J user comments and recommendations from 2008. I collected this data in April, 2010 using a script that parsed and stored records from the site archives via the built-in search functionality.⁷ The

⁶As I explain below, using C & J comment threads as a data source also fixes a number of potential confounding factors, such as posting time of day, post content, and sub-community norms.

⁷The script was written in the Python 3 programming language by Andrew Korzhuev, a student in the Information Sciences Department at the Saint Petersburg State Institute of Technology, in March, 2010. The script is licensed under the GNU GPL v3 and I am happy to share it along with the data it collected. This data collection was possible because the Daily Kos site maintains an open, publicly searchable archive

resulting data set allows me to describe the network created by the recommendations between users and to examine whether or not relational boundary work among Daily Kos community members produce systematic gatekeeping effects.

Overall, the research question driving the quantitative analysis asks whether or not the system of distributed moderation and filtering used on Daily Kos functions by means of decentralized gatekeeping. For the purposes of this analysis, I define gatekeeping as *the systematic reproduction of an unequal and regular flow of valued resources – especially influence – to an incumbent group or organization* and take decentralized gatekeeping to entail the production of inequalities along these lines by means of distributed, collective behavior.⁸ Through a series of hypothesis tests, I test whether large-scale patterns of status accumulation consistent with decentralized gatekeeping exist.

My definition of gatekeeping hinges on the identity and role of “incumbent” groups or individuals. In the context of a large online community focused on the production of political information and mobilization, the possession of privilege, status, or power may lead to comparative advantages in terms of articulating a perspective, having that perspective heard, and eliciting some sort of response or action from other members of the community. For the purposes of this analysis, I focus on two overlapping forms of incumbency: elite status and expertise. The test of gatekeeping effects is therefore a test of whether or not elite status or expertise associate with increased reputational returns to comments.⁹ I break this down into three specific hypotheses, each of which operationalizes a distinct component of incumbency:

Hypothesis 1a: More experienced users will receive more recommendations per comment.

Hypothesis 1b: More active users will receive more recommendations per comment.

Hypothesis 1c: Formal elite users will receive more recommendations per comment.

The fact that comment recommendations between Daily Kos users form a directed graph in which practices of reciprocity may drive the flow of attention and status (and thereby generate gatekeeping effects) among community members also suggests a secondary hypothesis:

of posts, comments, and recommendations, all of which are licensed by the site owners for reproduction and reuse.

⁸This operational definition builds on the arguments of Clayman and Reisner, who argued that gatekeeping encompassed both the *process* by which gatekeepers managed the flow of a given resources (e.g. publication in a newspaper) as well as the *criteria* that determined patterns of selection (e.g. “newsworthiness”) (see: Clayman and Reisner, 1998, : 179-80).

⁹Note that I define each of these variables as well as the statistical methods used for this analysis in greater detail later in the paper.

Hypothesis 2: Users who give more recommendations will receive more recommendations per comment.

If I find support for hypotheses 1a-c and 2, I could conclude that comment recommendation practices among Daily Kos participants contain patterns of behavior consistent with the presence of decentralized gatekeeping that reinforce the privileges of incumbent users of the site. Support for some subset of hypotheses would still imply the presence of behavior consistent with decentralized gatekeeping, but would also suggest that certain forms of incumbency associate with status advantages whereas others do not. In contrast, a result that failed to reject the null hypothesis of no effects for all four hypotheses would indicate that comment recommendation does not follow a pattern consistent with any of the forms of decentralized gatekeeping described here.

A Brief Overview of Daily Kos

Markos Moulitsas Zúñiga founded Daily Kos as a solo-authored weblog on May 26, 2002 (Armstrong and Moulitsas Zúñiga, 2006). Since then, Daily Kos has become one of the most heavily trafficked, collaborative political blogs on the Internet. Currently, the site attracts roughly 10 million page views from over 600,000 unique visitors in the U.S. per month, placing at the top of the political blogosphere and on the same plane as other large participatory websites like slashdot.com.¹⁰ Sometimes characterized as radically left-wing, the site has become the preeminent symbol of the so-called Netroots movement (Kerbel, 2009; Karpf, 2012).¹¹ While many online-only news and discussion sites can match the quantity of traffic on Daily Kos, few have harnessed user-participation and content to a comparable degree (Shaw and Benkler, 2012).

Between 2003 and 2006, the Daily Kos Web site underwent several transformations. First, in October, 2003, Moulitsas implemented a technical migration to a software platform designed to incorporate more dynamic forms of participation and interaction among users of the site.¹² The new platform incorporated reader contributions on a larger scale. In addition, during 2004, Moulitsas formalized a system of contributing editors who

¹⁰This is substantially less than major news outlets like *Huffington Post* (980 million page views, 35 million unique visitors) or *The New York Times* (400 million page views, 2 million visitors), but neither of these sites offer anything close to the participatory infrastructure that Daily Kos does. What is more, in years of congressional and presidential elections, traffic to Daily Kos typically surges. Page view and visitor data taken from Google AdPlanner on October, 2011 (See: <http://google.com/adplanner>).

¹¹It bears note that several of the site editors have publicly repudiated the idea that the site is truly radical. In a personal communication about this paper, Laura Clawson, a contributing editor to the site since 2006, underscored this point to me.

¹²The platform, called “Scoop,” was originally developed by Rusty Foster for the “Kuro5in” (pronounced “corrosion”), discussion forum, which is geared towards computer programming and related interests. See <http://www.kuro5in.org>, accessed April 3, 2010.

shared posting responsibilities with him. As a result of these technical and organizational changes, the density of content and participation on the site exploded during the 2004 presidential election cycle, contributing to the insurgent Howard Dean campaign (Armstrong and Moulitsas Zúniga, 2006). As a result, Daily Kos became a symbol of a new kind of networked political movement on the American left.

Between 2006 and 2011, the Daily Kos site and community has assumed a relatively stable form.¹³ The volume of participation, influence and attention of Daily Kos has made the site a benchmark by which other large-scale political discussion sites are measured. As of April, 2010, the site had over 200,000 registered users, out of which several thousand actively participated on the site every day.¹⁴ The extensive technical and social system by which users filter and moderate each others contributions to the site represents a massive proportion of activity on the site as well as a large-scale system of distributed community governance.

Distributed Content Filtering and Moderation

Within the Daily Kos community, the practice of distributed content filtering and moderation provides a basis for evaluating and prioritizing certain kinds of information over others. To facilitate this process, the software platform that makes up the site delimits four categories of content and four tiers of participants. The content categories are: front page stories; user diaries; comments; and ratings. The participant tiers are: site elites; trusted users; registered users; and readers. In general, the platform incentivizes content contributions that earn the approval of other users.

The program provides all registered users with the ability to construct a public identity tied to a unique username. Once registered and logged-in, users can comment, post diary entries, and customize a personal page. They do this with the knowledge that their work will be visible to any site visitor and (potentially) rated by other users. The multiple forms of user-generated content then serve as a foundation for other key social features on Daily Kos: content rating and reputation-building. Together, these features make up the institutional landscape within which the site's participants interact. They are also the means by which community members manage norms and rules. Every step in this process entails interactions between users.

Site elites on Daily Kos are a relatively small group of individuals with formal positions,

¹³At the beginning of 2011, Daily Kos deployed a completely transformed interface – dubbed “DK4” – that incorporates a number of new features. As this article was already under review at that time, I do not incorporate any discussion of the DK4 features into my analysis.

¹⁴User data from <http://dailykos.com>. During 2008, the site generated between 500,000 and 2 Million hits daily. Traffic data from aggregate statistics collected by “The Truth Laid Bear” (<http://www.ttlb.com>) and Nielsen’s “Blogpulse” service (<http://www.blogpulse.com>). The mean daily traffic at this time was around 600,000 hits.

status, and extraordinary privileges as identified on the site's masthead page.¹⁵ These include Markos Moulitsas himself as well as the technical staff and editors of the site. The site elites are distinguished from other participants by their ability to post front page stories and perform other managerial operations on the site as a whole. Daily Kos's formal organizational structure, manifests itself through the presence and roles of the site elites. The earliest site elites were selected directly by Moulitsas. More recently, a clearer organizational hierarchy has been created whereby some elites are listed on the masthead as holding specific editorial responsibilities.

The procedures by which new site elites are chosen remain opaque, but statements on the topic made by Moulitsas and others suggest a system of semi-informal selection conducted by Moulitsas himself and the other editors (Armstrong and Moulitsas Zúniga, 2006; Moulitsas Zúniga, 2008). Given the site's status as a prominent movement premised on advancing Democratic party interests, it is noteworthy that the positions are not determined through any sort of site-wide electoral process. At the same time, site elites make it clear in public statements on the site that they view themselves as ultimately accountable to and dependent on the readership for their continued legitimacy as community leaders.¹⁶ Whether or not these statements are reliable accounts of elite community members' status matters less than the fact that the elites justify their presence on such populist terms. This sort of justificatory logic signals the elites' ideologically-informed desire to understand themselves as part of a (small "d") democratic movement, even though their positions are not acquired or preserved through any sort of well-defined democratic process.¹⁷

Front page stories appear as the primary content on the site's main URL and are therefore the most visible and accessible content on the site. Front page stories are usually written by the site's editors and elites, but they are also sometimes user diaries that the elites have "promoted" to the front page. Through front page stories, site elites thus anchor the community's textual production in a steady stream of reporting and analysis that meet high quality standards. As a result, diary promotion to the front page confers prestige as well as formal reputation gains to diary authors.

Diaries are personal blogs that any *registered user* of the site may write and post. They vary widely in terms of length, quality, and content. In general, they mimic the tone and length of front-page stories while attempting to contribute original evidence or insights on an issue of interest to the site's participants. Formal and informal guidelines for writing the diaries exist, but many actual diaries deviate from these norms.

Immediately after posting, every diary authored by a registered user who is not a site elite appears in a *Recent Diaries* sidebar along the front page, increasing its visibility among

¹⁵See: <http://dailykos.com/special/about2> (accessed March 27, 2010).

¹⁶Several examples of this arise in the threads discussed below. See, in particular, Moulitsas' post in response to the writers' strike. Also, this kind of rhetoric emerges repeatedly in Moulitsas' books (Armstrong and Moulitsas Zúniga, 2006; Moulitsas Zúniga, 2008).

¹⁷I am not aware of any means by which site participants can "recall" an editor from her position.

other users of the site for a brief period. Other registered users can *recommend* user diaries, and the number of recommendations appears together with the diary title in the *Recent Diaries* sidebar. If a diary accumulates a large number of recommendations, it may automatically appear in the more prominently placed *Recommended Diaries* sidebar on the front page. Placement in the *Recommended Diaries* sidebar persists longer than in the *Recent Diaries* sidebar and signals that a diary has achieved an exceptional amount of popularity among the site's users.

Comments are the most ubiquitous and varied category of content on the site. Any registered user can comment on any story or diary. The comments on each story and diary appear as a threaded discussion below the story or diary in question. In general, front page stories attract a few hundred comments each. Comments function as one of the primary vehicles through which Daily Kos participants negotiate their views and engage in sustained interactions with other users of the site.

Ratings, like comments, are ubiquitous on Daily Kos. With the exception of front page posts, all content submitted to the site immediately becomes subject to user ratings, through which any registered user can contribute feedback on that content. This user feedback is then used to facilitate the reading and filtering of information on the site. In the case of diaries, the accumulation of positive ratings (recommendations) from numerous and/or prominent users results in advantageous placement and more widespread dissemination on the site through the Recommended Diaries sidebar. With comments, the accumulation of positive ratings adds to the reputation score of the user who posted the comment. As a result, ratings often become a mechanism of social exchange, whereby users will engage in reciprocal support of one another's contributions.

Registered users who accumulate many recommendations from their peers acquire *trusted user* status. Trusted user status provides access to additional recommending features on the site platform. Registered users that have not achieved trusted status are only capable of submitting positive ratings (also known as recommendations). Trusted users can provide negative or "troll" ratings as well. Any comment that receives a sufficiently low sum of ratings is hidden from un-trusted registered users of the site and from readers. By convention, users tend to contribute only positive ratings of each others comments; however, in the case of spam or inappropriate contributions, zero ratings may be used by the "trusted" members of the community to collaboratively remove content.

The boundary that separates trusted from untrusted users is very porous and is managed technically in an automated fashion by the site's platform.¹⁸ A registered user may shift between trusted and un-trusted status depending on the regularity and extent to which their contributions to the site receive recommendations from other users. Maintaining trusted status is a largely symbolic achievement with relatively narrow material benefits.

¹⁸The Scoop platform computes whether users are trusted using an algorithm customized by Moulitsas and the site's Chief Technical Officer, Jeremy Bingham. The details of this algorithm are secret to prevent users from gaming the system and acquiring trusted status too easily.

At the same time, the process of becoming trusted on the site offers participants an avenue to enhanced forms of commitment and those users who are trusted sometimes refer to their status as an indication of their commitment to the community.

The interactions of individual users of the site produce a dynamic flow of information, reputation, attention, and influence. The accumulation of comments and positive ratings contribute to the visibility of diaries or front page stories, as well as to the reputations of users. Users with strong reputation scores acquire additional privileges on the site and, if they continue to attract positive attention through recommendations and comments on their content, the potential to acquire enhanced influence among the other members of the site. At the same time, contributions which are uninteresting or otherwise inconsistent with the standards, norms, and views of a sufficient proportion of the site's participants fall from public view. In this way, the technical and social application of the moderation and filtering system takes advantage of the fact that readers can quickly process information to identify whether something is relevant their interests or not. By relying on the aggregation of numerous judgments about other's contributions, the site's users collectively categorize and identify interesting, relevant or controversial content. Over time, the content that rises to the top acquires status and becomes more likely to attract further attention.

The Daily Kos platform was designed to accommodate extensive interactions among users and to facilitate a process by which certain contributions acquire heightened visibility and impact over others. In this way, the system accommodates varying levels of commitment and activity, and also aims to harness the unequal distribution of popularity and influence among users to promote content and discussion deemed interesting by to the larger pool of participants.

It is important to underscore that although Moulitsas and the administrators of the site retain control over the precise metrics used by the site's reputation algorithm, this is not the same as directly determining users' reputations or their patterns of adopting the site's features. In this sense, the architectural choices that Moulitsas made in selecting the platform and customizing it should be understood in the context of the norms and interactive practices through which the community of Daily Kos participants have brought the site's technologies "to life."

Two Varieties of Gatekeeping on Daily Kos

The foregoing overview suggests that gatekeeping practices on Daily Kos can proceed through several different mechanisms. The site offers a range of tools and venues through which participants contribute content to the site, evaluate each others' contributions, and engage in formal as well as informal processes of rule or norm enforcement. In addition, the different tiers of user roles that are built into the Scoop software platform

presume a hierarchy of privileges and status. The result is a system in which more and less formalized as well as more and less centralized processes of gatekeeping take place. This gatekeeping can apply to participants as well as to content, both of which may be classified as undesirable.

I distinguish between two kinds of gatekeeping – centralized and decentralized – both of which reproduce structural advantages of elites or incumbents. Centralized gatekeeping occurs at high status positions within the community by site administrators or elite users. Decentralized gatekeeping, on the other hand, entails more diffuse processes that require the participation of numerous site users. In both cases, the effects are comparable: site elites and incumbent users (those who are more experienced, active, or comparatively empowered) play a privileged role establishing, interpreting, and enforcing the ground rules, norms, and frameworks within which discursive production and political mobilization occur on the site. Table 5.1 shows a side-by-side comparison of examples of the two types.

Table 5.1: Types of Gatekeeping on Daily Kos

Centralized	Decentralized
Formal rule & policy-making	Emergent social norms
User-training (FAQs)	Norm dissemination (user-to-user)
Rule enforcement (site elites)	Norm enforcement (user-to-user)
Status closure (site elites)	Status closure (incumbent users)
Agenda setting (front page)	Agenda setting (diaries/comments)

In comparison with previous definitions of gatekeeping, the key distinction with decentralized gatekeeping concerns the extent to which the gatekeeping not only entails the active participation of “the gated,” but also to think about how distributed actions by the members of a collective can generate similar effects to the concerted efforts of a single individual (For definitions of gatekeeping, see: Barzilai-Nahon, 2008, 2009; Clayman and Reisner, 1998; Lewin, 1947; Shoemaker and Vos, 2009). Below I introduce examples of both kinds of behavior.

Centralized Gatekeeping in the Clinton Supporters’ Strike

Overall, centralized gatekeeping on Daily Kos emerges as a by-product of the social position and status of site elites. Consistent with the role of news editors in the print media and other professions, these elites utilize their status and position within the Daily Kos community to reproduce their own authority and restrict access to privileges (Gieryn,

1983; Clayman and Reisner, 1998). As a result, visible mechanisms of centralized gatekeeping on Daily Kos tend to be more formalized than mechanisms of decentralized gatekeeping. Site elites – and in particular Markos Moulitsas – possess the resources to convert their perspectives into formal elements of site governance system more than any other members of the site community. Some of the ways in which they exercise these privileges therefore become very visible and very public, while others less so.

The period around the Democratic Party presidential primaries of 2008 provided numerous example of centralized gatekeeping in response to some contentious conflicts within the community. During the lead up to “Super Tuesday” (February 4, 2008) the polarization between supporters of Hillary Clinton and Barack Obama on the site grew increasingly tense. Moulitsas and the site’s editors had not endorsed Obama by that point, but some of them opposed some of the strategies pursued by Clinton’s campaign as she sought to divide the party after losing momentum in the popular vote.¹⁹ The conflict bled over into the comments and diaries, where Obama and Clinton supporters clashed. Resentful of the widespread pro-Obama sentiment among their peers, many Clinton advocates claimed to be the victims of unfair treatment. On March 14, “Allegra,” one of the Clinton supporters and a prominent diarist, proclaimed a “Writer’s Strike,” urging Hillary supporters and their sympathizers to immediately cease visiting, reading, and contributing to the site:

I’ve been posting at DailyKos for nearly 4 years now and started writing diaries in support of Hillary Clinton back in June of last year. Over the past few months I’ve noticed that things have become progressively more abusive toward my candidate and her supporters.

I’ve put up with the abuse and anger because I’ve always believed in what our online community has tried to accomplish in this world. No more. DailyKos is not the site it once was thanks to the abusive nature of certain members of our community.

I’ve decided to go on “strike” and will refrain from posting here as long as the administrators allow the more disruptive members of our community to trash Hillary Clinton and distort her record without any fear of consequence or retribution. I will not be posting at DailyKos effective immediately. I will not help drive up traffic or page-hits as long as my candidate – a good and fine DEMOCRAT – is attacked in such a horrid and sexist manner not only by other diarists, but by several of those posting to the front page.²⁰

¹⁹The site elites were far from unanimous in their support for Obama. Of the (at the time) 26 individuals identified as site elites, at least one publicly endorsed Hillary Clinton and another voted for John Edwards in the primaries. See: <http://www.dailykos.com/storyonly/2008/1/1/428108/-My-Vote-1-8-08>; and <http://www.dailykos.com/storyonly/2008/2/5/450060/-Im-For-Hillary-Clinton> (both accessed December 17, 2010). Thanks to Laura Clawson, one of the Daily Kos editors, who pointed me to this information in a personal email exchange.

²⁰See: <http://www.dailykos.com/story/2008/3/14/20827/4727/132/476843>, (accessed December 17, 2010).

Responses to the so-called strike were mixed. However, Moulitsas and some of the other senior members of the community took an aggressive stance against the strikers, mocking them and arguing that they had no right to expect consensus on the site, especially given that Clinton opposed some of the central tenets of the community. Three days after Allegra's post, Moulitsas responded directly, arguing that Clinton's willingness to split the Democrat's super-delegate vote against the popular vote would lead to a civil war within the party:

Clinton knows this, it's her only path to victory, and she doesn't care. She is willing – nay, eager to split the party apart in her mad pursuit of power.

If the situations were reversed, and Obama was lagging in the delegates, popular vote, states won, money raised, and every other reasonable measure, then I'd feel the same way about Obama. (I pulled the plug early on Dean in 2004.) But that's not the case.

It is Clinton, with no reasonable chance of victory, who is fomenting civil war in order to overturn the will of the Democratic electorate. As such, as far as I'm concerned, she doesn't deserve "fairness" on this site. All sexist attacks will be dealt with – those will never be acceptable. But otherwise, Clinton has set an inevitably divisive course and must be dealt with appropriately.²¹

Moulitsas situates his critique of Clinton and the strikers in reference to the founding ideals of the site, re-iterating his authority on the blog and underscoring the distinction between formal community rules (e.g., "sexist attacks...will never be acceptable") and the political vision behind his creation of the site. He shows no sympathy for those who disagree with his perspective.

The example demonstrates how Moulitsas uses his position and status as leader to affirm and reinforce community standards in the wake of important conflicts. These actions contribute to centralized gatekeeping on the site insofar as they reinscribe boundaries of acceptable behavior and political beliefs. Moulitsas can, in theory, kick out any users whose beliefs he disagreed with, but such actions could undermine his (and the community's) claims to enact democratic values and discourse.²² Instead, he tends to engage in moral, political, and intellectual persuasion of the site's users, arguing for a particular vision of Democratic party empowerment and electoral strategy. In casting the Clinton supporters as misguided and worthy of mockery, Moulitsas symbolically sets the boundaries of what he sees as a legitimate political position and classifies a subset of the community as beyond the pale.

²¹See <http://www.dailykos.com/storyonly/2008/3/17/12417/1285/527/478498>, (accessed December 17, 2010).

²²See Karpf (2012) for an example where Moulitsas banned users for promoting the idea that the U.S. government had been behind the September 11 attacks.

The episode illustrates most of the mechanisms of centralized gatekeeping identified in Table 5.1. Moulitsas draws on his capacity as site founder to make and enforce formal rules; lay down guidelines about acceptable behavior; and set the community political agenda of the site through his own posts (all of which appear on the front page).

Whatever his status or administrative privileges, Moulitsas cannot mandate the views of the site's user community by fiat. His agenda-setting and norm-enacting capacity hinges, in part, on the fact that he engages other site elites and experienced users in such discussions and seems to only take drastic action like banning or publicly denouncing users' views) under extraordinary circumstances. In this way, his actions also contribute to an overall process of status closure, whereby he exercises influence over the selection process of new site elites and the privileges entailed by elite status.

“Everyday” and Decentralized Gatekeeping

The distinct aspects of decentralized gatekeeping boil down to particulars of scale, context, and scope. First, decentralized gatekeeping happens on a larger scale than centralized gatekeeping. It incorporates a wider range of individuals and consists in activities that are far more diffuse and numerous. Second, the contexts decentralized gatekeeping are more widely accessible and less reliant on formal status divisions. In practice, this means that decentralized gatekeeping “happens everywhere” in contrast with centralized gatekeeping that necessarily occurs in settings and situations where site elites engage in the activities described above. In many cases, behaviors that contribute to decentralized gatekeeping are more banal than their centralized counterparts. Finally, the scope of decentralized gatekeeping tends to be narrower than that of centralized gatekeeping. This does not mean that decentralized gatekeeping behavior or its effects have less significant implications for the site than centralized gatekeeping, but merely that decentralized gatekeeping rarely entails the sort of claims to formalized authority and responsibility for the site as a whole that characterize centralized gatekeeping in many cases.

Despite these differences, the mechanisms of decentralized gatekeeping parallel those of centralized gatekeeping. In both cases, Daily Kos community members perform relational work to establish, negotiate, enforce, and adapt boundaries, norms, and standards that constitute the site. In the process of both, incumbent community members tend to reproduce their own access, privileges, and status. In other words, the effects of decentralized gatekeeping are also broadly consistent with those of centralized gatekeeping: the reproduction of social structure, authority, and privilege in a manner consistent with the participatory design of the Daily Kos community.

In May, 2008, less than one month after the Clinton supporters' strike, two conflicts occurred in a “Cheers & Jeers” comment thread that illustrate how everyday community

governance on Daily Kos contributes to an overall pattern of decentralized gatekeeping.²³ Cheers & Jeers, or “C & J,” is written by Bill Harnsberger, who is known by his username, “Bill in Portland Maine.” C & J began as a normal user diary, but its popularity led Markos Moulitsas to invite Bill in Portland Maine to make it a bi-weekly feature on the site in April, 2005.²⁴ Since then, the column has become a mainstay and a source for many of the inside jokes on the site. It appears every weekday at approximately 9AM Eastern Time, and typically attracts more comments than most other posts. Every C & J post follows a predictable format and aesthetic, including satirical “cheers” and “jeers” from Harnsberger that incorporate light political commentary and pop-culture references. Many of the comments come from regular readers who greet Bill in Portland Maine directly or post their own “cheers and jeers” for the day. The threads focus more on sociable and friendly interactions than on contentious political debate.

In response to one of the first C & J comments on May 13, 2008, a long-time member of the site called “joan reports” posted a comment linking to an off-site blog about the Democratic presidential primaries in West Virginia.²⁵ A little further down the thread, joan reports also submitted an identical comment and within a few minutes, a particularly active C & J contributor called “Phil N DeBlanc” responded to joan reports’s first comment by asking her to “quit spamming C & J.” Beneath her second comment, other users posted comments mocking it as spam. In response, joan reports apologized on both sub-threads. The apology earned joan reports a number of recommendations and positive comments from other users, one of whom remarked, “She’s cool – First time I ever saw someone apologize for spamming.”

Almost two hours later in the same thread, another user, “2Nurselady,” wrote: **“CHEERS TO HILLARY CLINTON For fighting for the rights of ALL of the voters in this country to have their voices heard, including Florida and Michigan!”** (original capitalization and emphasis). In the wake of the writers’ strike and amidst the amicable atmosphere of C & J, 2Nurselady’s contribution looked like an intentional provocation, and thus met with immediate condemnation, drawing a number of negative (“troll”) ratings. Bill in Portland Maine jumped to 2Nurselady’s defense, arguing, “[The comment] Seems like an honest statement of opinion. No profanity. No name-calling. You may disagree with how Hillary wants to ‘fight’ for the as-yet-unseated delegates in FL and MI, but the statement isn’t inflammatory.”

In response, some of the most frequent commentators on C & J, including one user called “homogenius,” responded to Bill in Portland Maine, supporting the negative ratings of 2Nurselady’s comments (which would make them invisible to untrusted participants):

Uhhhh Bill,

²³The full comment thread, including all quotations I use below, can be found at: <http://www.dailykos.com/comments/2008/5/13/85118/7425>.

²⁴See <http://www.dailykos.com/storyonly/2005/4/5/104652/3850>.

²⁵joan reports has participated since 2004, contributing thousands of comments and diaries.

Sweetie? Honey Pie?

This isn't about site rules or the FAQ. It's about community norms in C & J. A significant number of us feel that candidate shit violates the spirit and intent of C & J. It doesn't matter whether he or she is inflammatory, insulting, or profane.

I yield to the sense of the community on this, but that's my impression. But I'm sure as fuck not gonna hang out here if we're gonna be subjected to the same shit as the rest of this site for the duration of the primary season.

However, I'm guessing that this nurse person isn't a [Trusted User] and can't see our comments once he or she gets [troll]'d so I would suggest we leave one unhidden for that purpose.

What saith the rest of the rabble – do we open up C & J to unlimited candidate shit or do we maintain our oasis of insanity to titillate the snark gland and soothe the savage beast?

Bill in Portland Maine and homogenius went back and forth several times on the issue, but the negative ratings of many other users had effectively hidden 2Nurselady's comment in the meantime. Less than ten minutes after her first comment, 2Nurselady posted again:

JEERS TO THE DAILY KOS For removing my posts because they were pro-Hillary Clinton. I actually complimented The Daily Kos yesterday for allowing variant points of view and now, because I commented in a positive way about Hillary Clinton this morning, you've removed those posts??? Is this CNN???

2Nurselady's response illustrates that she does not understand the site's comment filtering system. At this point, the participants responded by recommending her original post to ensure that it remained visible and homogenius explained the situation:

Dear Nurselady,

We have unhidden this comment in case you are not a trusted user and can't read our responses to your comments which have been hidden.

In any other diary, your comments would not have received hide ratings (aka "donuts"). They would have been derided for being in bold face with too much in all caps (both are seen as shouting in cyberspace).

However, Cheers and Jeers is generally a place of respite from the candidate wars and other trials and psychoses of daily life and Daily Kos. Bill in Portland Maine's proprietorship of C & J is supported directly by contributions

from Kossacks. So, in addition to Mr. Kos's rules and regulations, we have some traditions and boundaries unique to C & J. I'm only one small contributor, so I defer to community sentiment...but I believe this is substantially correct.

If you continue to post candidate comments in C & J, you will likely find them hidden. If you continue to post in bold face and overuse caps, you will be soundly (and justifiably) jeered.

I hope this was helpful. Please feel free to ask for clarification from the community.

2Nurselady thanked homogenius for the information and never returned to comment in C & J again.

These interactions demonstrate some of the ways that participants who do not hold formal elite status on Daily Kos undertake gatekeeping roles in order to moderate and filter content on the site. In the case of joan reports's comments, site participants applied a set of standards without the intervention of site elites or the use of troll ratings. They used a combination of mockery, sympathy, and direct criticism, eliciting in a public apology for behavior that broke with the unwritten rules of the C & J sub-culture.

In the 2Nurselady incident, site participants once again coordinated in response to a violation of the C & J community norms, but one of the site elites as well as the Scoop rating system also played an important role in shaping the interactions. Looking at 2Nurselady's user page, a number of users quickly recognized a pattern of behavior that was inconsistent with the standards of written communication on the site as a whole and C & J in particular. Several of them then negotiated with a site elite (Bill in Portland Maine) over the proper course of action. When 2Nurselady returned and demonstrated that she did not understand the informal boundaries of conversations on C & J, one user (homogenius) explicitly clarified the normative logic at work. While 2Nurselady went on to amend her conversational tactics in subsequent comments and diaries, she ceased participating five days later.

In both cases, two well-known contributors to the C & J conversations, homogenius and Phil N DeBlanc, drew on their authority to speak on behalf of "the community" of C & J participants. Other, experienced users joined as well, giving weight to the categorization of joan reports' and 2Nurselady's comments as unacceptable. In doing so, they utilized the site's technical infrastructure and drew upon existing institutions in order to preserve the flow of information they recognized as legitimate (in this case, casual socializing and political humor).

These examples demonstrate that the interactions between Daily Kos participants involve more than just discussion. The interactions also entail identifying and categorizing behavior in accordance with formal and informal standards. Hierarchies of status and

identity become operationalized in these acts of categorization, which in turn reproduce boundaries of legitimate discourse and practice.

The application of these emergent norms contribute to both centralized and decentralized gatekeeping as site participants use them simultaneously to acquire and to signal “in-group” membership within experienced and visible sub-communities on Daily Kos. They also feed into the production of status inequalities between those site members who can successfully navigate and appropriate in-group codes and those who cannot. The practice of policing the boundary between trusted and untrusted users through comment rating thus functions as a form of status closure, whereby trusted users regulate access of untrusted users to privileges.

It is possible to quantify and visualize the relationship between comments and recommendations within the April 13, 2008 C & J thread involving joan reports and 2Nurse-lady. Table 5.2 contains a descriptive summary of all the comments and recommendations in that thread.

Table 5.2: Summary Data: Cheers & Jeers, April 13, 2008

	total	unique users	mode	median	mean	max
comments made	772	146	1	2	5.3	73
recommendations received	9516	146	9	31	65.2	537
recommendations given	9516	179	1	7	53.2	700

Note that the distributions of all the variables are extremely skewed. Figure 5-1 presents a scatterplot of comments made (log scale) against recommendations received (log scale) for all participants in the thread. Each point is also scaled to represent the (log) number of recommendations given.

Not surprisingly, the graph demonstrates a positive relationship between the number of comments made and the number of recommendations received. It also seems to show a positive relationship between comments, recommendations received and recommendations given (thus the growing size of points along both the *X* and *Y* axes).

Table 5.3 contains summary data for each of the key participants discussed above. Here, the positive association between the different types of gatekeeping behavior depicted earlier and authority within the site’s reputation system becomes transparent.

Figure 5-1: Summary Scatterplot: Cheers & Jeers, April 13, 2008

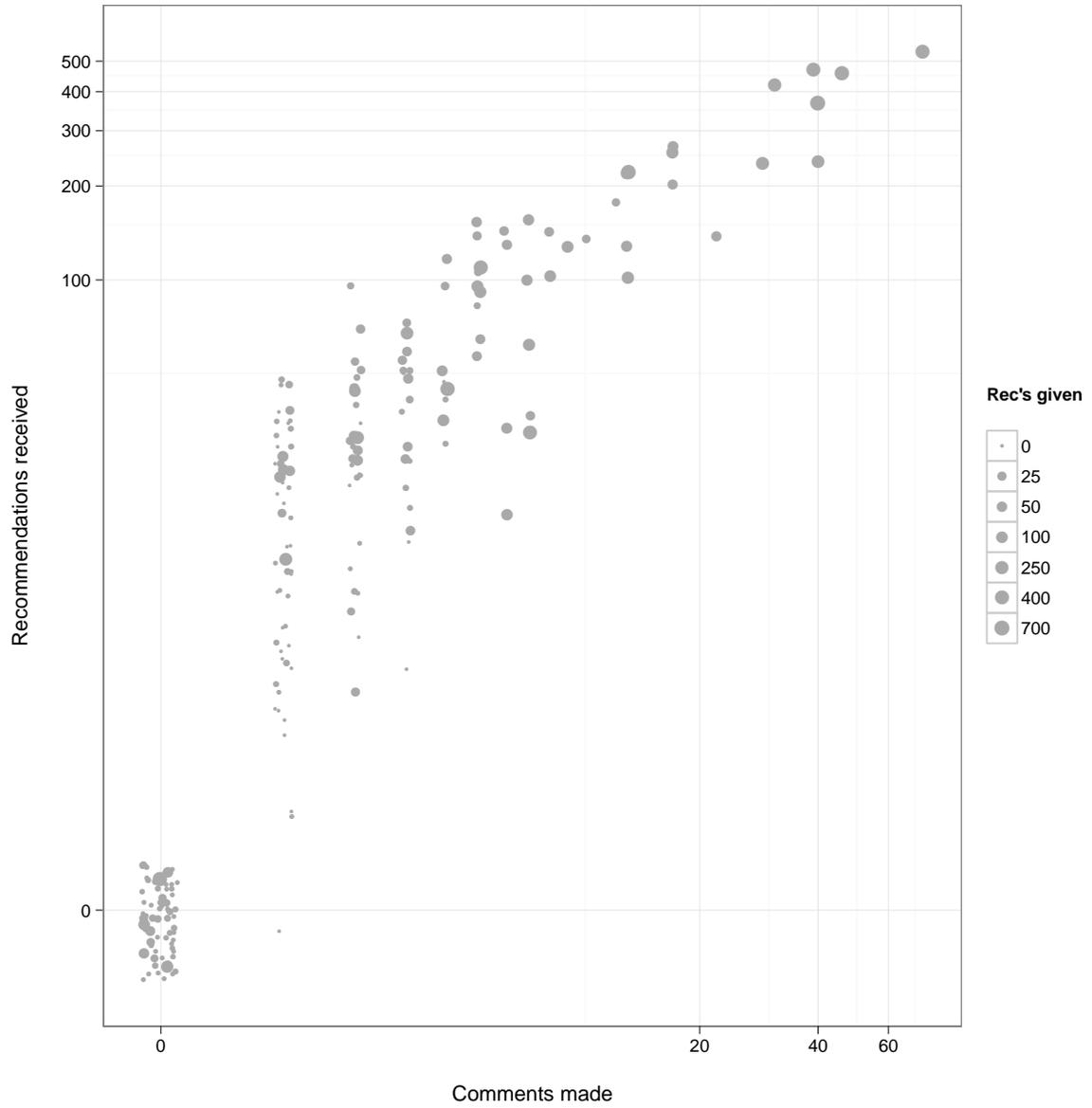


Table 5.3: Key Participants Cheers and Jeers, April 13, 2008

	comments	recommendations received	recommendations given
Phil N DeBlanc	46	459	500
Bill in Portland Maine	13	219	103
homogenius	22	138	46
joan reports	4	47	0
2Nurselady	3	5	0

These examples show an association between status, gatekeeping behavior, and participation in a single comment thread. The visualization also illustrates that the centralized gatekeeping practices performed by high status individuals like homogenius and Phil N DeBlanc also possess a collective, decentralized aspect insofar as their individual judgments are reinforced by dozens of other individuals who chose to recommend the comments in question or not.

Patterns of Decentralized Gatekeeping

In order to evaluate whether the relational work that happens in C & J comment threads produces decentralized gatekeeping at an aggregate level, I require more data and different methods. The evidence from the single comment thread discussed in the previous section suggests an effective means of testing for the presence of aggregated patterns of decentralized gatekeeping behavior. That example showed how site participants utilize the system of comments and recommendations to negotiate status relations, rewarding desirable forms of participation, experience and commitment with higher numbers of recommendations. In this section, I extend this finding and test whether these associations persist at a much larger scale, using a sample of over five thousand site participants and their behavior in several hundred comment threads within “Cheers & Jeers” during all of 2008. First, I present a descriptive analysis of the users, comments, and recommendations in my sample, including attributes of the network created by user comment recommendations. Then, using the same data, I construct a deductive test of the hypothesis that the relational work of recommending comments among Daily Kos users produces an aggregate pattern of decentralized gatekeeping.

Data and Methods

The data set I use to conduct this analysis contains all of the comments and recommendations from Cheers & Jeers in 2008. As a frame for drawing a *purposive sample* of users,

comments, and recommendations, C & J captures a very prominent and culturally significant subset of the Daily Kos population. It also makes for a strong test of decentralized gatekeeping, as participants in C & J threads tend to be, if anything, more experienced and more active than a random sample of site members would be. As a result, if decentralized gatekeeping occurs in C & J, that would suggest that they are very likely to be present across the rest of the site, where experienced or elite users are even more likely to encounter and interact with new users less familiar with the norms and rules of the community.

As discussed above in the Research Design and Methods section, the outcome of interest in this analysis is the reputational status of individual participants in the C & J comment threads measured by the number of recommendations their comments receive. I operationalize this as two distinct dependent variables. First, for the purposes of hypothesis testing and modeling the relationship between incumbency and reputational status, I divide each individual's total number of recommendations received by their total number of comments made. The resulting variable is thus the individual user's average recommendations per comment in 2008. This measure approximates what Daily Kos users experience and see in the context of comment threads, where each comment appears alongside the number of recommendations it has received. Second, for the purposes of describing and analyzing the network formed by site users (vertices) and their recommendations of comments (directed edges), I calculate the Bonacich centrality score of each user within the 2008 comment-recommendation network.²⁶

I include several independent variables in my analysis as measurements of distinct dimensions of user incumbency and controls. To measure experience, I use a count of the number of months elapsed between the month in which the user created his or her account and January, 2008. I also include an indicator of whether or not the user appeared on the site's masthead and was thus formally a site elite. Another variable, "activity" consists of count of the number of C & J comment threads in which the user participated in 2008 by either posting a comment or recommending someone else's comment. Finally, I also measure the total number of recommendations made by the user in C & J comment threads during 2008 (outdegree within the recommendation network).

My analysis proceeds in two steps. First, I describe the user-comment-recommendation network using a series of summary statistics as well as graph-level indices. For some of these indices, I conduct non-parametric tests to determine whether or not the network is more centralized or consists of more reciprocal ties than would be predicted by chance given its particular density and size (Wasserman and Faust, 1995; Butts, 2008).

²⁶I use Bonacich centrality in this case because it operationalizes a relational concept of influence where the value of someone's attention or recommendation is measured in turn by who recommends their contributions (Bonacich, 1987). Approximating eigenvector centrality scores, I set the attenuation parameter β equal to 3/4 the inverse of the maximum eigenvalue of the user-recommendation adjacency matrix. In this case, that value $\beta = 9.85 * 10^{-6}$. The use of such a small, positive β results in centrality scores that slightly reward individuals whose comments have more recommendations from individuals whose comments have also received many recommendations.

Table 5.4: Summary of activity on Cheers & Jeers, 2008

	total	unique users
stories	237	–
comments made	172920	4660
recommendations received	1973303	4165
recommendations given	1973303	4595

In the second stage of my analysis, I use ordinary least squares regression (OLS) and quantile regression models to test for evidence of an association between user incumbency and reputational status (Koenker, 2005; Koenker and Hallock, 2001). The rationale behind my use of quantile regression derives from the extremely skewed distribution of the dependent variable – recommendations received per comment per user. Given the extreme inequalities across the distribution, I have reason to expect that the processes driving status acquisition may vary across the distribution of the outcome. By dividing the distribution of this outcome into quantiles and then calculating coefficients for each quantile, I am able to estimate more precisely the relationship between each of the independent variables and my outcome measure. Following Koenker, I also calculate bootstrapped standard errors and p-values for each of these coefficients.

Results

Table 5.4 presents summary data about the sample of comments, recommendations given and recommendations received among Cheers & Jeers users in 2008. Descriptive statistics for all of the variables, including pairwise correlations, are provided in Table 5.5.

As is typical for measures of traffic, recommendation, and attention in online communities, all of different measures of reputational status follow extremely skewed distributions, with median values close to zero. Indeed, plotting and fitting curves to the distribution of user recommendations received, Bonacich centrality, and recommendations-per-comment reveals that they all follow a “parabolic fractal” distribution, one of several “power law” distributions that recur frequently in natural and social phenomena (Adamic and Huberman, 2000; Laherrère, 1996). Given such extreme distributions, I use the natural logarithm for reputational status measures as well as activity and recommendations given in the correlation tables below as well as all subsequent models.

Table 5.6 includes descriptive and graph-level analyses of the comment recommendation network. Overall, these results reveal a fairly centralized graph in which the vast majority of dyads contain mutual ties and where reciprocal ties are extremely more likely than would be predicted by chance.

Given that the graph is relatively sparse, with only a moderate portion of the total possible dyadic ties between users realized, the non-parametric calculation of the log-odds ratio of reciprocity (LRR) is noteworthy. This measure uses the size and density of the network to calculate the probability that any tie in the graph is reciprocated given the underlying probability of an edge existing in the first place. The relatively high odds of a reciprocal tie suggest that C & J users who were active as both commenters and recommenders during 2008 were likely to engage in reciprocal recommendations. The results of the models, presented in Table 5.7, show evidence of a complex, differential relationship between users' experience, activity and reputational status.²⁷

Overall, the results suggest a significant, positive association between user activity and the number of recommendations-received-per-comment. The association varies depending on the outcome, growing steadily through the fiftieth percentile of the distribution before stabilizing around a maximum level.

In addition, I find a significant, positive association between user experience and the number of recommendations-received-per-comment. This association follows a distinct pattern of growth across the different quantiles of the dependent variable, remaining relatively insignificant below the fiftieth percentile and then growing rapidly over the rest of the distribution.

²⁷For the purposes of interpretation, note that I use the natural logarithm of the dependent variable as well as several of the independent variables. These results are robust to the inclusion of interaction and quadratic terms.

Table 5.5: Summary Statistics, Cheers and Jeers, 2008

	Summary Values				Pairwise Correlations					
	min	median	mean	max	(1)	(2)	(3)	(4)	(5)	(6)
(1) comments made	0	2	29.93	11347						
(2) recommendations received	0	2	341.52	77751	0.76*					
(3) rec's received per comment	0	1	7.65	7248	0.00	0.09*				
(4) Bonacich centrality score	0	0.01	0.14	31.83	0.00	0.01	0.00			
(5) recommendations given	0	17	341.52	76136	0.94*	0.78*	0.01	0.00		
(6) active stories	1	2	8.95	237	0.52*	0.63*	0.08*	0.01	0.64*	
(7) months of experience	0	21	20.21	51	0.03*	0.02	-0.01	0.08*	0.05*	0.08*

† Interval scale with January, 2008 = 0

* p-value ≤ 0.05

Table 5.6: Network Variables & Graph Level Indices, Cheers & Jeers 2008

Measure	Value
vertices (active users)	5778
edges (recommendations)	1973303
mutual edges (dyads)	47698
asymmetric edges (dyads)	180070
null edges (dyads)	16461985
network density	0.01
edgewise reciprocity	0.35
log-odds reciprocity ratio [†]	3.74

[†] Calculated against the baseline probability of an edge within any graph with the same number of nodes and edges.

A significant, negative relationship between recommendations-given and recommendations-received-per-comment also emerges at the fiftieth percentile of the dependent variable, dropping steeply across the rest of the distribution. I find no evidence of a significant relationship between elite user status and recommendations-per-comment.

Table 5.7: Regression Results Daily Kos Cheers & Jeers, 2008
Dependent Variable: Recommendations Received per Comment[†]

	OLS	Quantile Regression					
		0.1	0.25	0.5	0.75	0.9	0.95
(Intercept)	.202***	-.123***	-.305***	-.523***	.265***	1.212***	1.913***
Rec's given [†]	-.110***	0	0	0	-.078***	-.157***	-.244***
Active stories [†]	.733***	.179***	.441***	.757***	.865***	.962***	.997***
Months exper.	.003***	0	0	0	.006***	.008***	.011***
Elite user	-.083	.001	-.001	0	-.047	-.031	-.352

$N = 4655$

Adjusted $R^2 = 0.330$

[†] Indicates logged variable. Dependent variable is also logged.

* p-value ≤ 0.01

Discussion: Gatekeeping and Reputational Status

Returning to the hypotheses listed earlier, the results suggest that experience and activity level have a significant association with recommendations-received-per-comment (supporting *H1a* and *H1b*). At the same time I find no evidence of an association between elite status and recommendations-received-per-comment (failing to reject the null for *H1c*), as well as a significant negative association between recommendations-given and recommendations-received-per-comment (reversing the expected relationship from *H2*).

There appear to be strong associations between reputational status and experience and activity within C & J comment threads. Overall, these findings support the idea that patterns of decentralized gatekeeping emerge in the data. Users' relative experience and activity levels within comment threads associate with reputational payoffs. At the same time, as the negative association of recommendation-giving and comment-receiving illustrates, not all forms of activity associate with the same kinds of reputational outcomes. User incumbency predicts reputational status more effectively depending on the sort of activity users tend to pursue.

These findings have several important limitations, the most important of which stems from potential for endogeneity in the models. The analysis I have presented here cannot distinguish between situations where Daily Kos users participate on the site longer *because* they receive more recommendations versus situations where Daily Kos users receive more recommendations *because* they have participated on the site longer. Nevertheless, the possibility of reverse causality along these lines does not undermine the validity of my finding that "experience pays" for Daily Kos users insofar as peer-generated status measures on the site are concerned. The strong association between experience and status implies that decentralized gatekeeping effects – the systematic accrual or retention of privileges by incumbent individuals within the community – occur irrespective of the direction of the causal processes involved. Indeed, I would argue that it is likely that a process of self-selection unfolds whereby the community members who decide to return to the site over the course of many weeks, months, and years may do so both because they receive positive reinforcement and because they seek to acquire greater standing among their peers. In concluding that more experience is associated with greater reputational status, it is not necessary to separate the one story from the other. As I argued earlier, decentralized gatekeeping, unlike its centralized variants, need not be the product of self-conscious filtering procedures or acts of exclusion. Instead, decentralized gatekeeping effects encompass the range of mechanisms by which both self-selection and exclusion give rise to and reinforce incumbent advantages within information-generating systems. Longitudinal analysis of the same data could not reasonably distinguish between these competing causal storylines either, as there is no meaningful way to control for the (presumably variable) differences in intrinsic quality of comments or commenters. This is a critical limitation because without such controls, no statistical test can separate users who stay on the site longer because they accrue greater status from those who accrue

greater status because they stay on the site longer. Future research should design more nuanced tests that can disentangle these respective explanations of my findings.

Given the culturally significant role of C & J within the Daily Kos site as a whole, as well as the relatively egalitarian social norms that prevail among C & J participants, I conclude that similar patterns of behavior are likely present across the rest of the site, although they may be more difficult to observe or measure in a valid way.

Strong benefits to experience and influence make intuitive sense – indeed, such patterns are exactly what the existing empirical and theoretical literature on online informational production and exchange that I reviewed above would predict. However, the evidence that Daily Kos participants’ highly unequal levels of experience, activity, and reputation associate so strongly suggests that the dynamics of social reproduction among the site’s users are quite stable. In this sense, the case illustrates Tilly’s notion of the relational foundations of inequality:

In a relational view, inequality emerges from asymmetrical social interactions in which advantages accumulate on one side or the other, fortified by the construction of social categories that justify and sustain unequal advantage. As a rough analogy, consider a conversation involving initially equal partners in the course of which (through wit, guile, knowledge or loudness) one conversationalist gradually gains the upper hand (Tilly, 2001, p. 362).

Tilly’s “rough analogy” of relational work to a conversation helps map this claim onto the context of Daily Kos. Among Daily Kos participants, stable, extreme inequalities of status and participation have emerged in a number of distinct arenas. In general, site participants who are more active contributors and have a greater amount of experience tend to accrue greater status. This association between experience, participation level, and status suggests that the interactions among site participants play an important role in generating and sustaining social hierarchies.

Conclusions

The results presented here suggest the presence of two kinds of gatekeeping on Daily Kos, both of which have contradictory effects on the site. Collective action in a large and “open” online community entails more than the traditional forms of gatekeeping performed by site elites and administrators: it also relies on participants’ decentralized interactions, which give rise to decentralized gatekeeping. Decentralized gatekeeping facilitates both bottom-up deliberation and governance as well as the reproduction of status inequalities. These inequalities, in turn, feed back into the complex of norms,

practices, and standards that prevail among site users, contributing to the processes of social reproduction in the community.

I want to underscore the fact that gatekeeping practices incorporate the contestation and negotiation of status relations on the site. My examples illustrate how high-status contributors to Cheers & Jeers performed boundary work in moderating the comment threads. Sometimes – as with 2NurseLady – they did so through disagreement with site elites like Bill in Portland Maine; however, the aggregated evidence taken from the entire archive of 2008 C & J comment threads suggests that the effects also reproduce diffuse status inequalities across the user population as a whole.

In the incidents involving joan reports and 2NurseLady, the ability of the community members to moderate successfully depended in part on their ability to draw on and deploy appropriate codes of behavior established on the site. In deploying these codes, they enacted informal community norms which validated contributions consistent with the overarching goals articulated by Moulitsas, Harnsberger and other site elites elsewhere. When necessary, they also contested and adapted existing standards to suit their needs in particular situations.

Across these examples, the distinction between centralized and decentralized gatekeeping is porous, and there are many ways in which Moulitsas' and other site elites' actions influence the patterns of gatekeeping that prevail across the rest of the community. The effects of decentralized gatekeeping are, in some sense, the cumulative result of many small-scale examples of relational boundary work, each instance of which involves much smaller numbers of people in specific interactions. Among the site elites and leaders, the tendency towards social closure and exclusion must continually be balanced against the ideological and organizational exigencies to egalitarian and democratic ideals. As 2Nurselady demonstrated, appeals to such ideals – even when made by an outsider who neither understands nor has a long-term commitment to the site – are taken seriously. Participatory governance and democratic legitimacy matter on Daily Kos and decentralized interactions represent one way in which these values are translated into practice.

Future research should pursue more precise identification strategies through which to test for the presence or effects of decentralized gatekeeping. The mechanisms of gatekeeping described here only reflect a snapshot of a single dimension of participation (commenting) on the Daily Kos site during a specific period of time. Patterns of decentralized gatekeeping and path dependency reinforced through comment recommendation are not likely to determine the social structure among the site's community as a whole. Making comments and receiving recommendations is far from the only means by which members of the site might participate and acquire status in the eyes of their peers. There are also user-blogs (diaries); participation in offline and advocacy events (such as the annual Netroots Nation Conference or unaffiliated social events); as well as work within the formal Daily Kos organization or other organizations that make up the netroots political movement. In other words, the practices of comment recommendation and the corresponding patterns of path dependency that go along with these practices only constitute

a single dimension of the multiplex social processes through which status hierarchies may emerge, rise and fall within Daily Kos as a whole. Reputational gains through commenting thus do not guarantee that a given user of the site will become well-known or achieve broader influence, although they are an index of a certain kind of reputational standing. Status achieved or measured through comments is not determinative of other sorts of status within the community. However, comment recommendations do provide a visible and objective indicator of one dimension of the community's status relations. More fine-grained longitudinal analyses of the patterns of comment posting and recommendation in relation to other modes of status acquisition would be necessary to establish the precise mechanisms by which Daily Kos participants become more or less influential members of the community overall. Also, further analysis will be necessary to establish whether or not the oligarchic tendencies revealed by this analysis persist across these other forms of behavior.

To the extent that the patterns of decentralized gatekeeping analyzed here constitute a path dependent system of status relations, they imply several conclusions relevant to theories of gatekeeping, democratic organizations, and the networked public sphere. First of all, the presence of decentralized gatekeeping complicates the “myth of digital democracy” perspective elaborated by Hindman and others that views the online public sphere as nothing more than a new setting in which old elites can exert their influence. Just as traditional social movement organizations cannot be defined in reference to the identities of their leaders alone, it does not make sense to characterize Daily Kos as an extension of the personality traits of Markos Moulitsas. In moments of conflict, Moulitsas may draw on his monopolistic control over the site infrastructure as a rhetorical justification for the legitimacy of his perspectives, but both he and the other site elites ultimately rely on the persuasiveness of their rhetoric and their ability to build discursive consensus. In this sense, the processes and practices of decentralized gatekeeping reinforce the democratic basis of the site – only the best contributions and the most compelling contributors receive broad support – at the same time as they serve the interests of those who already possess status and influence within the community.

Indirectly, decentralized gatekeeping dynamics partially reinforce Hindman's view that social reproduction emerges through the network dynamics of communication and participation in the open and non-bureaucratic organizations of the blogosphere. In this sense, even though Daily Kos may be unique in terms of its scale and recognition in the political blogosphere, the site exemplifies patterns of attention, influence, and participation found within open source software development communities, Wikipedia, networked social movement organizations, and other sorts of open collective action projects. If decentralized gatekeeping prevails across these other kinds of environments, the putative link between openness and egalitarian outcomes is indeed, as Hindman claims, something of a myth. Decentralized gatekeeping may represent yet another pathway towards inequality production within the larger sphere of democratic and online participation even at the same time as it introduces a means for participants to exercise democratic influence within particular sites or movement organizations.

This analysis of gatekeeping in Daily Kos also reveals some of the variations that characterize gatekeeping in networked environments in contrast with their offline counterparts. Previous studies of offline gatekeeping have focused on bureaucratic settings with fairly clear boundaries. These settings have given rise to modes of gatekeeping behavior largely consistent with the organizational affordances and constraints particular to each environment. For example, newspaper editors exercise individual and collective authority over what sorts of news makes the front page. Likewise, tenured faculty at research universities review grant proposals to determine which projects will receive funding and institutional support. In both cases, incumbents or elites establish and enforce norms that enable them to manage the boundaries of a particular field. In addition, the gatekeeping might proceed at either an individual or a collective level. A single editor makes choices about articles that go into her particular section and newspaper, and she also attends conferences and social events where industry-wide standards are discussed among her fellow editors.

Gatekeeping mechanisms in online collectives like Daily Kos have similar dimensions to offline settings. Moulitsas, the other site elites, and some of the well-recognized incumbent users may hold the authority to directly shape and enforce the sorts of behavior that are considered legitimate on the site. In particular, Moulitsas' unique role as the site's figurehead as well as his absolute authority over the site's infrastructure provide him with broad dictatorial powers, although he seems to avoid using them to their full extent.²⁸ At the same time, the collective gatekeeping practices *also* take on a more decentralized character as the practices of deploying categories of behavior and enforcing norms are distributed more widely across the community. While this study has characterized these decentralized gatekeeping effects and found quantitative evidence of their presence on an aggregate scale, my findings here cannot speak to the effects of decentralized gatekeeping on either the character of political discourse or political engagement. Other studies have addressed these issues (Lawrence et al., 2010; Smith, 2009; Schlozman et al., 2010), but more research will be necessary to evaluate whether and how such transformations matter for the future of political engagement, news production, and collective action.

The establishment and preservation of an elite minority within open online collectives may serve an analogous purpose to the stabilization of management structure and roles in more traditional organizational forms. Elite community members can provide continuity as well as a baseline of contributions to the site at the same time as they play an agenda-setting role relative to their peers. They can also incorporate less experienced peers into the community through the transmission of norms and training (Antin and Cheshire, 2010; Preece and Shneiderman, 2009). In the context of building an effective movement organization, this kind of leadership can promote long-term movement sur-

²⁸This sort of "benevolent dictatorship" is a common organizational structure in online collectives, such as the Linux kernel development community (Weber, 2004). As Weber argues, strong norms of meritocracy as well as the strict technical demands of creating a functional computer operating system are reasons this autocratic mode of governance retains legitimacy, despite its obvious contradictions with the egalitarian and communitarian ethos underpinning open source and online collaboration.

vival, the achievement of advocacy goals and other forms of success. In open online collectives, gatekeeping and similar practices may therefore be necessary for the success and survival of the community as they allow for the cultivation of a high signal-to-noise ratio in what would otherwise be a cacophonous, chaotic environment. According to such a view, the exclusion of certain people and perspectives could serve a productive function inasmuch as it allows for the site to achieve growth and coherence and the leaders to achieve their objectives. So long as decentralized gatekeeping allows opportunities for legitimate deliberation and contestation, such patterns of exclusion and social reproduction may, in fact, provide for democratic participation in a more effective manner than other kinds of formal organizational boundary maintenance practices. As findings from a single case do not provide an empirical foundation for settling such debates, however, future work should elaborate these claims and test their applicability to a wider range of open online collectives and network organizations.

Gatekeeping as an Interactional Process

In contrast with the experimental and observational studies of the effects of interactional incentives and motivations in Chapters 2 and 3, this analysis of gatekeeping on Daily Kos underscores how the interactional dimensions of online collective action “come to life” and determine the shape of participation dynamics within a particular community. As a form of interactional boundary maintenance, gatekeeping practices can provide a means by which contributors adapt and enforce social norms. They also provide an occasion to discuss and challenge the perspectives of site elites and other incumbent authority figures. In every case, the impact of gatekeeping and related interactional social processes remains polyvalent. Interactional incentives or motives (the promise of status and esteem among fellow contributors) may drive many individuals to contribute to the Daily Kos community, but the processes and dynamics of social interactions themselves play a critical role in determining the shape and character of participation over time.

My analysis of interactional social processes also deepens the explanations emphasizing generic group or network dynamics. To use an example I referred to earlier, previous research showing that participants in online collectives tend to assume stable roles and structural configurations has not addressed the means by which such roles and structures are established or change over time (e.g. Kittur et al., 2007, 2009; Lampe and Resnick, 2004; Lampe et al., 2007; Ortega and Gonzalez Barahona, 2007; Panciera et al., 2009, 2010; Wilkinson, 2008; Wu et al., 2009). Likewise, ethnographic studies of user participation often fall short of drawing connections back to broader patterns or organizational dynamics such as community governance (e.g. Bryant et al., 2005). Through this qualitative and quantitative analysis of commenting practices, I am able to both analyze the content of interactions to describe gatekeeping practices and to show how the content of these gatekeeping interactions correspond to the larger patterns of governance and structural effects.

These points underscore the benefits of an interactional approach to thinking about the organizational dimensions of online collectives. First, because the interactions themselves reveal the mechanisms and processes underlying meso-level dynamics that contribute to the governance and social reproduction of communities. Second, because the organizational dimension to the Daily Kos environment (and other online collectives) complements existing explanations that focus at the individual level or at the level of generic group processes.

Daily Kos, Online Collectives & The Networked Public Sphere

Building then from the organization and interactional perspective on Daily Kos presented here, I consider the entire field of political blogs in the following Chapter. In doing so, I expand on the analysis of a single blog in order to better understand the forces determining the adoption, character, and impact of online collectives in the context of the *Networked Public Sphere* (Benkler, 2006) in the United States. I also explore the impact of salient aspects of institutional and cultural context on the character of online collectives. As discussed in Chapters 1 and 4, the reasons for doing so derive in part from the limitations of previous research as well as the overarching logic of the interactional approach I am advocating.

The foregoing theoretical and empirical account of decentralized gatekeeping represents a useful counterpoint to previous work emphasizing either the salience of participatory affordances or the reproduction of hierarchy within the political blogosphere. Institutionalized status inequalities inside of open online communities contradict some of the radical egalitarian ideals that make these sites attractive to many people at the same time as they facilitate organizational democracy, long-term movement building goals, and the continued commitment of community insiders.

In this aspect, one goal of the next chapter is to consider how dynamics of the political and public spheres of the U.S. as a whole may shape the structures and practices of participation on Daily Kos. Addressing this question entails taking a broader perspective – one that examines both the relationship of Daily Kos to other political blogs as well as the structure and character of the political blogosphere as an organizational field. Such an approach will help overcome the constraints of studying a single blog at a single point in time. By looking instead at a population of blogs and considering their evolution since 2003 I will be able to address the implications of an interactional approach for explaining the meso-level dynamics of online collectives.

The next chapter also addresses another line of critique that could be applied to the foregoing analysis of Daily Kos as well as the interactional perspective I have tried to elaborate throughout this project. My study of gatekeeping practices does not address the implications of the fact that platform design choices made by Moulitsas and the other site administrators play a huge role in structuring the nature of the social interactions

and discourses that take place within the community. Indeed, the majority of analyses of the networked public sphere and the political blogosphere have argued that the rise of political blogs seems to have produced relatively uniform and stable effects on networked discourse (Adamic and Glance, 2005; Drezner and Farrell, 2008; Hargittai et al., 2008; Hindman, 2008). While this line of argument can tend towards a reductive sort of technological determinism whereby blog interfaces are presumed to cause certain changes in the nature of networked discourse, the idea that the presence of certain participatory affordances in blogging platforms facilitates the rise of more collaborative forms of engagement and discursive production is well-founded (Benkler, 2006). This sort of argument also echoes the logic of pervasive claims that the rise of wikis and similar collaborative online platforms have fundamentally altered the nature of organization and economic production (Shirky, 2008; Tapscott and Williams, 2006). Depending on how compelling you find these claims, they threaten to undermine my view that interactions and social dynamics among the participants in online collectives play a central role in shaping the patterns of contribution and outcomes of online collectives. Does the impact of networked collectives (and online collective action more generally) on society boil down to the adoption of new tools with particularly collaborative affordances? The next chapter addresses this question.

Chapter 6

Online Collectives in Context: The U.S. Political Blogosphere 2003-2008

Introduction

Interactional dynamics such as the gatekeeping practices discussed in the previous chapter constitute the discursive processes and products of some of the largest and most prominent online collectives like Daily Kos. At the same time, the modes of participation and interaction on a site like Daily Kos emerged and evolved in the context of the wider field of U.S. politics and political organizations. As a result, the implications of the patterns of behavior that prevail in Daily Kos hinge on a variety of factors that do not figure in my earlier analysis – for example, the role of the blogosphere within U.S. politics; the distribution of comparable socio-technical infrastructures for participation elsewhere; as well as the particular adoption and use patterns of blogs and related tools across distinct subsets of the population.

In this chapter, I extend my analysis of Daily Kos by contextualizing it within the broader trajectory of the political blogosphere as a whole. Since its emergence around 2003, the political blogosphere has become a key arena of online collective action, spurring debates about the Internet's potential to transform political engagement and the public sphere. Some observers emphasize the democratizing potential and egalitarian character of large-scale online communities and collaborative platforms, such as political blogs or social network sites (SNS) (Benkler, 2006; Shaw and Benkler, 2012; Karpf, 2012, 2008b). Others have questioned the idea that networked communication over the Internet has altered or overcome underlying social inequalities that ultimately determine who gets to participate in the political sphere (Hargittai, 2010; Hindman, 2008; Schlozman et al., 2010; Zukin et al., 2006). A third group have considered the organizational contexts within which digital technologies for campaigning have become institutionalized and implemented (Howard, 2005; Kreiss, 2012; Nielsen, 2012).

An effective analysis of the political blogosphere must, to some extent, integrate these different perspectives while also addressing the interactional dimensions of participation I have addressed in Chapter 5. Those who claim that blogs and networked movements hold the potential to democratize political discourse and participation ground their arguments on the view that online collectives do not simply reproduce existing, offline inequalities, but rather enable new publics to coalesce and mobilize in a more egalitarian fashion than was historically feasible (Benkler, 2006; Shirky, 2008). Counterarguments have underscored the persistence of socioeconomic and other socio-structural inequalities as predictors of participation (e.g. Schlozman et al., 2010; Hargittai, 2010). Scholars of politics and democracy have also criticized the design of technical systems that algorithmically reproduce preexisting inequalities of attention and privilege (Hindman, 2008). However, the fact that online tools *might* make enhanced collaboration and political participation possible does not determine their effects. As the previous chapter on Daily Kos shows, members of a given collective may adopt practices that canalize participation in ways that *both* facilitate bottom-up organizational governance *and* reproduce an existing status order. In this sense, assessing the character and impact of a population of online collectives like political blogs requires both closer attention to the internal dynamics of participation within communities as well as to the dynamics of the organizational and cultural fields within which they emerge.

The previous chapter examined the participation dynamics within a single political blog and showed how everyday interactions on the site tend to facilitate organizational democracy at the same time as they reproduce norms, boundaries and status relations. This chapter analyzes a much larger sample of the political blogosphere in order to assess the extent to which interactional dynamics within online collectives may be shaped through broader social forces, such as those at work in the arena U.S. politics. I focus on three related developments across the organizational field inhabited by elite U.S. political blogs: the irruption and subsequent stabilization of the blogosphere; the professionalization and bureaucratization of major blogs; and, finally, the emergence of stable cross-ideological variations across the left and right wings of the blogosphere. In the process, I step back from my earlier focus on group dynamics and interactions in order to examine the organizational characteristics and technological infrastructures through which blog-based interactions occur.

The questions that frame this chapter derive from my earlier analysis of interactional incentives and dynamics in Mechanical Turk, Wikipedia, and Daily Kos. Specifically, this chapter provides an opportunity to elaborate on some of the organizational, technological, and cultural factors that determine the extent to which interactional dimensions of online collectives emerge in the first place. In the case of an individual political blog like Daily Kos, the technical platform and culture of the community are deeply intertwined, making it difficult to explain whether or how one may have shaped the other. Likewise, the presence of social awards like Barnstars on Wikipedia reflects the fact that the site participants have adapted the underlying MediaWiki software in order to support a particular set of cultural values and practices. Analyses limited to a single site can-

not overcome these constraints. By analyzing a larger set of online collectives (political blogs) in the context of particular organizational fields (U.S. politics and political media), I gain the ability to consider both how particular communities adopt technological tools and social formations. I also can begin to speculate more effectively about the impact of online collectives and the interactional dynamics that contribute to their functioning within a wider context. Consequently, the analysis speaks both to the generalizability and implications of the earlier chapters.

For these reasons, the political blogosphere provides an excellent site for further considering the impact of online collectives and for better understanding the effects of the interactional dimensions of online participation. As hybrid organizations that encompass some of the same activities as new producers, movement organizations, and political consultancies, blogs simultaneously entered several extraordinarily crowded and competitive spheres. This meant that they not only confronted the challenges of other online collectives (e.g. attracting and retaining contributors, establishing legitimacy, sustaining contributions, managing boundaries, etc.), but also had to do so in organizational fields filled with incumbent actors. As a consequence, the trajectory of the political blogosphere provides an opportunity to consider some of the reasons why online collective action does not proceed in an undifferentiated fashion. Blogging technology provides affordances that support effective, sustainable commons-based production, but these affordances can be adopted and adapted at different rates, by different segments of the population, leading to social practices with divergent implications for democracy, media production, and the public sphere.

In the sections that follow, I first situate my analysis in the context of previous approaches to analyzing blogs and participation in the public sphere. I then present a brief history of the U.S. political blogosphere, emphasizing two processes that have marked its evolution: the professionalization of bloggers and blogging organizations, as well as the stabilization of a set of highly prominent elite blogs that attract the most attention and influence. Then, I present evidence from a content analysis of 155 blogs showing that, as of Summer, 2008, the political blogosphere consisted of a wide range of participatory infrastructures, consistent with the strong ideological divisions separating the political left and the right in America. Finally, I consider the implications of these findings for democracy and the public sphere, as well as for what the trajectory and impact of the blogosphere in the field of U.S. politics might mean for online collectives more broadly and for the interactional theory of online collective action I have elaborated throughout this project.

Background:

Blogs, Democracy, and the Public Sphere

Early research on the blogosphere focused on the dynamics of linking and discursive production as political blogs emerged as one of the most visible forms of online engagement

during the 2004 presidential campaign. This first generation of arguments was based largely on anecdotal evidence; however beginning in 2004-2005, scholars began applying network analysis to study hyperlink patterns and to characterize the blogosphere as a whole. This quantitative work assessed whether the Internet altered levels of discursive participation and deliberation. The primary arguments that the Internet decreased discursive participation claimed that the power law distribution of links into sites prevented all but a few sites from being observed (Barabási, 2003; Hindman, 2008). On the other hand, Farrell and collaborators observed that blog readers are particularly “activated,” reporting high degrees of political participation in surveys (Drezner and Farrell, 2008; Lawrence et al., 2010). Interpreting link analysis data, Benkler (2006) argued that participation increased to the extent that individuals could contribute to debates directly, or through someone they know directly. By contributing to blogs that are part of tightly clustered communities of interest, Benkler claimed that less well-known individuals could attract attention from ever-larger attention clusters and communities. Wallsten’s analysis of agenda setting and the blogosphere during the 2004 campaign provided additional empirical support for this claim (Wallsten, 2007).¹ Hindman (2008) countered these arguments with empirical claims that the overall size of the political public sphere was negligible, and that the leading voices in the blogosphere were as elite as those of the most exclusive editorial pages of the country’s newspapers. Sunstein (2002; 2007), meanwhile, emphasized the risk of the Internet undermining deliberation. Adamic & Glance (2005) claimed to support this hypothesis with their finding that only one in six links at the top of the left and right blogospheres linked across the ideological divide. The only study combining link analysis with content analysis showed that many of the links across the divide involved substantive argument, and that the two sides of the blogosphere did not exhibit greater insularity or polarization over time (Hargittai et al., 2008).

Throughout the early period of political blogosphere research, however, studies treated the domain space of all blogs as comprised of homogeneous units of analysis, and, using this framework, found the left and right wings of the blogosphere to be largely symmetric. One early exception to this tendency was a report by Bowers & Stoller (2005), two prominent members of the left blogosphere, who embraced a more dichotomous view of left and right wing blogs. They argued that elite blogs on the right reproduced an integrated, top-down approach to political messaging that reinforced off-line communities and organizations, whereas elite left-wing blogs took a more participatory approach and sought to build new political communities (Bowers and Stoller, 2005, : 4-5). Their report, however, neither engaged nor infiltrated academic debates on the subject. As a result, the “symmetric blogospheres” argument remained in place.

Link-based network analysis has appeared to confirm the symmetric blogospheres argument. In this approach, analyzing the network graph of blogs through hyperlinks has

¹Wallsten draws mixed conclusions in this regard. On the one hand, he claims that blogs perform an influential role in the public sphere vis-a-vis their effect on the traditional mass media; at the same time, he joins Hindman (2008) in claiming that the demographics of A-list bloggers (white, male, educated, wealthy) tend to reinforce the cultural and political biases of the traditional media.

entailed interpreting blog domains as discrete speakers. Each blog domain (for example, <http://www.hotair.com> or <http://www.mydd.com>) represents a node in the graph that stands for the networked public sphere; and inter-domain links represent conversational moves as well as attention to statements. Thus, a low link count into the blog domain means low attention levels to statements made on that blog. Only links between domains, in this approach, count as attending to what is said. Internal discourse among users of the same blog does not count, because these users are not counted.

The Significance of Intra-blog Variations

Treating each blog as one node has masked important differences. Hindman's (2008) argument about the replication of media elitism in the blogosphere illustrates this point. Hindman analyzes 75 individual top bloggers (e.g. Markos Moulitsas of Daily Kos and Glenn Reynolds of Instapundit), and argues that blogs are written by authors who are at least as elite as the op-ed columnists of the leading newspapers in terms of educational credentials, professional or technical background, gender and race. Enhanced democratization of the networked public sphere is, according to this view, a myth. The problem with this claim is that it rests on the assumption that a platform hosting substantive contributions from thousands of users every day (Daily Kos) represents an identical unit of analysis to a site authored by a single individual (Instapundit). This interpretation misses a core attribute of blogosphere discourse that should be obvious from the previous chapter: Daily Kos – and several other large, collaborative blogs like it – is composed of literally thousands of individuals engaged in ongoing discussion and information sharing. To treat the actions or perspectives of these individuals as somehow equivalent to those of Moulitsas does not make sense.

In effect, the resolution of the standard tools used in these prior studies was too low to show the diversity of the networked public sphere. As indicated above, one consequence of the low resolution has been that prior studies portrayed the left and right wing blogospheres as mirroring each other in most respects.

By contrast, the importance of increasing the level of resolution in analyses of the blogosphere as a whole is shown most clearly in Hargittai et al. (2008). Their analysis confirms the patterns of linking behavior across the political divide observed by Adamic and Glance (2005), but they then use content analysis to show that the prior interpretations of this linking pattern – polarization and fragmentation – is false. By increasing the resolution – analyzing the content of the actual statements – they showed that many statements across the political divide are substantive, and that positions expressed on the left and the right do not become more extreme over time. The results of their study also imply that an analysis of the socio-economic status of privileged speakers within each site is not sufficient to understand their role within the networked public sphere as a whole.

Part of this chapter extends both my work on Daily Kos as well as the existing methodological critiques of link analysis of the U.S. political blogosphere by comparing within-domain practices. One objective of this comparison is to establish whether studies grounded in link analysis alone have obscured both the diversity of participatory affordances online as well as the primary mechanisms by which the networked public sphere could increase or decrease democratic participation relative to the mass mediated public sphere. A secondary objective lies in considering the extent to which the participatory practices that characterize Daily Kos represent broader trends across the rest of the blogosphere.

To be clear, this analysis does not shed light on either the quality of participation or the extent of polarization in online discourse, but those cannot be the sole theoretical touchstones of analysis of the networked public sphere. Concern with “polarization” comes out of a particular democratic theory that emphasizes deliberation, or the capacity to attend respectfully to the arguments of others (Habermas, 1962). A range of democratic theories also ask who has the opportunity to be heard, and to convert a particular matter of concern into a credible item on a society’s political agenda. This research operationalizes these questions of participation. To the extent that one holds a view of democracy that is not exclusively focused on deliberation, but is oriented toward recognizing the diversity of views in society and the importance of political mobilization, socio-technical affordances that allow interest groups to develop their own agendas, and then convert them into public action, can enhance democracy. To the extent that participation can be squelched by existing structures of political, economic, and cultural power, organizational pathways around these blockages may support effective participation by people historically excluded from setting the public agenda. The creation of such pathways could improve the openness of the public sphere to views and agenda setting efforts outside the traditional sources of discursive and cultural power. In particular, these pathways might enhance the participation of Internet users who in the past were consigned to the role of passive consumers. In this regard, it is critical to investigate whether the Internet can be used to enhance the available opportunities for democratic participation and engagement, while recognizing that opportunities alone are not equivalent to deeper forms of institutionalized social transformation.²

This chapter also speaks to concerns beyond the study of democracy and the public sphere. First, it addresses an older theoretical debate over the degree to which a communications technology determines how knowledge is produced, controlled, and used in a society. Media determinism, the view that the material characteristics of a given technology define its uses, is anchored in Marshall McLuhan’s (1962) work as well as that of Harold Innis (1951), who argued for the centrality of media to structures of political power and authority. While few academics today subscribe to McLuhan’s strong-form deterministic view, it continues to exert influence in popular and non-academic policy circles. More common is a range of views from “soft” determinism to more thoroughgoing institution-

²It is important to underscore the contingencies implicit in this claim. Previous work on the “participation divide” shows that the existence of participatory affordances does not ensure that such affordances will be adopted or undermine existing social inequalities (Hargittai and Walejko, 2008).

alism and “performativity.” Soft determinism emphasizes how the technical affordances and constraints of a technology affect its likely patterns of use, interacting with, and sometimes even shaping, other forces that structure discourse in a given period (Innis, 1951; Eisenstein, 1979; Beniger, 1986). By contrast, institutionalist claims emphasize the organizational, legal, and political decisions that surround the use of a communication technology (McChesney, 1993; Starr, 2005). Theories of performativity, on the other hand, emphasize how social relations and the conditions of knowledge production shape technologies (e.g. MacKenzie, 2006). On balance, few scholars hold a simple, single-cause view of any form, and a large body of work focuses on the mutual shaping of technological, political, organizational, and cultural forms (e.g. Barnouw, 1966; Benkler, 2006; Castells, 1996; Habermas, 1962; Winner, 1986).

A more complex relationship may characterize the emergence of a particular technology, its adoption patterns, and the political-theoretical implications of its actual use. The technology of interest in this case, the weblog, offers a wide range of flexible affordances and is implemented in a legal framework that neither determines nor substantially narrows its use. Likewise, the organizational forms for control of blogs do not tend to constrain their use. All these historical facts about the way the Internet has been deployed and adopted are contingent, and susceptible to challenge and change (Benkler, 2006). Nevertheless, they characterize the actual state of affairs in the 1990s and 2000s; and this state of affairs left the technological and institutional frameworks relatively open. By comparing technical, organizational, and institutional aspects of blogs, this study assesses whether the networked public sphere has in fact developed around a homogeneous set of participatory practices, which might support a more deterministic view, or whether the evidence supports more complicated, differentiated patterns of participation.

Emergence and Evolution of the U.S. Political Blogosphere

The U.S. political blogosphere emerged during the 2004 presidential campaign. Since that time, the landscape of political blogs has undergone several dramatic shifts as well as a series of somewhat more subtle evolutionary changes. The most significant, ongoing transformation has been the formalization and professionalization of the most prominent individuals and organizations involved in political blogging. As part of this process, the political blogosphere has become integrated into the loose organizational networks of the press, political parties, non-profits, consulting firms, and political action committees that make up the wider sphere of American politics (Drezner and Farrell, 2008; Kerbel, 2009). As an organizational field, the blogosphere has stabilized to a large degree; however, important differences characterize elite blogs on the left and right, corresponding to distinct models of democratic political organization and discursive production.

The first political blogs were highly amateur affairs, and usually consisted of the writings of a well-informed, outspoken political outsider with passionate views. Some blogs, espe-

cially MyDD and Daily Kos on the left, made an effort to incorporate multiple contributors and voices into the conversation, but these were the exception rather than the rule (Bowers and Stoller, 2005; Drezner and Farrell, 2008; Karpf, 2012; Kerbel, 2009). This began to change around the time of the 2004 presidential campaign as the blogosphere emerged as a viable medium of opinion-generation, news diffusion, muckraking, and mobilization (Drezner and Farrell, 2008). On the left, bloggers played a crucial role driving the Howard Dean campaign in the Democratic primaries and upending South Carolina Senator Trent Lott in response to a racist remark at a fundraiser (Armstrong and Moulitsas Zúniga, 2006; Benkler, 2006). On the right, bloggers helped reveal that CBS News and Dan Rather had used fraudulent documents about George W. Bush's record in the Texas Air National Guard, resulting in a subsequent investigation and hastening Rather's retirement. See (Last, 2004). In each of these cases, "A-list" bloggers proved themselves at least equal to journalists in more traditional formats and organizations. In general, they benefited from the speed of publication and transparency norms that characterized the blogosphere from its earliest days. Without the burdens of hierarchical organizations or editorial oversight, the bloggers framed issues and pursued stories in a provocative way that many print, radio, and television journalists were simply unprepared or unwilling to do. As a result they accrued credibility as well as the attention of the public, the media, and political elites.

Professionalization

During these early years, political bloggers were derided as pajama-clad voices from the political wilderness (e.g. Last, 2004). However, the early elite bloggers resembled their peers in the media and political institutions in terms of educational credentials, class, race and gender (Hindman, 2008). Furthermore, in the years between 2004 and 2008, numerous "first wave" political bloggers received book deals or were hired as columnists by national publications looking to build online traffic and advertising revenue.³ Over time, more A-list bloggers could be found on Sunday morning political talk shows or authoring op-eds in major news outlets. As the bloggers professionalized, substantive differences between them and news producers in partisan broadcast print or television media became less salient.

Formalization

Blogging organizations also became more formal during this time. Most of the early blogs used off-the-shelf blogging software and were authored by individuals. For example, of

³Examples of books include (Armstrong and Moulitsas Zúniga, 2006) and (Reynolds, 2006). Columnists include Ross Douthat (*The New York Times*); Mickey Kaus (Slate.com); Andrew Sullivan; (*The Atlantic Monthly*); and Kevin Drum (*Mother Jones*).

the fourteen unique sites counted as top blogs in 2004 by Drezner and Farrell, only four were either (part of) an incorporated organization or had a formal organizational hierarchy. Data collected through the examination of archived copies of these blogs on the Internet Archive's "Way Back Machine" (<http://wayback.archive.org>). Of those same fourteen blogs and bloggers, all of them are now either independent corporate entities or part of incorporated organizations. This pattern holds across a larger sample of top blogs as well. Data collected by Shaw and Benkler in Summer, 2008 show that at that time, 93 out of 155 (60%) of top political blogs were either (part of) an incorporated entity or involved a formal organizational hierarchy. These were originally two separate questions, the first about incorporation and the second about organizational structure. In total, 62 out of 155 (40%) were (part of) an incorporated organization and 77 (50%) involved a formal hierarchy of some sort.⁴

Political Integration

Bloggers and blog communities have also integrated themselves into the broader field of established political organizations, networks and actors. While this process has followed an uneven pace, a number of bloggers on the left and right have become prominent figures within mobilizations and campaigns, signaling their growing role as power brokers and agenda setters. On the right, bloggers at first integrated into existing organizations or movements by working with major partisan media outlets (e.g. the National Review and Fox News), or by forming new media strategy and campaign consultancies. Subsequently, several bloggers also played a role in supporting and building momentum around the Tea Party movement, although it is not clear that the political blogosphere has constituted a more important component of the Tea Party than broadcast media, informal social networks, or existing advocacy organizations. As a result, the right political blogosphere did not claim leadership of a clearly defined grassroots movement or constituency, but it still became an active force in shaping the voice and agenda of conservative politics. In contrast, the left blogosphere elites have more aggressively sought to transform the landscape of political mobilization through the creation of new organizations and constituencies under the banner of a "netroots" movement. These efforts have proceeded by means of conferences, fundraising campaigns, and new advocacy organizations agitating for change within the Democratic Party (Bai, 2007; Karpf, 2012; Kerbel, 2009).

The processes of professionalization, formalization, and political integration occurring in the blogosphere between 2004-2008 have not followed an even trajectory across all blogs, but have nevertheless resulted in an overall stabilization and institutionalization of the field. Such dynamics of stabilization following disruptive technological innovations appear consistent to those observed in other organizational fields (e.g. Fligstein, 2001).

⁴Details of the sampling, coding and analysis techniques can be found in (Shaw and Benkler, 2012). For both questions, Krippendorff's α reliability coefficient was $\geq .7$.

Many of the elite blogs established consistent styles and regular communities of reader-participants despite the cyclical ebb and flow of attention around national elections. This pattern of stabilization has also manifested in the distribution of attention across the blogosphere as a whole. Using secondary data gathered by Karpf, a comparison of the mean monthly rank of top 50 left and right blogs along several metrics of authority and attention from June, 2009 through January, 2011, shows the distribution of ranks across left and right blogs to be stable, despite some turnover within the two groups. The data comes from Karpf's (2008a) Blogosphere Authority Index (BAI). Using Wilcoxon Rank Sum tests, I found that all differences between left and right on every metric are significant $p \leq 0.001$. The BAI is available at: <http://www.blogosphereauthorityindex.com>. Correlations between blog rankings for all sites on all measures in the first and last months of Karpf's data collection are likewise positive and significant. Correlations calculated using Pearson's r , all $p \leq 0.01$. For the aggregate BAI correlation test between first and last month rank for all sites, $r = 0.75$. The ecosystem of blogs, while still new and innovative relative to the wider field of political organizations, may not be as volatile as casual observers would believe.

Two Blogospheres

Important differences also emerged between the left and right of the blogosphere during the early years of its emergence. As Yochai Benkler and I have elaborated previously, cross-ideological variation in the adoption of participatory blogging platforms has resulted in "two blogospheres" characterized by distinct democratic affordances (Shaw and Benkler, 2012; Karpf, 2008b). Similarly, as implied above, the elite bloggers on the two major sides of the political spectrum have taken divergent approaches when it comes to integrating their discursive production into broader projects of mobilization and movement building.

I recapitulate key pieces of the "two blogospheres" study below.⁵ In particular, I provide an overview of the methods and data sources, a condensed presentation of salient results, and some discussion. Then I return to the overarching questions of the implications of these findings for the impact and future of the blogosphere as well as for my interactional account of online collectives.

Methods

In order to test for differences in the collaborative and discursive practices across top U.S. political blogs, Benkler and I designed a content analysis instrument. We then selected

⁵Further details can be found in the published version of the study (Shaw and Benkler, 2012) and in the methodological appendices to that version, which are available at: https://cyber.law.harvard.edu/publications/2010/Tale_Two_Blogospheres_Discursive_Practices_Left_Right

155 top political blogs and coded them using the instrument during a two-week period in early August, 2008. Following the completion of coding, we categorized the political orientation of the blogs in our sample and compared the results across ideological groups. Below, I describe our key concepts and variables, coding scheme, sampling procedure and analytical techniques.

The coding instrument and procedure draws on techniques of content analysis (Krippendorff, 2004). The instrument captures information related to our research questions about the blogs' organizational form; community of participants; content; and technological architecture. Our questions focused on stable, structural attributes of each blog, avoiding time-sensitive elements of the text and hyperlinks. In particular, our variables analyzed (a) the relative accessibility of different kinds of blog content; (b) the boundaries between content produced by site elites and other users; (c) technical features that offer enhanced opportunities for participation; and (d) the predominant styles of different kinds of content on each blog.

In terms of content accessibility, content accessible on the front page of a site is "primary," and everything that requires additional clicks to reach "secondary." This definition extends Hargittai's (2000) distinction between accessible and available online content, reflecting her finding that only a small minority of Internet users look past the first page of search results. In the realm of political blogs, many sites with multiple authors contributing posts, comments, or forum threads reserve the front page for high status authors and posts, creating a core-periphery distinction among participants on a site. The primary/secondary content distinction therefore helps to evaluate the degree to which contributions by people other than the owners, operators, or core authors of a site are accessible.

The primary/secondary content distinction also helps to assess another crucial aspect of blogs that no previous study had rendered explicit: the boundaries between primary content producers and other users or readers. Frequently, a combination of technological and social affordances keep primary content insulated from secondary content. However, some blogs retain extremely rigid barriers between user-generated contributions (whether in the form of comments, internal blogs, or forums) and "authorized" primary content. At the other end of the spectrum, a few sites make no distinction between any of the content contributed by all users of the site, resulting in a completely permeable boundary between primary and secondary content. As a result, for each blog in this study, we evaluated the extent to which boundaries between primary and secondary content types are rigid or permeable.

Benkler and I also categorized whether or not the blogging platforms used by the sites in our study included enhanced technical affordances for collaboration, participation, and discussion. We counted any of the following technical tools as enhanced: forums; chat; secondary and user blogs; stable user profiles or content feeds; and collaborative moderation or filtering tools. Comments alone are standard in almost all blogging software, and

we did not count them as “enhanced.” In this regard, our coding mirrors the categories developed independently by Karpf (2008b).

Finally, we sought to characterize the predominant style of primary and secondary content appearing on each blog as well as the extent to which the blog engaged in explicit campaign mobilization or fundraising activities. These questions took the form of a qualitative assessment of the most recent posts and comments available on each site at the time of coding. Given the limitations of this assessment, we interpret the results of these variables with care.

Sample Selection

We generated a sample of top U.S. political blogs by aggregating seven existing lists of “top political blogs” from six different sources (see Table 6.1). Roughly speaking, if a URL appeared on more than one list, we judged it more likely to be both a blog and more influential.

Table 6.1: Sources of Political Blog Rankings

Source	URL	Date Accessed
Yahoo.com	<i>http://dir.yahoo.com/Government/Politics/NewsandMedia/Blogs</i>	March 14, 2008
Technorati.com	<i>http://www.technorati.com/blogs/directory/politics</i>	March 14, 2008
Campaigns and Elections	<i>http://www.campaignsandelections.com/blogs/allblogs.cfm</i>	March 14, 2008
The Truth Laid Bear (link rankings)	<i>http://truthlaidbear.com/ecotraffic.php</i>	May 23, 2008
The Truth Laid Bear (traffic rankings)	<i>http://truthlaidbear.com/ecotraffic.php</i>	May 23, 2008
Blogrolling.com	<i>http://www.blogrolling.com/top.phtml</i>	July 10, 2008
Morningside Analytics	NA (Personal email)	July 28, 2008

Our selection followed the work of previous blogosphere research in this regard (Adamic and Glance, 2005; Hargittai et al., 2008; Wallsten, 2007). We ranked the URLs in our aggregated list based on the number of original listings in which they each appeared. Then, we applied a further set of selection criteria to the ranked aggregated list. To be included in our sample, a URL had to:

1. Appear on at least four of the seven lists of top blogs (or at least five of the seven lists, for the top 65 blogs in our study);
2. Show signs of active posting and/or commenting within the 30 days prior to our coding;
3. Contain content that predominantly and/or consistently addressed U.S. political issues;
4. Contain at least one page visible from the listed URL labeled or described as a “blog.”

The resulting list contained a total of 165 URLs, ten of which were later discovered to be duplicates, and excluded, leaving the total number of unique blogs in our sample at 155.⁶

It is important to underscore a few characteristics of our sample. First, even though it includes over 150 URLs, the group of top political blogs in our study remains very small and exclusive. There are literally millions of blogs in the English language and many thousands of those regularly address political topics. A random sample drawn from this universe would fail to capture the blogs that attract the vast majority of site-visits and in-links, which previous research has shown follow “power law” distributions (Adamic and Huberman, 2000). Given the unequal nature of readership distribution, our sample likely accounts for an extremely high proportion of the total number of site-visits and in-links in the U.S. political blogosphere.

Coding Procedure

Two coders applied the instrument to our sample during the first three weeks of August, 2008. As in Hargittai et al. (2008), Benkler and I chose this relatively slow period in the Presidential campaigns in order to avoid major political events.⁷ We randomly assigned a set of 129 URLs to each coder, including a randomly chosen overlapping set of 42 URLs, which we then used to test inter-coder reliability. For each URL, coders confirmed that

⁶A full list of the sample is available in Annex III of the Methods supplement at the URL mentioned above

⁷The Democratic National Convention took place several days after our coding – August 25-28.

the site met the criteria for inclusion in our study and then applied the coding instrument.⁸ Subsequent to the completion of all coding, Shaw applied left, right, and center codes for ideological affiliation to all of the valid URLs within the sample, using the same criteria for left and right applied by Hargittai and colleagues (2008). Blogs which did not demonstrate explicit signs of partisanship or demonstrated equal representation of left and right views were coded as center. This coding of ideology took place after the completion of our substantive coding so as to prevent the labels from influencing the assessment of the sites. To ensure that this process did not introduce bias into the ideological codes, another researcher randomly checked Shaw's codes against prior studies (Adamic and Glance, 2005; Hargittai et al., 2008) as well as the independently labeled list of blogs from Morningside Analytics used in our sampling procedure. Our sample broke into 65 and 67 blogs on the left and right respectively, and 23 in the center.⁹

Statistical Tests

For each question in the coding instrument we created a contingency table of responses by ideological affiliation and tested whether there was a significant difference in the distribution of responses by affiliation. Our null hypothesis was that there is no difference in response based on affiliation. As is typical for a contingency tables, we used the χ^2 test for independence to determine whether and differences between left and right wing blogs we observed from our coding of was significantly different from what we would expect if the null hypothesis (no difference between left and right) were true. As previous literature suggests a power law distribution of traffic, links, and attention in the blogosphere, we also hypothesized that the characteristics of the higher ranked blogs might have been significantly different than those ranked lower and therefore created a second smaller sample from those URLs that appeared on only five or more of our seven lists of the top political blogs (Adamic and Huberman, 2000; Drezner and Farrell, 2008; Lawrence et al., 2010; Shirky, 2008). As a result, we repeated the left/right analysis for these 65 super-elite blogs. Finally, for all questions in our instrument, we calculated Krippendorff's α measure of intercoder reliability (Krippendorff, 2004).¹⁰

Results

The starkest, most objective finding from the coding was that the left and right wings of the blogosphere adopted significantly different technological features and platforms.

⁸We randomly assigned a set of 129 URLs to each coder, including a randomly chosen overlapping set of 42 URLs, which we then used to test inter-coder reliability.

⁹The small number of blogs in the center made it impossible to calculate valid χ^2 tests across the three groups for the majority of our variables. As a result, we report the results and analysis of the Center blogs in Appendix II.

¹⁰Unless otherwise noted, Krippendorff's α exceeded or was very close to the rule of thumb critical value of 0.7. Full results of all Krippendorff's α calculations are available from the authors upon request.

Over 40% of blogs on the left adopt platforms with enhanced user participation features. Only about 13% of blogs on the right do so. While there is substantial overlap, and comments are used in the vast majority of blogs on both sides of the political divide, the left adopts technologies that make user-generated diaries and blogs more central to the site to a greater degree than does the right.

Table 6.2: Technology Adoption and Participatory Affordances

		Left	Right	p-value
Platform [†]	enhanced	20	7	0.0021
	standard	27	46	
User Blogs	available	14	4	0.0187
	unavailable	51	63	
Content Boundaries	flexible	14	6	0.0762
	rigid	51	61	

[†] Missing data from 32 blogs due to non-standard platforms

Table 6 and Figure 6-1 show the raw and proportional differences in the use of enhanced blogging platforms left and right. Close to half (46%) of blogs on the left use software that facilitates the incorporation of user comments, blogs, and diaries into the primary blog content, whereas 13% of the blogs on the right do so. In proportional terms, an even larger difference separates the two sides' active implementation of user diaries or blogs (22% vs. 6%). The distribution of flexible content boundaries is nearly identical (22% vs. 9%).

The differences in technological platform and tool adoption across the left and right reflect a related distinction in the organizational structure of sites. Here the left and right differ as well, with the left tending towards larger numbers of site owners, administrators, or leaders (Table 6.3). Right-wing bloggers tend to operate on blogs that are managed or governed by a single individual more often than do bloggers on the left, with 42% of blogs on the right falling in this category versus 20% on the left (Figure 6-2).

Table 6.3: Site Governance

	Left	Right	p-value
Individual	13	27	0.0157
Multiple Person	51	38	

Figure 1: Technology Adoption and Participatory Affordances

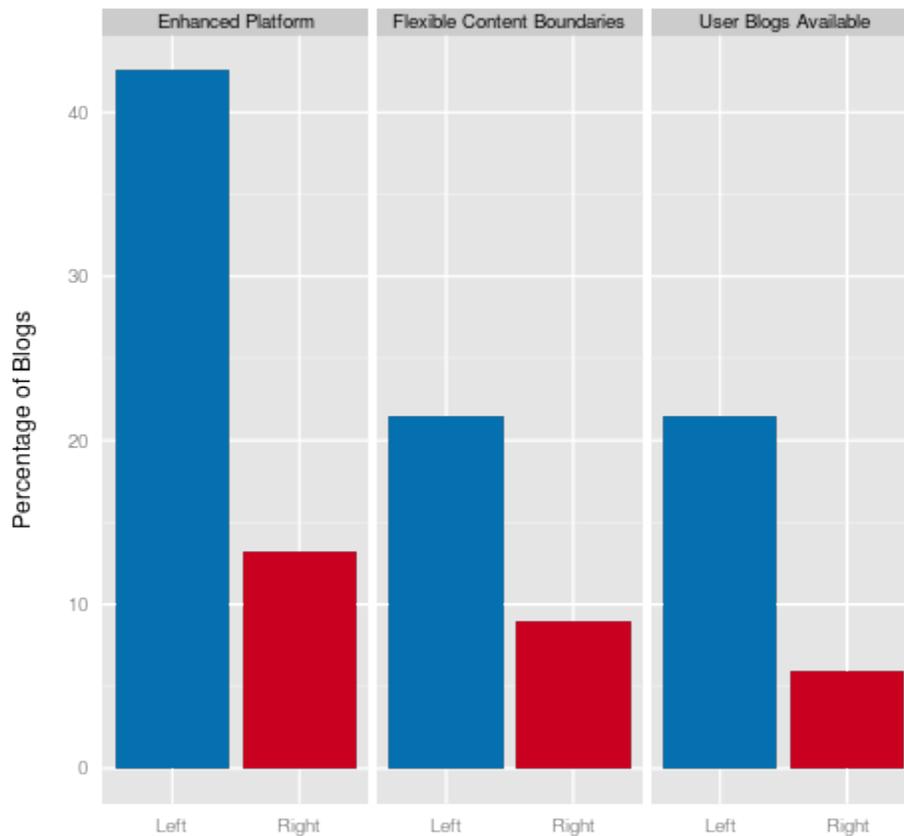


Figure 6-1: Technology Adoption and Participatory Affordances

We find no difference in the use of comments or forums, but a significant difference in user blogs, which are more widespread on the left than the right (Table 6.4 and Figure 6-3).

This technical affordance, in turn, makes it easier for left-wing blogs to generate secondary content containing sustained writing, reporting, and opinion and make this content a part of the front page of the site. When we look, independently, at the structure of the relationship between secondary content and primary content, we find that here, too, the left adopts more fluid and permeable boundaries between primary and secondary content, while the right adopts practices that more strictly separate secondary from primary content (see Table 6 and Figure 6-1, above).

Another aspect of political blogs' discursive culture concerns the writing style and depth of analysis. Here, we encounter another significant difference between the left and the right: primary authors on the left tend slightly to write more substantive reporting and

Figure 2: Individual Governance

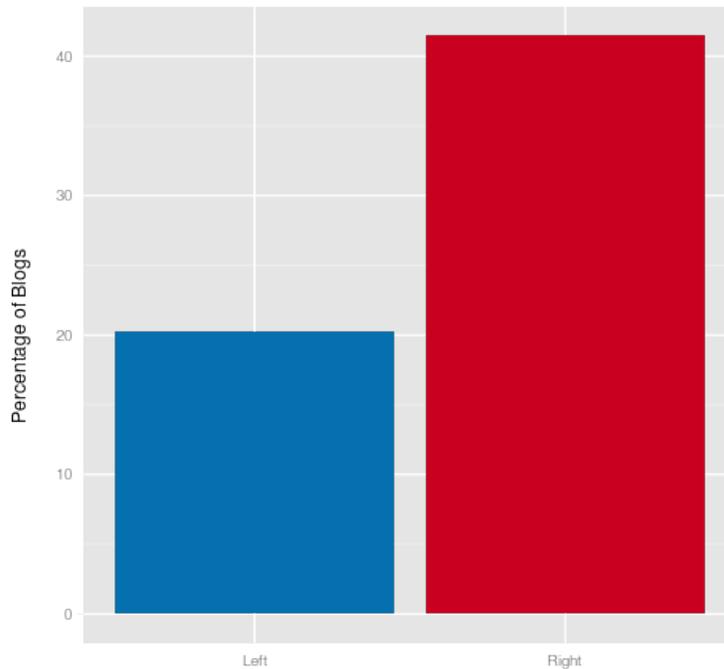


Figure 6-2: Site Governance

opinion posts, whereas the right wing blogs tend to focus on relatively short and punchy posts, linking externally to other sites (Table 6.5 and Figure 6-4).

We note, however, the substantial overlap: mixed practices occur on two-thirds of the sites. More fine-grained analysis might explore possible differences between left and right in this area.

The final piece of the puzzle relates to efforts to convert participation in discussion into political mobilization. Here, we find no significant differences within the sample as a whole, but a significant difference between the top 65 “super elite” blogs on the left and the right along dimensions related to mobilization (Table 6.6 and Figure 6-5).

First, we see many more calls to action on the left than on the right. These include direct appeals to attend political rallies, participate in letter-writing or phone banking campaigns, raise funds or attend protests.¹¹ As the distributions in Table 6 reveal, much of the disparity between the presence of calls to action on the right and left stems from the

¹¹One such example involved the Burnt Orange Report blog’s efforts to recruit readers to perform volunteer data entry on behalf of the Travis County, Texas Democratic Party Office. See <http://www.burntorangereport.com/showDiary.do?diaryId=6475> (Accessed December 9, 2008).

Table 6.4: User-generated Content Opportunities

		Left	Right	p-value
Comments	available	56	57	0.9430
	unavailable	9	10	
Forums	available	7	10	0.6507
	unavailable	58	57	
User Blogs	available	14	4	0.0187
	unavailable	51	63	

Table 6.5: Primary Content Authorship and Style

		Left	Right	p-value
Authorship	Solo (1)	17	28	0.0687
	Multiple (2-20)	37	34	
	Large-scale Collaboration (>20)	10	4	
Predominant Style	Links and Minimal Analysis	6	15	0.0387
	Mixed	43	44	
	In-depth Analysis	16	8	

prevalence of campaign fundraising efforts on the left.¹² Relatively low ($\alpha \leq 0.7$) inter-coder reliability for these questions indicates that the results should be treated cautiously (Krippendorff, 2004). However, the differences are significant and consistent with the patterns revealed by the rest of our findings.

Discussion

Figure 6-6 summarizes the results of the analysis Benkler and I conducted. In all, we find evidence of an association between the technologies, institutions, and practices of participation. Figure 6 illustrates that sites on the left adopt more participatory technical

¹²Our measure of calls to action did not include fundraising *per se*, but focused on off-line events such as phone banking, rallies, and other forms of volunteer participation. At the same time, because so many off-line forms of participation are also fundraising activities, we cannot distinguish perfectly between the two. See the coding instrument available in Appendix II.

Figure 3: User-generated Content Opportunities

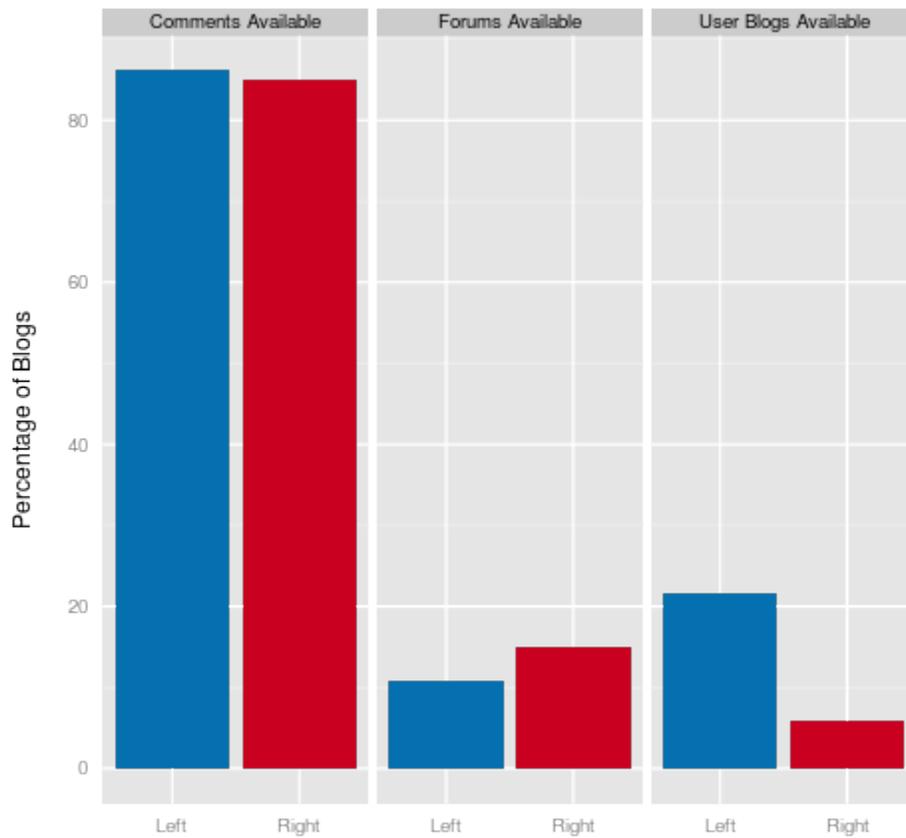


Figure 6-3: User-generated Content Opportunities

platforms, are comprised of significantly fewer sole authored sites, include user diaries and blogs, practice fluid boundaries between secondary and primary content, include longer narrative and discussion posts, and, among the top half of the sample, use blogs as platforms for mobilizing action as well as engaging in public political discourse.

These differences speak directly to the debates over the effect of the Internet on democracy and the structure of the public sphere. The left adopts technical platforms that enhance participation in the blog's primary discursive space. The right emphasizes sole-authored blogs, and constructs blogs in which the modes of participation of users are separated rigidly from the main content, and largely set to the side of the main discursive space. The left not only chooses more participatory technology, but also uses the available technological tools to maintain more fluid relations between the secondary or user-contributed materials and those of primary contributors. The left is more egalitarian in opportunities for speech, more discursive, and more collaborative in managing the sites. The right is more individualistic and hierarchical, with its practice consisting

Table 6.6: Mobilization: Calls to Action and Fundraising (Top 65 Blogs Only)

		Left	Right	p-value
Calls to Action	present	14	6	0.0330 [†]
	absent	17	28	
Fundraising	present	11	2	0.0076 [†]
	absent	20	32	

[†] Indicates low intercoder reliability

more of pointing to external stories than engaging in discussion or commentary. We do not contend that these characteristics are inherently correlated in any way – for example, it is not a given that sites operated by individuals would link more actively than sites where there is broader participation and discussion. Nevertheless, among the blogs in our study, these attributes characterized the left and right respectively. The differences offer evidence of a non-deterministic relationship between the emergence of a technology, its adoption patterns, and the political-theoretical implications of these adoption patterns.

Our findings on content boundaries are important for two reasons. First, a critic of our coding scheme might argue that we are too dismissive of the participatory potential of comments and forums, and therefore biasing our findings “against” the forms of participation favored by right wing blogs. However, examining not only the prevalence of different features, but also the institutionalized permeability of the boundaries between primary and secondary content, we see that the prevailing pattern of information flow on the right wing sites is structured to be less fluid, leaving user-contributed statements on the periphery of the conversation. Powerline (<http://www.powerlineblog.com>), one of the most popular blogs on the right at the time of our coding, illustrates this point. The content created by all three of the core bloggers appears on the landing page of the site in reverse chronological order. The landing page also includes various links to the forum, the location of all secondary content contributed by non-core participants, but no technological affordance makes it possible for non-core authors to contribute to this main page (even as commenters). The layout reinforces the sharp division between these secondary contributions and those of the core authors, as the forum has a completely different appearance from the main site. While several sites on the right maintain highly participatory platforms and flexible content boundaries – the Free Republic Forum is one example – these are exceptions and not the rule.

Second, this finding emphasizes for us that even when technology allows the easy integration of collaborative features, cultural or organizational practices may work at cross purposes. One example of this is TownHall, a right wing site that enables user blogs, but where, despite their technical availability, these secondary blogs are strictly separated

from primary author blogs, so that they remain a less accessible, secondary component of the discursive environment of that site. It is important to reiterate that such technical and editorial decisions about the structure of primary and secondary content do not foreclose active engagement with non-core contributions. Personal email communications with primary authors, perhaps the least visible form of participation, can be integrated into the primary content.¹³ In other words, whatever the technological affordance, it is embedded in a social-cultural practice, which, in turn, can amplify or muffle participation.

Conclusions

The significance of the cross-ideological differences Benkler and I reported in our study hinges on whether they facilitate distinct pathways of influence and engagement, as well as the extent to which they do or do not become institutionalized over time. In terms of the field of U.S. politics and political organizations, the patterns of intra-blog democracy and stabilization exemplified by Daily Kos coupled with the stabilization of the organizational field of political blogs discussed earlier suggest that the initial period of disruptive innovation that characterized the blogosphere between 2003 and 2008 may have already ended. This does not mean that the influence of the political blogosphere and associated movements such as the netroots is waning or diminished, but rather that the place of blogs within the field of U.S. politics and the networked public sphere may no longer be as volatile as it initially seemed. Blogs are now an established piece of the political information and social movement organization ecosystem and it makes intuitive sense that their internal dynamics would likewise assume a relatively stable form. It will be important to see whether or not this stabilization encompasses the netroots movement and the role of the Internet in political organization and behavior.

The results of the study Benkler and I conducted also suggest that the effects of online collective action on democracy are not homogeneous and likely change over time. As the political blogosphere has evolved over the past decade, it appears play a different role for the left and the right. The right seems to focus more heavily on blogs that filter content produced by others and provide links to it. This may explain why right wing blogs have been observed to link more often than left-wing blogs (Adamic and Glance, 2005). On the left, by contrast, primary content tends to be longer, consisting of more reporting and opinion. This may, in turn, be consistent with less linking. Whether the content of these longer contributions is substantively different from what was found on mainstream media sites is a topic for further research, and will require more robust text analysis tools. In effect, readers on the right are treated more as traditional media consumers: they play a relatively passive and marginal role in producing the primary content, and the primary

¹³This is a practice frequently used by Joshua Micah Marshall (2008), founder of Talking Points Memo.

content itself consists more predominantly of amplification of news content itself produced in the traditional model. Users on the left have a more active, productive role, blurring the media production-consumption distinction and, through this, increasing the probability that the left wing of the blogosphere incorporates a wider range of views (through decentralized gatekeeping and related practices) than a more centralized model.

Further research will be necessary to determine the extent to which these affordances may undermine or reinforce existing social inequalities (Hargittai and Walejko, 2008). Similarly, subsequent studies should combine better means of tracking influence with more nuanced measures of participation and engagement beyond the evidence we have presented here (Karpf, 2012; Wallsten, 2007).

A second, methodologically important conclusion is that link analysis, as it has been used to map the networked public sphere, has limitations for analyzing pathways to participation. Studies based on link analysis disagree about some questions, but they portray a symmetric political blogosphere (e.g. Adamic and Glance, 2005). This study, together with the work of Karpf (2008b) and Wallsten (2008), shows that this supposed symmetry is misleading. It raises a concern with link analysis that looks at the shape of the blogosphere as a whole by treating the entire blog domain as the node, effacing the level of the individual post, the individual author, and the internal workings of discrete blogs. All of these levels and practices require more nuanced exploration.

Third, the findings here are consistent with the idea that technology, organizational forms, and authorial and cultural practices can reinforce each other to constitute the structure of the public sphere. In this regard, the findings also underscore the non-deterministic nature of the potentially broader adoption of peer production tools. Insofar as the news media constitutes a political institution which may or may not reinforce the underlying political and economic power structure of a society, the uneven trajectory of collaborative practices that on the left and right in the networked public sphere of the United States imply divergent social outcomes (Schudson, 2002).

As a result, I conclude that the effects of peer production on electoral democracy and the media ecosystem remains open to several potential outcomes. While the left wing of the blogosphere exhibits stronger indicators of mobilization and organization for action, it is impossible to say whether the left's use of more participatory and discursive platforms causes this trend. Blog users who are more engaged on a day to day basis could be more amenable to mobilization for action as well (Lawrence et al., 2010). But the unequal levels of mobilization may also reflect the fact that Benkler and I took our observations during an election cycle when the left was highly energized, while the right, just before Sarah Palin's appointment as John McCain's running mate, was more lethargic. Differences in the blogosphere may also reflect the differences between Democratic and Republican online mobilization during the 2008 campaign as a whole (Smith, 2009). While these facts do not affect our core findings, they moderate our confidence in the stability of the difference with regard to mobilization. Looking at the structures of participation and

the levels of mobilization on the left, however, leads us to think that the stellar Obama Internet campaign was largely an extension of practices that already characterized the left-wing blogosphere, rather than a new order imposed on a previously disorganized or non-participatory population. Wallsten's (2008) similar findings based on 2004 data reinforce this view. We believe that more robust comparisons of the content of blog posts with regard to various forms of mobilization offers a promising avenue for follow-up study.

What would account for the different patterns of weblog use on the left and the right? It cannot be one of the factors shared across the ideological divide, like the political institutional framework (U.S. law or the party system) or the available technologies. Possible explanations of the divergence range from more to less deterministic. One line of research ties political views to personal characteristics, such as work by psychologists that explains variations in political belief through divergent psychological needs and moral foundations (Graham et al., 2009; Jost et al., 2003). In addition, cultural cognition research has found that people form beliefs about facts and circumstances in ways that fit their values, imposing cognitive structures of belief along two axes: individualist/communitarian and hierarchical/egalitarian (Kahan et al., 2007). Certainly, one could interpret the results discussed here to claim that Republicans and Democrats embraced discursive forms that fit the respective cultural cognition and psychological profiles that reflect their political views. Blogs on the right are more likely to be individualistic and hierarchical, where, for example, opponents of gun control and environmental regulation often reside (Kahan et al., 2007). The right's relatively limited integration of user contributions is consistent with readers or users who seek an authoritative voice, consistent with claims by Jost and colleagues (2003) as well as findings from moral foundations research (Graham et al., 2009) on the psychological orientations and narrative preferences of conservatives. The more egalitarian, participatory practices on the left require tolerance for the unpredictability of open and fluid discourse.

An alternative explanation would be more historically rooted in the institutions of information production and political action particular to American Republicans and Democrats in recent years. During the formative period of the blogosphere (2002-2004), the American right had control of all branches of the federal government; it had active presence in the public sphere through Fox News and AM talk radio; and it had networks of popular mobilization through churches. The left, by contrast, was out of power under an administration that was increasingly perceived as hostile and polarizing; felt excluded from mainstream media; and lacked clear community-based structures of participation (Bai, 2007; Moulitsas Zúniga, 2008). Many individuals on the left felt alienated from the structures of power within the Democratic party (Armstrong and Moulitsas Zúniga, 2006). Under these conditions, it is perhaps unsurprising that the right wing of the blogosphere would place less of an emphasis on building participation online, while the left would seize upon the affordances of the new medium to build platforms for active engagement and mobilization (Bowers and Stoller, 2005; Karpf, 2012; Kerbel, 2009). Certainly, this story is consistent with the self-understanding of major bloggers on the left (Armstrong and Moulitsas Zúniga, 2006; Bowers and Stoller, 2005; Moulitsas Zúniga, 2008). It also

suggests that nothing inherent in the cultural or psychological profiles of bloggers on the right will prevent them from embracing more collaborative modes of participation in years to come.

A third explanation is based on demography. Nationally representative phone surveys have found that increasing numbers of younger people have tended to affiliate with the political left in recent decades (Keeter et al., 2008) , and that younger people are the most active users of the Internet for purposes of political engagement (Smith, 2009). It is certainly possible that users who are more actively engaged online may be attracted to technologies that embrace higher levels of user engagement. However, this explanation seems flawed for several reasons. First, Smith (2009) also reports that Republicans (68%) were more likely than Democrats (53%) or Independents (56%) to be “online political users” during the 2008 campaign cycle. Republicans (84%) were also more likely than Democrats (71%) to use the Internet at all. Also, Lawrence et al. (2010) find evidence of a very small age difference, on average, between blog-readers and non-blog readers. More to the point, they find that political blog readers are, on average, somewhat older than the population of blog readers as a whole. In separate surveys of first year college students, Hargittai (2009a) similarly finds that young people tend to read political blogs far less than they read other kinds of online media. The evidence thus suggests that it is not a cohort of tech-savvy youth driving the growth of participatory political blog communities on the left.

Further nuanced and “high resolution” research into patterns of posting, commenting and discussion; participation; and the capacity of the blogosphere to drive levels of engagement along various dimensions will be necessary to understand the implications of these findings more fully. Divergent adoption patterns of a given technology are not new. Protestant and Catholic Europe had different and antagonistic approaches to the printing press, resulting in centuries of difference in levels of literacy and reading practices, which did not narrow until the late 19th and early 20th centuries (Eisenstein, 1979; Starr, 2005). It remains to be seen whether, and to what extent, the shift in political power in the United States between 2006 and 2008 will elicit a shift in practices of online participation and mobilization, or whether the practices remain, either because they reflect stable cultural or psychological types or because historical patterns of practice tend to have their own inertia. But the debates over the degree to which the Internet enhances democratic participation or leads to a transformation in the media ecosystem of the United States will to some extent depend on whether the left or right wing of the blogosphere is generalized, and how newer technological platforms are incorporated into the extant practices of the societies and communities into which they are introduced.

Implications for Online Collectives

In terms of broader implications for online collectives and the interactional account of online collective action that I have advanced throughout this project, my findings on the

political blogosphere suggest that macro-social analyses of the contexts of online participation help explain the variations that occur across different online environments. This chapter also implies that the dynamics of social and organizational fields play an important role in determining the character of online collectives that enter particular domains of activity.

First, the analysis Benkler and I conducted in the “two blogospheres” study demonstrates that the dynamics of participation and gatekeeping I observed on Daily Kos are not universal even within the domain of political blogs. Rather, many aspects of the participatory culture of the Daily Kos community likely correspond with the political institutions of the U.S. left during a particular period in the evolution of blogging technologies and organizations. This underscores some limits to the generalizability of my findings in Chapter 5, but also implies an important conclusion: The participatory, interactional dynamics of any online collective are nested within a wider social context that is similarly dynamic.

This latter point echoes Emirbayer’s (1997) claims about the advantages of a relational approach to sociological analysis in general. Arguably, the success and failure of online collectives – as well as the extent to which they may or may not incorporate participatory infrastructures – depends on a complex of factors including the social and organizational field within which they operate. These factors, such as the political and organizational climate in the case of the U.S. political blogosphere, shift over time, as do the norms and social relations within specific online collectives. As a result, static models of behavior, motivation, or social structure will, in all likelihood, prove inadequate to the task of predicting the impact of online collectives in any domain. I elaborate further on the implications of this concern in the concluding chapter.

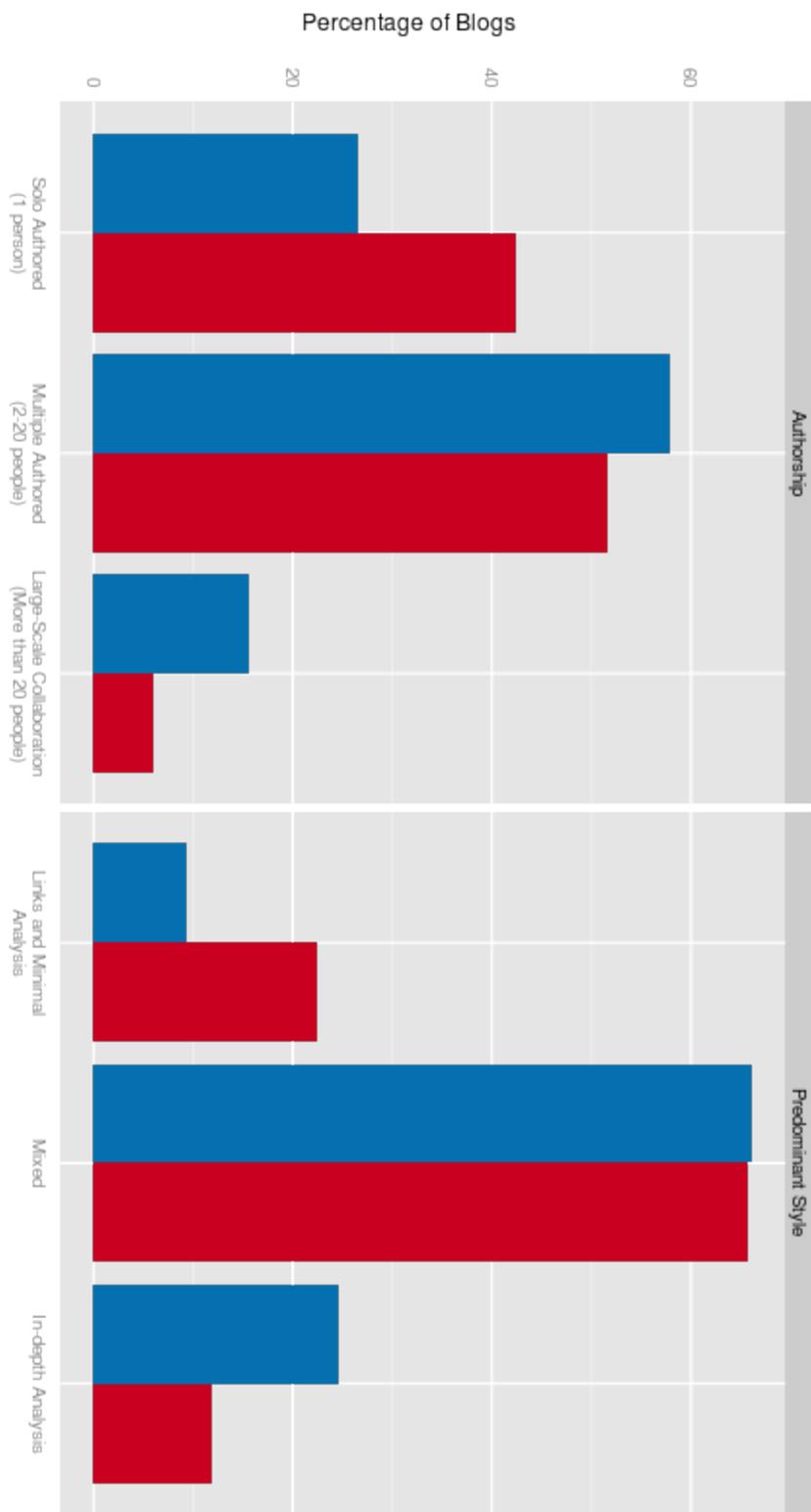


Figure 4 Primary Content Authorship and Style

Figure 6-4: Primary Content Authorship and Style

Figure 5: Calls to Action and Fundraising
(Top 65 Blogs Only)

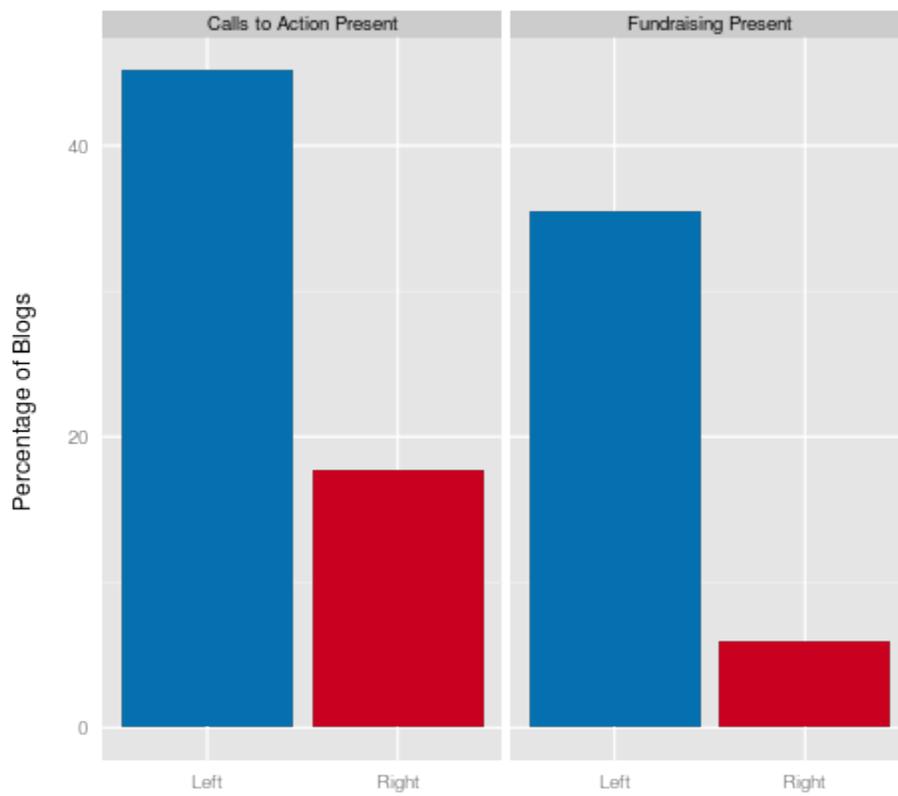


Figure 6-5: Primary Content Authorship and Style

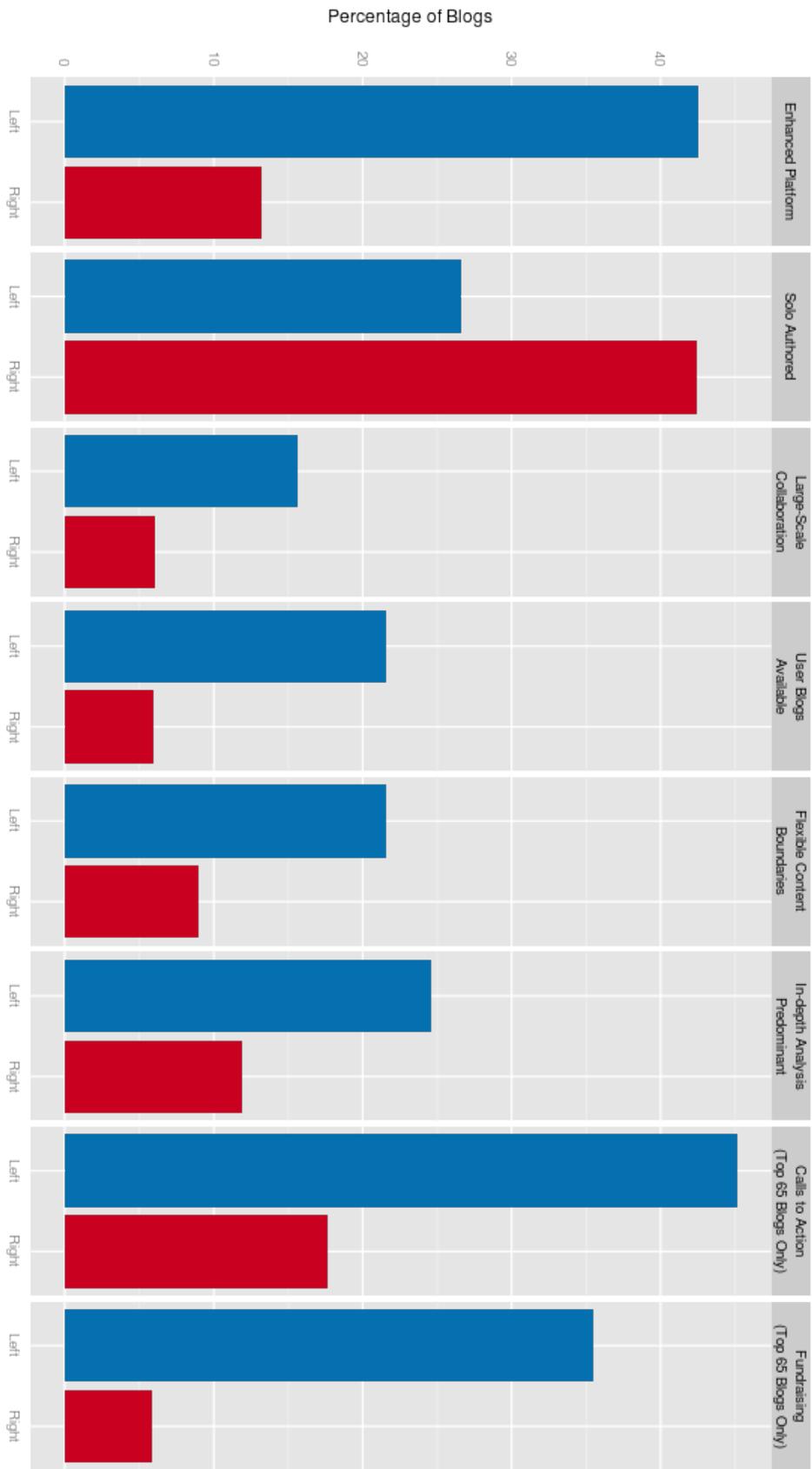


Figure 6: Summary of Significant Differences

Chapter 7

Conclusions

Overview

Below, I synthesize the key contributions of this dissertation and revisit some of the core findings from the empirical chapters. In the process, I attempt to clarify the relationships between the different studies and how they contribute to the overarching project. I also reiterate my central claim – that interactional dynamics play a central role in motivating participation in online collectives as well as in the formation and reproduction of online groups’ organizations and institutions – and attempt to clarify some of its implications in light of my findings. Finally, I outline some of the limitations and areas of future research revealed through my work, with an eye towards generating both theoretical insights into the dynamics of collaboration and collective behavior as well as contributing to the growing body of work that seeks to influence the design and applications of online collaboration.

Synthesizing the Argument

The experimental studies on MTurk as well as the observational analysis of barnstars on Wikipedia demonstrate some of the ways in which interactional dynamics and concerns affect participation patterns. Both chapters also show that individual characteristics, institutionalized practices, and socioeconomic factors can mediate the effects of interactional incentives. In the case of Mechanical Turk, the incentive that most improves quality schemes prioritized workers’ orientation towards their peers and worker motivations were found to be deeply shaped by social desirability pressures. These findings illustrate the power of interactional concerns even in highly atomized and anonymous environments. The analysis of barnstars in Wikipedia, on the other hand, shows both

that interactional, peer-oriented concerns such as social status can remain unevenly distributed and subject to behavioral pressures such as the cyclical contribution patterns typical of Wikipedia editors. The combination of these factors leads to the differential effects we observe in editors' responses to receiving a status-based award.

Chapter 2 establishes a baseline set of expectations about the effects of relational incentives and interactional motivations for participation in even the least social of social computing environments: Amazon's Mechanical Turk marketplace. In Study #1, the results of the list experiment reveal that Mturk workers were motivated by a wider range of motivational factors than identified in previous research and that social desirability concerns exerted pressures on them despite the absence of much social interaction with peers in the Mturk system. Study #2 then builds on this initial result by comparing the effects of numerous incentive schemes on worker performance and finding that those experimental conditions that tied payoffs to peer-oriented concerns elicited more accurate work than other financial or social incentive schemes. The findings of both studies support the underlying claim that interactional concerns drive participation in online collectives of all kinds – even those that do not incorporate very much interaction.

Chapter 3 then analyzes the limits of interactional incentives through an observational study of barnstars, a type of social award distributed among the editors of Wikipedia. In this study, my collaborators and I build on previous research finding that barnstars and other social awards motivate increased contributions to public goods (Restivo and van de Rijt, 2012; Willer, 2009a). We then use the entire history of contributions to the English-language Wikipedia to compare the effects of social awards on two sub-populations: those barnstar recipients who publicly display their awards on their profile pages and those who choose not to do so. We find evidence that, on average, any effects of the awards are dwarfed by the underlying periodicity of editors' behavior, and that all award recipients make fewer contributions to the encyclopedia in the month immediately following their first barnstar. At the same time, we also find that those editors who do *not* display their awards publicly experienced a significant, negative discontinuity in their rate of contribution immediately following the receipt of the award, suggesting that barnstars "crowded out" these editors' motivations to contribute for a short period of time. The differential effects of this social award imply that relational, interactional incentives are not sufficient to elicit sustained contributions from all members of an online collective. At the same time, the fact that the sub-population of barnstar recipients who chose to display their awards publicly did not experience as rapid a decline in contributions as their peers suggests that social awards *can* reinforce positive participation patterns for many individuals. On balance then, the mixed effects of barnstars on Wikipedia editors shows one way in which interactions between participants can contribute to the emergence and reinforcement of participation inequalities – even among the most highly committed and active members of an online collective.

The Chapters in Part II show how interactional aspects of participation in online collectives can both shape and be shaped by institutionalized practices within the context of a

specific organizational, technological, and cultural environment. In particular, Chapter 5 demonstrates how interactional processes such as gatekeeping function in the context of an online collective. Chapter 6 identifies some of the conditions that determine the diffusion of participatory infrastructures across the population of online collectives.

In the case of Daily Kos, a relatively small elite exercises influence and control even without much formal organizational structure. Even though gatekeeping reproduces elite status and social relations within the community, interactional mechanisms of boundary maintenance also facilitate negotiation and something like deliberation over community rules and enforcement. Individual users who violate community norms – like joanreports or 2Nurselady – will encounter resistance from site elites and more experienced community members in the form of direct comments as well as down-votes within the site’s reputation system. Nevertheless, the norms and standards of the community remain up for debate, as shown by the interaction between BillInPortlandMaine and homogenius. In this aspect, the participatory infrastructure of the site as well as the interactions through which community members perform organizational governance functions support an important degree of bottom-up governance throughout the community.

In this way, Chapter 5 elaborates on the idea that interactions drive the emergence and reproduction of inequalities as well as institutions within online collectives. I show how micro-level discursive interactions among community members functioned as sites of organizational boundary maintenance. Specifically, individual community members (e.g. homogenius in one of the ethnographic examples included in the chapter) use the site’s content moderation tools both to disseminate and negotiate community norms in conversation with both new entrants (2Nurselady) and site leaders (BillInPortlandMaine). My quantitative analysis demonstrates that the result of numerous micro-level interactions aggregated over thousands of comment threads and recommendations is a sort of loose organizational democracy with strong tendencies towards status reproduction and path dependency.

Chapter 6 expands on the case study of Daily Kos to consider the implications of both interactional analysis as well as online collectives in the context of the U.S. political blogosphere as a whole. Through an historical overview of the rise and evolution of the blogosphere, I demonstrate that political blogs have tended to become more formal (in organizational terms) and more professionalized over time. The blogs have also acquired a relatively stable order in terms of the distribution of traffic and links during the period from 2003-2008. Finally, using a coding instrument to compare participatory practices and platforms across 155 elite blogs in Summer 2008, Yochai Benkler and I find evidence of strong cross-ideological variations, with the left blogosphere tending to embrace collaborative infrastructure more than the right. Together these results suggest that macro-social factors such as cultural or ideological variations as well as political institutions within a particular organizational field can determine the shape and scope of online collectives to a large degree. The findings also illustrate that the characteristics of the Daily Kos community are at least as much a product of the ideological dispositions that

pervade the left blogosphere as they are a reflection of generic processes or patterns of participation in an online collective. At a more macro-social level, this analysis shows that the degree to which particular interactional orders emerge within online collectives can potentially shape the nature of the public sphere. In this sense, interactional dimensions of online collective action may explain the means by which the left blogosphere operates much more effectively than the right blogosphere. Similarly, the impact of online collectives more generally may depend on whether or not a given sub-community embraces the affordances of participatory Internet technologies and finds ways to allow democratic organizational practices to flourish.

As an illustration of this point, it's possible to imagine that a hypothetical analysis of a highly collaborative and participatory right wing blog (such as the Free Republic forums or Red State) would produce similar findings to those from my analysis of Daily Kos. In all likelihood, gatekeeping and other interactional processes distributed across the population of contributors also contribute to mechanisms of community governance within these right wing blogs, where individual users interact through many of the same technological interfaces as on left wing sites. Beyond the technological infrastructure, there are also somewhat generic codes of behavior that have emerged across a wide range of online communities and would, in most cases, obtain. Even though further research will be necessary to test this proposition and to better understand some of the ways in which codes of behavior may vary across the participatory communities in the right and left blogosphere, I believe that some of the differences will appear less substantial than the similarities among the most participatory sites.

The presence of some similarities does not diminish the importance of the finding that significant differences distinguish the prototypical left wing site from its right wing counterpart. In this respect, it is worth thinking about the models of participation that obtain on a site that is more representative of a "normal" right wing blog. In the case of Instapundit, Glenn Reynolds writes all of the primary content of the site and (as of this writing) does not allow comments. Instead, to the extent that user participation occurs, readers of Instapundit interact with him through email or other, less visible modes of communication. The choice of technological and social infrastructure radically forecloses opportunities for intra-blog democracy or lateral governance of any sort. While the site may still generate successful collective action of certain kinds (coordination of political opinions; attention aggregation around particular issues; fundraising; mobilization), these occur through an organizational form that more closely resembles a rigid hierarchy on the model of broadcast communication.

These examples illuminate the importance of the findings of Chapter 6. In general, the right wing of the political blogosphere has pursued organizational forms that reproduce hierarchical structures and governance practices much in the same way as industrial news organizations and traditional firms would. This does not foreclose the possibility that some of the right wing political blogs pursue identical practices to Daily Kos or that some left wing blogs adopt corporate governance practices and structures identical to

those of more traditional news media organizations.

The implications of this finding of an affinity between political ideology and socio-technical infrastructures of collective action are potentially contradictory when considered in the context of the other chapters. On the one hand, this result suggests that Daily Kos is fundamentally a product of the culture and ideals of a particular subset of the American left at a particular point in time. Likewise, Wikipedia and online labor markets like Mechanical Turk may, in the end, turn out to share little in common with each other or any other online collectives. According to this view, selection pressures and sorting mechanisms that drive particular sub-populations to join particular groups would likely explain most behavioral variations across communities. This perspective threatens the generalizability of the findings I have reported. On the other hand, the trajectory of the political blogosphere also demonstrates how processes of institutionalization and stabilization across the political spectrum have canalized new technological tools and social practices into a combination of both novel democratic practices as well as relatively well-worn patterns of action. Such canalization implies that institutions and the micro-level processes through which they are both constituted and contested play a fundamental role in shaping the impact of a novel set of technological platforms or organizations.

Key contributions of this work

Interactional Approach to Online Collective Action

As the foregoing summary suggests, the primary contribution of this dissertation consists of the elaboration of an interactional account of online collective action through a series of empirical studies that test particular aspects of this account in light of previous research. The interactional account revolves around the following points:

- Interactions, and not only individual-level motivations and incentives, social structural variations, or generic group processes (such as network dynamics), play a central role in shaping participation in online collectives as well as the institutions that prevail within collectives.
- The patterns of interactions and the relative impact of a particular interactional mechanism (such as a social award like a barnstar) or infrastructure (such as a participatory blogging platform) vary depending on the population within which they are deployed.
- Exogenous social conditions and factors such as political culture, organizational pressures, or cultural/attitudinal differences play an important role in constraining and canalizing the patterns of participation in online collectives as well as the particular interactional dynamics that prevail within them.

This interactional approach contributes novel theoretical and empirical findings to previous explanations of peer production, online collaboration and collective action. The key contribution of this research to previous studies of incentives and motivation (e.g. Benkler, 2006; Cheshire, 2007; Kollock, 1999; Kraut and Resnick, 2011; Weber, 2004) is to recast earlier findings in light of the interactional processes and behavioral dynamics that stem from interactions. The studies I present here demonstrate that relational, interactional motivations and incentives obtain across a wider range of online collectives than previously thought. They also underscore the importance of understanding the role of interactional processes in the context of differential psychological orientations, socio-economic and cultural variations, and the wider organizational field within which online collectives arise.

With regard to research into the dynamics of online participation and collaboration (e.g. Adamic and Huberman, 2000; Barabási, 2003; Salganik et al., 2006; Wilkinson, 2008; Wu et al., 2009), my work demonstrates how generic participation dynamics – such as the editor lifecycle patterns I discussed in my analysis of barnstars on Wikipedia or the commenting behavior I described on Daily Kos – are shaped through interactional processes such as gatekeeping or differential orientations towards social status. At the same time, I find that generic participation dynamics still determine the core patterns of contribution. The impact of receiving a status-based award on a Wikipedia editor's contribution rate is dwarfed by their underlying propensity to edit in a cyclical pattern. What these studies add to previous research are a supplementary sense of how generic participation dynamics may be shaped through interactional dynamics and the differential psychological and cultural orientations of participants in online environments.

The key contribution of this research to the explanations of online participation that I characterized as concerned with structural inequalities (e.g. Hargittai and Hinant, 2008; Hargittai, 2010; Hindman, 2008) lies in the extent to which these papers demonstrate some of the mechanisms through which generic participation inequalities and patterns of contribution emerge. It is one thing to say that structural (demographic, socioeconomic, etc.) factors associate with unequal outcomes in terms of online participation, but this does not explain very much about the precise means by which such inequalities occur and are reproduced. By providing at least a provisional account of some of these mechanisms – e.g. attitudinal preferences and community commitment in the case of barnstars, or experience and capacity to assimilate/reproduce community norms in the case of Daily Kos – this research illustrates how macro-social variations may transpose into meso- and micro-level filtering or sorting processes. While several of my findings confirm the importance of socioeconomic variations in shaping online participation, I also demonstrate some of the concrete ways – like gatekeeping behavior – in which structural inequalities can translate into the sorts of generic inequalities that prevail across so many online collectives. Through the study of the blogosphere, I also show that the extent to which these processes matter varies depending on whether and how a particular collective adopts social and technical infrastructure that enables effective collaboration.

Implications and Future Research

Returning to the project goals I laid out in Chapter 1, these empirical studies have fulfilled many of my objectives. First, several of the chapters support my claim that interactional factors and interaction-oriented selective incentives support participation in a wide variety of online collectives. Secondly, as the study of Barnstars on Wikipedia and gatekeeping on Daily Kos have shown, interactional dynamics contribute to the emergence and persistence of intra-site inequalities and status hierarchies, while also facilitating semi-democratic negotiation over norms and rules. In this way, interactions provide a dynamic foundation for the creation and reproduction of institutions and other organizational dynamics critical to the survival and success of online collectives. While none of the evidence presented here can speak effectively to the question of whether interactional dynamics or their products (e.g. the inequalities of participation in Daily Kos) *cause* community success or not, my findings imply that they at least contribute to community growth and maintenance.

There are several key limitations to this project that prevent it from providing a more comprehensive answer to the questions that frame the research. First, the analysis is largely conducted on single sites and communities. Without more extensive comparative data and research designs, these findings cannot provide a valid basis for inferences across different kinds of projects or platforms. Likewise, the fact that I have conducted the research across highly varied domains of activity has generated suggestive comparative results, but ultimately cannot speak to the question of how the particular areas within which particular online collectives operate may or may not shape their internal dynamics and/or the probability of their success or failure. Again, additional comparative research will be necessary to address this issue. Furthermore, my emphasis in all of these studies has been on behavioral data – whether gathered through experiments, qualitative observation, or the downloading site records. Consequently, even though this research can address many concerns related to the motivations or performance of contributors to many online collectives, I am nevertheless unable to offer any insights into participants' subjective experience of these phenomena or the means by which they justify their actions. In terms of my broader claims, such perspectives are crucial in order to better grasp the foundations as well as the substance of interactions within collectives.

Subsequent analyses should extend these findings and try to isolate causal mechanisms of success and failure both through stronger identification strategies as well as through larger, comparative frames of analysis. Furthermore, future research should expand on the findings I report in Chapter 6 to try to explain the factors that determine the impact of online collectives in particular social fields like the networked public sphere or the domain of American politics. My results suggest that impact of online collectives may depend on the extent to which they incorporate interactional dimensions of participation effectively. Also, my findings imply that the effective management of interactional dimensions – that is, the canalization of interactions into useful directions such as role production, hierarchy formation, organizational management etc. – may provide a par-

tial explanation of why some collectives succeed and others fail. These are central questions that future research must address in order to begin to design online collectives in a more purposive manner and to predict when online collectives will more effectively meet a particular set of demands or objectives than traditional organizations or technological tools.

Appendix A

Creative Commons License

This work is licensed under a Creative Commons Attribution Share-alike 3.0 License.¹

Creative Commons Legal Code

Attribution-ShareAlike 3.0 Unported

CREATIVE COMMONS CORPORATION IS NOT A LAW FIRM AND DOES NOT PROVIDE LEGAL SERVICES. DISTRIBUTION OF THIS LICENSE DOES NOT CREATE AN ATTORNEY-CLIENT RELATIONSHIP. CREATIVE COMMONS PROVIDES THIS INFORMATION ON AN “AS-IS” BASIS. CREATIVE COMMONS MAKES NO WARRANTIES REGARDING THE INFORMATION PROVIDED, AND DISCLAIMS LIABILITY FOR DAMAGES RESULTING FROM ITS USE.

License

THE WORK (AS DEFINED BELOW) IS PROVIDED UNDER THE TERMS OF THIS CREATIVE COMMONS PUBLIC LICENSE (“CCPL” OR “LICENSE”). THE WORK IS PROTECTED BY COPYRIGHT AND/OR OTHER APPLICABLE LAW. ANY USE OF THE WORK OTHER THAN AS AUTHORIZED UNDER THIS LICENSE OR COPYRIGHT LAW IS PROHIBITED.

BY EXERCISING ANY RIGHTS TO THE WORK PROVIDED HERE, YOU ACCEPT AND AGREE TO BE BOUND BY THE TERMS OF THIS LICENSE. TO THE EXTENT THIS LICENSE MAY BE CONSIDERED TO BE A CONTRACT,

¹See: <http://creativecommons.org/licenses/by-sa/3.0/us/>.

THE LICENSOR GRANTS YOU THE RIGHTS CONTAINED HERE IN CONSIDERATION OF YOUR ACCEPTANCE OF SUCH TERMS AND CONDITIONS.

1. Definitions

a. “Adaptation” means a work based upon the Work, or upon the Work and other pre-existing works, such as a translation, adaptation, derivative work, arrangement of music or other alterations of a literary or artistic work, or phonogram or performance and includes cinematographic adaptations or any other form in which the Work may be recast, transformed, or adapted including in any form recognizably derived from the original, except that a work that constitutes a Collection will not be considered an Adaptation for the purpose of this License. For the avoidance of doubt, where the Work is a musical work, performance or phonogram, the synchronization of the Work in timed-relation with a moving image (“synching”) will be considered an Adaptation for the purpose of this License.

b. “Collection” means a collection of literary or artistic works, such as encyclopedias and anthologies, or performances, phonograms or broadcasts, or other works or subject matter other than works listed in Section 1(f) below, which, by reason of the selection and arrangement of their contents, constitute intellectual creations, in which the Work is included in its entirety in unmodified form along with one or more other contributions, each constituting separate and independent works in themselves, which together are assembled into a collective whole. A work that constitutes a Collection will not be considered an Adaptation (as defined below) for the purposes of this License.

c. “Creative Commons Compatible License” means a license that is listed at <http://creativecommons.org/licenses/by/4.0/> that has been approved by Creative Commons as being essentially equivalent to this License, including, at a minimum, because that license: (i) contains terms that have the same purpose, meaning and effect as the License Elements of this License; and, (ii) explicitly permits the relicensing of adaptations of works made available under that license under this License or a Creative Commons jurisdiction license with the same License Elements as this License.

d. “Distribute” means to make available to the public the original and copies of the Work or Adaptation, as appropriate, through sale or other transfer of ownership.

e. “License Elements” means the following high-level license attributes as selected by Licensor and indicated in the title of this License: Attribution, ShareAlike.

f. “Licensor” means the individual, individuals, entity or entities that offer(s) the Work under the terms of this License.

g. “Original Author” means, in the case of a literary or artistic work, the individual, individuals, entity or entities who created the Work or if no individual or entity can be identified, the publisher; and in addition (i) in the case of a performance the actors,

singers, musicians, dancers, and other persons who act, sing, deliver, declaim, play in, interpret or otherwise perform literary or artistic works or expressions of folklore; (ii) in the case of a phonogram the producer being the person or legal entity who first fixes the sounds of a performance or other sounds; and, (iii) in the case of broadcasts, the organization that transmits the broadcast.

h. “Work” means the literary and/or artistic work offered under the terms of this License including without limitation any production in the literary, scientific and artistic domain, whatever may be the mode or form of its expression including digital form, such as a book, pamphlet and other writing; a lecture, address, sermon or other work of the same nature; a dramatic or dramatico-musical work; a choreographic work or entertainment in dumb show; a musical composition with or without words; a cinematographic work to which are assimilated works expressed by a process analogous to cinematography; a work of drawing, painting, architecture, sculpture, engraving or lithography; a photographic work to which are assimilated works expressed by a process analogous to photography; a work of applied art; an illustration, map, plan, sketch or three-dimensional work relative to geography, topography, architecture or science; a performance; a broadcast; a phonogram; a compilation of data to the extent it is protected as a copyrightable work; or a work performed by a variety or circus performer to the extent it is not otherwise considered a literary or artistic work.

i. “You” means an individual or entity exercising rights under this License who has not previously violated the terms of this License with respect to the Work, or who has received express permission from the Licensor to exercise rights under this License despite a previous violation.

j. “Publicly Perform” means to perform public recitations of the Work and to communicate to the public those public recitations, by any means or process, including by wire or wireless means or public digital performances; to make available to the public Works in such a way that members of the public may access these Works from a place and at a place individually chosen by them; to perform the Work to the public by any means or process and the communication to the public of the performances of the Work, including by public digital performance; to broadcast and rebroadcast the Work by any means including signs, sounds or images.

k. “Reproduce” means to make copies of the Work by any means including without limitation by sound or visual recordings and the right of fixation and reproducing fixations of the Work, including storage of a protected performance or phonogram in digital form or other electronic medium.

2. Fair Dealing Rights. Nothing in this License is intended to reduce, limit, or restrict any uses free from copyright or rights arising from limitations or exceptions that are provided for in connection with the copyright protection under copyright law or other applicable laws.

3. License Grant. Subject to the terms and conditions of this License, Licensor hereby grants You a worldwide, royalty-free, non-exclusive, perpetual (for the duration of the applicable copyright) license to exercise the rights in the Work as stated below:

a. to Reproduce the Work, to incorporate the Work into one or more Collections, and to Reproduce the Work as incorporated in the Collections;

b. to create and Reproduce Adaptations provided that any such Adaptation, including any translation in any medium, takes reasonable steps to clearly label, demarcate or otherwise identify that changes were made to the original Work. For example, a translation could be marked “The original work was translated from English to Spanish,” or a modification could indicate “The original work has been modified.”;

c. to Distribute and Publicly Perform the Work including as incorporated in Collections; and,

d. to Distribute and Publicly Perform Adaptations.

e. For the avoidance of doubt:

i. Non-waivable Compulsory License Schemes. In those jurisdictions in which the right to collect royalties through any statutory or compulsory licensing scheme cannot be waived, the Licensor reserves the exclusive right to collect such royalties for any exercise by You of the rights granted under this License;

ii. Waivable Compulsory License Schemes. In those jurisdictions in which the right to collect royalties through any statutory or compulsory licensing scheme can be waived, the Licensor waives the exclusive right to collect such royalties for any exercise by You of the rights granted under this License; and,

iii. Voluntary License Schemes. The Licensor waives the right to collect royalties, whether individually or, in the event that the Licensor is a member of a collecting society that administers voluntary licensing schemes, via that society, from any exercise by You of the rights granted under this License.

The above rights may be exercised in all media and formats whether now known or hereafter devised. The above rights include the right to make such modifications as are technically necessary to exercise the rights in other media and formats. Subject to Section 8(f), all rights not expressly granted by Licensor are hereby reserved.

4. Restrictions. The license granted in Section 3 above is expressly made subject to and limited by the following restrictions:

a. You may Distribute or Publicly Perform the Work only under the terms of this License. You must include a copy of, or the Uniform Resource Identifier (URI) for, this License with every copy of the Work You Distribute or Publicly Perform. You may

not offer or impose any terms on the Work that restrict the terms of this License or the ability of the recipient of the Work to exercise the rights granted to that recipient under the terms of the License. You may not sublicense the Work. You must keep intact all notices that refer to this License and to the disclaimer of warranties with every copy of the Work You Distribute or Publicly Perform. When You Distribute or Publicly Perform the Work, You may not impose any effective technological measures on the Work that restrict the ability of a recipient of the Work from You to exercise the rights granted to that recipient under the terms of the License. This Section 4(a) applies to the Work as incorporated in a Collection, but this does not require the Collection apart from the Work itself to be made subject to the terms of this License. If You create a Collection, upon notice from any Licensor You must, to the extent practicable, remove from the Collection any credit as required by Section 4(c), as requested. If You create an Adaptation, upon notice from any Licensor You must, to the extent practicable, remove from the Adaptation any credit as required by Section 4(c), as requested.

b. You may Distribute or Publicly Perform an Adaptation only under the terms of: (i) this License; (ii) a later version of this License with the same License Elements as this License; (iii) a Creative Commons jurisdiction license (either this or a later license version) that contains the same License Elements as this License (e.g., Attribution-ShareAlike 3.0 US); (iv) a Creative Commons Compatible License. If you license the Adaptation under one of the licenses mentioned in (iv), you must comply with the terms of that license. If you license the Adaptation under the terms of any of the licenses mentioned in (i), (ii) or (iii) (the “Applicable License”), you must comply with the terms of the Applicable License generally and the following provisions: (I) You must include a copy of, or the URI for, the Applicable License with every copy of each Adaptation You Distribute or Publicly Perform; (II) You may not offer or impose any terms on the Adaptation that restrict the terms of the Applicable License or the ability of the recipient of the Adaptation to exercise the rights granted to that recipient under the terms of the Applicable License; (III) You must keep intact all notices that refer to the Applicable License and to the disclaimer of warranties with every copy of the Work as included in the Adaptation You Distribute or Publicly Perform; (IV) when You Distribute or Publicly Perform the Adaptation, You may not impose any effective technological measures on the Adaptation that restrict the ability of a recipient of the Adaptation from You to exercise the rights granted to that recipient under the terms of the Applicable License. This Section 4(b) applies to the Adaptation as incorporated in a Collection, but this does not require the Collection apart from the Adaptation itself to be made subject to the terms of the Applicable License.

c. If You Distribute, or Publicly Perform the Work or any Adaptations or Collections, You must, unless a request has been made pursuant to Section 4(a), keep intact all copyright notices for the Work and provide, reasonable to the medium or means You are utilizing: (i) the name of the Original Author (or pseudonym, if applicable) if supplied, and/or if the Original Author and/or Licensor designate another party or parties (e.g., a sponsor institute, publishing entity, journal) for attribution (“Attribution Parties”) in

Licensors' copyright notice, terms of service or by other reasonable means, the name of such party or parties; (ii) the title of the Work if supplied; (iii) to the extent reasonably practicable, the URI, if any, that Licensor specifies to be associated with the Work, unless such URI does not refer to the copyright notice or licensing information for the Work; and (iv) , consistent with Section 3(b), in the case of an Adaptation, a credit identifying the use of the Work in the Adaptation (e.g., "French translation of the Work by Original Author," or "Screenplay based on original Work by Original Author"). The credit required by this Section 4(c) may be implemented in any reasonable manner; provided, however, that in the case of a Adaptation or Collection, at a minimum such credit will appear, if a credit for all contributing authors of the Adaptation or Collection appears, then as part of these credits and in a manner at least as prominent as the credits for the other contributing authors. For the avoidance of doubt, You may only use the credit required by this Section for the purpose of attribution in the manner set out above and, by exercising Your rights under this License, You may not implicitly or explicitly assert or imply any connection with, sponsorship or endorsement by the Original Author, Licensor and/or Attribution Parties, as appropriate, of You or Your use of the Work, without the separate, express prior written permission of the Original Author, Licensor and/or Attribution Parties.

d. Except as otherwise agreed in writing by the Licensor or as may be otherwise permitted by applicable law, if You Reproduce, Distribute or Publicly Perform the Work either by itself or as part of any Adaptations or Collections, You must not distort, mutilate, modify or take other derogatory action in relation to the Work which would be prejudicial to the Original Author's honor or reputation. Licensor agrees that in those jurisdictions (e.g. Japan), in which any exercise of the right granted in Section 3(b) of this License (the right to make Adaptations) would be deemed to be a distortion, mutilation, modification or other derogatory action prejudicial to the Original Author's honor and reputation, the Licensor will waive or not assert, as appropriate, this Section, to the fullest extent permitted by the applicable national law, to enable You to reasonably exercise Your right under Section 3(b) of this License (right to make Adaptations) but not otherwise.

5. Representations, Warranties and Disclaimer

UNLESS OTHERWISE MUTUALLY AGREED TO BY THE PARTIES IN WRITING, LICENSOR OFFERS THE WORK AS-IS AND MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND CONCERNING THE WORK, EXPRESS, IMPLIED, STATUTORY OR OTHERWISE, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF TITLE, MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NON-INFRINGEMENT, OR THE ABSENCE OF LATENT OR OTHER DEFECTS, ACCURACY, OR THE PRESENCE OF ABSENCE OF ERRORS, WHETHER OR NOT DISCOVERABLE. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OF IMPLIED WARRANTIES, SO SUCH EXCLUSION MAY NOT APPLY TO YOU.

6. Limitation on Liability. EXCEPT TO THE EXTENT REQUIRED BY APPLICABLE LAW, IN NO EVENT WILL LICENSOR BE LIABLE TO YOU ON ANY LEGAL THEORY FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL, PUNITIVE OR EXEMPLARY DAMAGES ARISING OUT OF THIS LICENSE OR THE USE OF THE WORK, EVEN IF LICENSOR HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

7. Termination

a. This License and the rights granted hereunder will terminate automatically upon any breach by You of the terms of this License. Individuals or entities who have received Adaptations or Collections from You under this License, however, will not have their licenses terminated provided such individuals or entities remain in full compliance with those licenses. Sections 1, 2, 5, 6, 7, and 8 will survive any termination of this License.

b. Subject to the above terms and conditions, the license granted here is perpetual (for the duration of the applicable copyright in the Work). Notwithstanding the above, Licensor reserves the right to release the Work under different license terms or to stop distributing the Work at any time; provided, however that any such election will not serve to withdraw this License (or any other license that has been, or is required to be, granted under the terms of this License), and this License will continue in full force and effect unless terminated as stated above.

8. Miscellaneous

a. Each time You Distribute or Publicly Perform the Work or a Collection, the Licensor offers to the recipient a license to the Work on the same terms and conditions as the license granted to You under this License.

b. Each time You Distribute or Publicly Perform an Adaptation, Licensor offers to the recipient a license to the original Work on the same terms and conditions as the license granted to You under this License.

c. If any provision of this License is invalid or unenforceable under applicable law, it shall not affect the validity or enforceability of the remainder of the terms of this License, and without further action by the parties to this agreement, such provision shall be reformed to the minimum extent necessary to make such provision valid and enforceable.

d. No term or provision of this License shall be deemed waived and no breach consented to unless such waiver or consent shall be in writing and signed by the party to be charged with such waiver or consent.

e. This License constitutes the entire agreement between the parties with respect to the Work licensed here. There are no understandings, agreements or representations with respect to the Work not specified here. Licensor shall not be bound by any additional

provisions that may appear in any communication from You. This License may not be modified without the mutual written agreement of the Licensor and You.

f. The rights granted under, and the subject matter referenced, in this License were drafted utilizing the terminology of the Berne Convention for the Protection of Literary and Artistic Works (as amended on September 28, 1979), the Rome Convention of 1961, the WIPO Copyright Treaty of 1996, the WIPO Performances and Phonograms Treaty of 1996 and the Universal Copyright Convention (as revised on July 24, 1971). These rights and subject matter take effect in the relevant jurisdiction in which the License terms are sought to be enforced according to the corresponding provisions of the implementation of those treaty provisions in the applicable national law. If the standard suite of rights granted under applicable copyright law includes additional rights not granted under this License, such additional rights are deemed to be included in the License; this License is not intended to restrict the license of any rights under applicable law.

Creative Commons Notice

Creative Commons is not a party to this License, and makes no warranty whatsoever in connection with the Work. Creative Commons will not be liable to You or any party on any legal theory for any damages whatsoever, including without limitation any general, special, incidental or consequential damages arising in connection to this license. Notwithstanding the foregoing two (2) sentences, if Creative Commons has expressly identified itself as the Licensor hereunder, it shall have all rights and obligations of Licensor.

Except for the limited purpose of indicating to the public that the Work is licensed under the CCPL, Creative Commons does not authorize the use by either party of the trademark “Creative Commons” or any related trademark or logo of Creative Commons without the prior written consent of Creative Commons. Any permitted use will be in compliance with Creative Commons’ then-current trademark usage guidelines, as may be published on its website or otherwise made available upon request from time to time. For the avoidance of doubt, this trademark restriction does not form part of the License.

Creative Commons may be contacted at <http://creativecommons.org/>.

Bibliography

- (2009). World values survey 1981-2008 official aggregate v.20090901. *World Values Survey Association* (www.worldvaluessurvey.org), *Aggregate File Producer: ASEP/JDS, Madrid*.
- Adamic, L. and B. Huberman (2000). Power law distribution of the world wide web. *Science* (287), 2115.
- Adamic, L. A. and N. Glance (2005). The political blogosphere and the 2004 U.S. election: divided they blog. In *Proceedings of the 3rd international workshop on Link discovery*, LinkKDD '05, New York, NY, USA, pp. 36–43. ACM.
- Adams, S. A., C. E. Matthews, C. B. Ebbeling, C. G. Moore, J. E. Cunningham, J. Fulton, and J. R. Hebert (2005). The effect of social desirability and social approval on self-reports of physical activity. *American Journal of Epidemiology* 161(4), 389–398.
- Adler, P. S. (2001). Market, hierarchy, and trust: The knowledge economy and the future of capitalism. *Organization Science* 12(2), 215–234.
- Alexa.com (2011, December). *mturk.com - Traffic Details*.
- Andreoni, J. and R. Petrie (2004). Public goods experiments without confidentiality: a glimpse into fund-raising. *Journal of Public Economics* 88(7-8), 1605–1623.
- Andrews, K. T., M. Ganz, M. Baggetta, H. Han, and C. Lim (2010). Leadership, membership, and voice: Civic associations that work. *American Journal of Sociology* 115(4), 1191–1242.
- Antin, J. and C. Cheshire (2010). Readers are not free-riders. *Proceedings of the 2010 ACM conference on Computer supported cooperative work (CSCW '10)*, 127–130.
- Antin, J. and A. Shaw (2012). Social desirability bias and self-reports of motivation: A cross-cultural study of amazon mechanical turk in the US and india. *Proceedings of the 2012 ACM Conference on Human Factors in Computing Systems (CHI'12)*.
- Ariely, D., A. Bracha, and S. Meier (2009). Doing good or doing well? image motivation and monetary incentives in behaving prosocially. *American Economic Review* 99(1), 544–555.

- Armstrong, J. and M. Moulitsas Zúniga (2006). *Crashing the Gate: Netroots, Grassroots and the Rise of People-Powered Politics*. White River Junction, VT: Chelsea Green.
- Axelrod, R. M. (1984). *The Evolution of Cooperation*. New York, NY: Basic Books.
- Bai, M. (2007, August). *The Argument: Billionaires, Bloggers, and the Battle to Remake Democratic Politics*. New York, NY: Penguin Press.
- Barabási, A.-L. (2003). *Linked: How Everything Is Connected to Everything Else and What It Means*. New York: Penguin.
- Barnouw, E. (1966). *A Tower in Babel: A History of Broadcasting in the United States*. Oxford: Oxford University Press.
- Barzilai-Nahon, K. (2008). Toward a theory of network gatekeeping: A framework for exploring information control. *Journal of the American Society for Information Science and Technology* 59(9), 1493–1512.
- Barzilai-Nahon, K. (2009). Gatekeeping: A critical review. *Annual Review of Information Science and Technology* 43, 1–79.
- Bénabou, R. and J. Tirole (2006). Incentives and prosocial behavior. *American Economic Review* 96(5), 1652–1678.
- Beniger, J. R. (1986). *The Control Revolution*. Cambridge: Harvard University Press.
- Benkler, Y. (2002). Coase’s penguin, or, linux and the nature of the firm. *Yale Law Journal* 112(3), 369–446.
- Benkler, Y. (2006). *The Wealth of Networks: How Social Production Transforms Markets and Freedom*. New Haven: Yale University Press.
- Benkler, Y. (2012). Beyond the bad man and the knave: Law and the interdependence of motivational vectors. Unpublished manuscript, Harvard Law School, Cambridge, MA.
- Benson, R. D. and É. Neveu (2005). *Bourdieu and the journalistic field*. New York, NY: Polity.
- Bernstein, M. S., A. Monroy-Hernández, D. Harry, P. André, K. Panovich, and G. Vargas (2011). 4chan and /b/: An analysis of anonymity and ephemerality in a large online community. In *Fifth International AAAI Conference on Weblogs and Social Media*. AAAI Publications.
- Boczkowski, P. J. (2010). *News at Work: Imitation in an Age of Information Abundance*. Chicago, IL: University of Chicago Press.
- Bonacich, P. (1987). Power and centrality: A family of measures. *The American Journal of Sociology* 92(5), 1170–1182.

- Bowers, C. and M. Stoller (2005). Emergence of the progressive blogosphere: A new force in american politics. Technical report, New Politics Institute.
- Bryant, S. L., A. Forte, and A. Bruckman (2005). Becoming wikipedian: transformation of participation in a collaborative online encyclopedia. In *Proceedings of the 2005 International ACM SIGGROUP Conference on Supporting Group Work*, Sanibel Island, Florida, USA, pp. 1–10. ACM.
- Buhrmester, M., T. Kwang, and S. D. Gosling (2011). Amazon’s mechanical turk. *Perspectives on Psychological Science* 6(1), 3–5.
- Burke, M. and R. Kraut (2008). Mopping up: modeling wikipedia promotion decisions. In *Proceedings of the ACM 2008 Conference on Computer Supported Cooperative Work (CSCW ’08)*, San Diego, CA, USA, pp. 27–36. ACM.
- Butts, C. T. (2008). Social network analysis: A methodological introduction. *Asian Journal Of Social Psychology* 11(1), 13–41.
- Castells, M. (1996). *The Rise of the Network Society*. Malden, MA: Blackwell.
- Chandler, D. and A. Kapelner (2010). Breaking monotony with meaning: Motivation in crowdsourcing markets. *University of Chicago mimeo*.
- Chen, D. L. (2010). Markets and morality: How does competition affect moral judgment? *Working Paper, Duke University School of Law*.
- Chen, D. L. and J. J. Horton (2009). The wages of paycuts: Evidence from a field experiment. *Working Paper*.
- Cheshire, C. (2007). Selective incentives and generalized information exchange. *Social Psychology Quarterly* 70, 82–100.
- Cheshire, C. and J. Antin (2008). The social psychological effects of feedback on the production of internet information pools. *Journal of Computer-Mediated Communication* 13(3), 705–727.
- Ciampaglia, G. L. (2011). Editor life cycle. Wikimedia summer of research report, Wikimedia Foundation, SF, CA.
- Clayman, S. E. and A. Reisner (1998). Gatekeeping in action: Editorial conferences and assessments of newsworthiness. *American Sociological Review* 63(2), 178–199.
- Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational & Psychological Measurement* 20(1), 37–46.
- Coleman, J. S. (1973). *The Mathematics of Collective Action*. Chicago, IL: Aldine.
- Collins, R. (1981). On the microfoundations of macrosociology. *American Journal of Sociology* 86(5), 984–1014.

- Deci, E. L. and R. M. Ryan (1985). *Intrinsic Motivation and Self-Determination in Human Behavior*. New York, NY: Plenum Press.
- DeMaio, T. J. (1984, June). Social desirability and survey measurement: A review. In C. F. Turner, E. Martin, and N. R. C. U. P. o. S. M. o. S. Phenomena (Eds.), *Surveying subjective Phenomena*, Volume 2, pp. 257–282. Russell Sage Foundation.
- Derné, S. (1994). Cultural conceptions of human motivation and their significance for culture theory. In D. Crane (Ed.), *The Sociology of Culture: Emerging Theoretical Perspectives*, pp. 267–287. Cambridge, MA: Blackwell.
- Downs, J., M. Holbrook, S. Sheng, and L. Cranor (2010). Are your participants gaming the system?: screening mechanical turk workers. In *Proceedings of the 28th International Conference on Human Factors in Computing Systems (CHI '10)*, New York, NY, pp. 2399–2402. ACM Press.
- Drezner, D. and H. Farrell (2008). The power and politics of blogs. *Public Choice* (134), 15–30.
- Eisenstein, E. L. (1979). *The Printing Press as an Agent of Change*. Cambridge: Cambridge University Press.
- Ekeh, P. P. (1974). *Social Exchange Theory: The Two Traditions*. Cambridge, MA: Harvard University Press.
- Emirbayer, M. (1997). Manifesto for a relational sociology. *American Journal of Sociology* 103(2), 281–317.
- Fisher, D., M. Smith, and H. T. Welser (2006). You are who you talk to: Detecting roles in usenet newsgroups. In *Proceedings of the 39th Annual Hawaii International Conference on System Sciences - Volume 03*, HICSS '06, Washington, DC, USA. IEEE Computer Society.
- Fisher, D. R. (2006). *Acitvism Inc.: How the Outsourcing of Grassroots Campaigns in Strangling Progressive Politics in America*. Stanford, CA: Stanford University Press.
- Fligstein, N. (2001). *The Architecture of Markets: An Economic Sociology of Twenty-First-Century Capitalist Societies*. Princeton, NJ: Princeton University Press.
- Freedman, D. A. (2008a). On regression adjustments in experiments with several treatments. *The Annals of Applied Statistics* 2(1), 176–196.
- Freedman, D. A. (2008b). Randomization does not justify logistic regression. *Statistical Science* 23(2), 237–249.
- Freeman, J. (1973). The tyranny of structurelessness. *Berkeley Journal of Sociology* 17, 151–165.

- Frey, B. S. and R. Jegen (2001). Motivation crowding theory. *Journal of Economic Surveys* 15(5), 589–611.
- Frey, B. S. and S. Neckermann (2008). Awards. *Zeitschrift für Psychologie / Journal of Psychology* 216(4), 198–208.
- Ganster, D. C., H. W. Hennessey, and F. Luthans (1983). Social desirability response effects: Three alternative models. *The Academy of Management Journal* 26(2), 321–331.
- Ghosh, R. and R. Glott (2002). Free/Libre and open source software: Survey and study. Technical report, European Commission.
- Gieryn, T. F. (1983). Boundary-work and the demarcation of science from non-science: Strains and interests in professional ideologies of scientists. *American Sociological Review* 48(6), 781–795.
- Gleave, E., H. Welser, T. Lento, and M. Smith (2009). A conceptual and operational definition of 'Social role' in online community. In *HICSS '09. 42nd Hawaii International Conference on System Sciences*, Washington, DC, USA, pp. 1–11. IEE Computer Society.
- Glott, R., R. Ghosh, and P. Schmidt (2010, March). Wikipedia survey. Technical report, UNU-MERIT, Maastricht, Netherlands.
- Goffman, E. (1967). *Interaction Ritual: Essays on Face-to-Face Behavior*. New York, NY: Pantheon.
- Goffman, E. (1973). *The Presentation of Self in Everyday Life*. New York, NY: Doubleday.
- Golder, S. A. and M. W. Macy (2011). Diurnal and seasonal mood vary with work, sleep, and daylength across diverse cultures. *Science* 333(6051), 1878–1881.
- Gonzalez-Ocantos, E., C. K. de Jonge, C. Melndez, J. Osorio, and D. W. Nickerson. Vote buying and social desirability bias: Experimental evidence from nicaragua. *American Journal of Political Science*.
- Graham, J., J. Haidt, and B. A. Nosek (2009). Liberals and conservatives rely on different sets of moral foundations. *Journal of Personality and Social Psychology* 96(5), 1029–1046.
- Habermas, J. (1962). *The Structural Transformation of the Public Sphere: An Inquiry Into a Category of Bourgeois Society*. London: Polity.
- Hanaki, N., A. Peterhansl, P. S. Dodds, and D. J. Watts (2007). Cooperation in evolving social networks. *Management Science* 53(7), 1036–1050.
- Hardin, G. (1968). The tragedy of the commons. *Science* 162(December 13), 1243–1248.
- Hargittai, E. (2000). Open portals or closed gates? channeling content on the world wide web. *Poetics* 27, 233–253.

- Hargittai, E. (2009a, February). Digital na(t)ives? the role of skill in internet use. Cambridge, MA.
- Hargittai, E. (2009b). An update on survey measures of web-oriented digital literacy. *Social Science Computer Review* 27(1), 130–137.
- Hargittai, E. (2010). Digital na(t)ives: Variation in internet skills and uses among members of the 'Net generation'. *Sociological Inquiry* 80(1), 92–113.
- Hargittai, E., J. Gallo, and M. Kane (2008). Cross-ideological discussions among conservative and liberal bloggers. *Public Choice* (134), 67–86.
- Hargittai, E. and A. Hinant (2008). Digital inequality: Differences in young adults' use of the internet. *Communication Research* 35(5), 602–621.
- Hargittai, E. and G. Walejko (2008). The participation divide: Content creation and sharing in the digital age. *Information, Communication and Society* 11(2), 239–256.
- Hindman, M. (2008). *The Myth of Digital Democracy*. Princeton, NJ: Princeton University Press.
- Hopkins, D. and G. King (2010). A method of automated nonparametric content analysis for social science. *American Journal of Political Science* 54(1), 229–247.
- Horton, J. and L. Chilton (2010). The labor economics of paid crowdsourcing. *Proceedings of the ACM Conference on Electronic Commerce 2010*.
- Horton, J. J., D. Rand, and R. J. Zeckhauser (2010). The online laboratory: Conducting experiments in a real labor market. *Experimental Economics* 14(3), 399–425.
- Howard, P. N. (2005). *New Media Campaigns and the Managed Citizen*. Cambridge University Press.
- Hsu, J. C. (1996). *Multiple comparisons: Theory and Methods*. Boca Raton, FL: CRC Press.
- Huberman, B. A., D. Romero, and F. Wu (2009). Crowdsourcing, attention and productivity. *Journal of Information Science (in press)*.
- Innis, H. A. (1951). *The Bias of Communication*. Toronto: University of Toronto Press.
- Ipeirotis, P. (2010). Demographics of mechanical turk. *New York University Working Paper CEDER-10-01*.
- Janus, A. L. (2010). The influence of social desirability pressures on expressed immigration attitudes. *Social Science Quarterly* 91(4), 928–946.
- Jost, J. T., J. Glaser, A. W. Kruglanski, and F. J. Sulloway (2003). Political conservatism as motivated social cognition. *Psychological Bulletin* 129(3), 339–375.

- Kahan, D. M., D. Braman, P. Slovic, J. Gastil, and G. L. Cohen (2007). The second national risk and culture study: Making sense of - and making progress in - the american culture war of fact. *Yale Law School, Public Law Working Paper No. 154*.
- Kapelner, A. and D. Chandler (2010). Preventing satisficing in online surveys. In *Proceedings of 2010 CrowdConf*.
- Karpf, D. (2008a). Measuring influence in the political blogosphere: Who's winning and how can we tell? *Politics and Technology Review* (March), 33–41.
- Karpf, D. (2008b). Understanding blogspace. *Journal of Information Technology & Politics* 5(4), 369–385.
- Karpf, D. (2012). *The MoveOn Effect: The Unexpected Transformation of American Political Advocacy*. New York, NY: Oxford University Press.
- Kaufmann, N., D. Veit, and T. Schulze (2011). More than fun and money . worker motivation in crowdsourcing a study on mechanical turk. In *Proceedings of the Seventeenth Americas Conference on Information Systems*, Detroit, MI.
- Keegan, B. and D. Gergle (2010). Egalitarians at the gate. *Proceedings of the 2010 ACM conference on Computer supported cooperative work (CSCW '10)* (Savannah, Georgia, ACM Press), 131–134.
- Keeter, S., J. M. Horowitz, and A. Tyson (2008, April). Gen dems: The party's advantage among young voters widens. Technical Report 813, Pew Research Center for the People and the Press, Washington, D.C.
- Kerbel, M. R. (2009). *Netroots: Online Progressives and the Transformation of American Politics*. Boulder, CO: Paradigm Publishers.
- Keser, C. and F. Van Winden (2000). Conditional cooperation and voluntary contributions to public goods. *The Scandinavian Journal of Economics* 102(1), 23–39.
- Khanna, S., A. Ratan, J. Davis, and W. Thies (2010). Evaluating and improving the usability of mechanical turk for low-income workers in india. In *Proceedings of the First ACM Symposium on Computing for Development, ACM DEV '10*, London, United Kingdom, pp. 12:1–12:10. ACM.
- Kiesler, S., J. Siegel, and T. W. McGuire (1984). Social psychological aspects of computer-mediated communication. *American Psychologist* 39(10), 1123–1134.
- Kiesler, S. and L. S. Sproull (1986). Response effects in the electronic survey. *Public Opinion Quarterly* 50(3), 402–413.
- King, M. F. and G. C. Bruner (2000). Social desirability bias: A neglected aspect of validity testing. *Psychology and Marketing* 17(2), 79–103.

- Kittur, A., E. Chi, B. Suh, and T. Mytkowicz (2007). Power of the few vs. wisdom of the crowd: Wikipedia and the rise of the bourgeoisie. *Conference on Human Factors in Computing Systems (CHI)* (San Jose, CA, ACM Press.).
- Kittur, A., E. H. Chi, and B. Suh (2008). Crowdsourcing user studies with mechanical turk. In *Proceeding of the twenty-sixth annual SIGCHI conference on Human factors in computing systems*, Florence, Italy, pp. 453–456. ACM.
- Kittur, A., B. Lee, and R. E. Kraut (2009). Coordination in collective intelligence: the role of team structure and task interdependence. In *Proceedings of the 27th international conference on Human factors in computing systems (CHI 2009)*, pp. 1495–1504.
- Kittur, A., B. Suh, B. A. Pendleton, and E. H. Chi (2007). He says, she says: conflict and coordination in wikipedia. In *Proc. CHI '07*.
- Koenker, R. (2005). *Quantile Regression*. New York, NY: Cambridge University Press.
- Koenker, R. and K. F. Hallock (2001). Quantile regression. *The Journal of Economic Perspectives* 15(4), 143–156.
- Kohn, A. (1999). *Punished by Rewards: The Trouble with Gold Stars, Incentive Plans, A's, Praise, and Other Bribes* (2 ed.). Mariner Books.
- Kollock, P. (1998). Social dilemmas: The anatomy of cooperation. *Annual Review of Sociology* 24, 183–214.
- Kollock, P. (1999). The economies of online cooperation: Gifts and public goods in cyberspace. In P. Kollock and M. Smith (Eds.), *Communities in Cyberspace*, pp. 220–239. London: Routledge.
- Kraut, R. E. and P. Resnick (2011). *Building Successful Online Communities: Evidence-Based Social Design*. Cambridge, MA: MIT Press.
- Kreiss, D. (2012). *Taking Our Country Back: The Crafting of Networked Politics from Howard Dean to Barack Obama*. New York, NY: Oxford University Press.
- Kriplean, T., I. Beschastnikh, and D. W. McDonald (2008). Articulations of wikiwork: uncovering valued work in wikipedia through barnstars. In *Proceedings of the 2008 ACM Conference on Computer Supported Cooperative Work (CSCW '08)*, San Diego, CA, USA, pp. 47–56. ACM.
- Krippendorff, K. (2004). *Content Analysis: An Introduction to Its Methodology* (2nd Edition ed.). Thousand Oaks, CA: Sage.
- Krippendorff, K. H. (2003). *Content Analysis: An Introduction to Its Methodology* (2nd ed.). Sage Publications, Inc.

- Kuklinski, J. H., M. D. Cobb, and M. Gilens (1997). Racial attitudes and the “new south”. *The Journal of Politics* 59(2), 323–349.
- Laherrère, J. (1996). Distributions de type “fractal parabolique” dans la nature. *Comptes Rendus de l’Académie des Sciences, Série II a: Sciences de la Terre et des Planètes* 7(4 April), 535–541.
- Lakhani, K. R., R. G. Wolf, J. Feller, B. Fitzgerald, S. Hissam, and K. R. Lakhani (2005). Why hackers do what they do: Understanding motivation and effort in Free/Open source software projects. In *Perspectives on Free and open Source Software*. Cambridge, Mass: MIT Press.
- Lampe, C. and E. Johnston (2005). Follow the (slash) dot: effects of feedback on new members in an online community. In *Proceedings of the 2005 international ACM SIG-GROUP conference on Supporting group work, GROUP ’05*, New York, NY, USA, pp. 11–20. ACM.
- Lampe, C. and P. Resnick (2004). Slash(dot) and burn: Distributed moderation in a large online conversation space. In *Conference on Human Factors in Computing Systems (CHI)*, Vienna, Austria, pp. 543–550. ACM Press.
- Lampe, C. A., E. Johnston, and P. Resnick (2007). Follow the reader: filtering comments on slashdot. In *Proceedings of the SIGCHI conference on Human factors in computing systems, CHI ’07*, New York, NY, USA, pp. 1253–1262. ACM Press.
- Last, J. V. (2004, September). What blogs have wrought. *The Weekly Standard* 10(3).
- Lawrence, E., J. Sides, and H. Farrell (2010). Self-segregation or deliberation? blog readership, participation, and polarization in american politics. *Perspectives on Politics* 8(1), 141–157.
- Lerner, J. and J. Tirole (2002). Some simple economics of open source. *The Journal of Industrial Economics* 50(2), 197–234.
- Leuf, B. and W. Cunningham (2001). *The Wiki way: quick collaboration on the Web*. Addison-Wesley Longman Publishing Co., Inc. Boston, MA, USA.
- Lewin, K. (1947). Frontiers in group dynamics: Concept, method and reality in social science; equilibria and social change. *Human Relations* 1(1), 5–41.
- Little, G., L. B. Chilton, R. Miller, and M. Goldman (2009). TurKit: tools for iterative tasks on mechanical turk. *Working Paper, MIT*.
- MacKenzie, D. A. (2006). *An engine, not a camera: how financial models shape markets*. Cambridge, MA: MIT Press.
- Markus, H. R. and S. Kitayama (2003). Culture, self, and the reality of the social. *Psychological Inquiry* 14, 277–283.

- Marshall, J. M. (2008, May). Interview with authors.
- Marwell, G. and P. Oliver (1993). *The critical mass in collective action : a micro-social theory*. Cambridge: Cambridge University Press.
- Maslach, C. and S. E. Jackson (1981). The measurement of experienced burnout. *Journal of Organizational Behavior* 2(2), 99–113.
- Mason, W. and D. J. Watts (2009). Financial incentives and the "performance of crowds". *SIGKDD Explor. Newsl.* 11(2), 100–108.
- McChesney, R. W. (1993). *Telecommunications, Mass Media, and Democracy: The Battle for the Control of U.S. Broadcasting, 1928-1935*. New York: Oxford University Press.
- McLuhan, M. (1962). *The Gutenberg Galaxy: The Making of Typographic Man*. Toronto: University of Toronto Press.
- Meade, A., A. Watson, and C. Kroustalis (2007). Assessing common methods bias in organizational research. In *22nd Annual Meeting of the Society for Industrial and Organizational Psychology, New York*.
- Michels, R. (1915). *Political Parties: A Sociological Study of the Oligarchical Tendencies of Modern Democracy*. New York, NY: Hearst International Library Co.
- Mieszkowski, K. (2006, July). "I make \$1.45 a week and i love it". http://www.salon.com/tech/feature/2006/07/24/turks/index_np.html.
- Mirchandani, K. (2004, October). Practices of global capital: Gaps, cracks and ironies in transnational call centres in india. *Global Networks* 4(4), 355–373.
- Moorman, R. H. and P. M. Podsakoff (1992). A meta-analytic review and empirical test of the potential confounding effects of social desirability response sets in organizational behavior research. *Journal of Occupational and Organizational Psychology* 65(2), 131–149.
- Moulitsas Zúniga, M. (2008). *Taking On the System: Rules for Radical Change in a Digital Era*. New York: Penguin.
- Nardi, B., D. J. Schiano, M. Gumbrecht, and L. Swartz (2004). Why we blog. *Communications of the ACM* 47(12), 41–46.
- Neckermann, S., R. Cueni, and B. S. Frey (2009). What is an award worth? an econometric assessment of the impact of awards on employee performance. Working paper, CESifo Group Munich, Munich, Germany.
- Nederhof, A. J. (1985). Methods of coping with social desirability bias: A review. *European Journal of Social Psychology* 15(3), 263–280.

- Neff, G. and D. Stark (2004). Permanently beta: Responsive organization in the internet era. In P. N. Howard and S. Jones (Eds.), *Society Online: The Internet in Context*, pp. 173–188. Thousand Oaks, CA: Sage.
- Nielsen, R. K. (2012). *Ground Wars: Personalized Communication in Political Campaigns*. Princeton, NJ: Princeton University Press.
- Nisbett, R. and T. Wilson (1977). Telling more than we can know: Verbal reports on mental processes. *Psychological Review* 84(1), 231–259.
- Nov, O., M. Naaman, and C. Ye (2009). Motivational, structural and tenure factors that impact online community photo sharing. In *Third International Conference on Weblogs and Social Media (ICWSM 2009)*, San Jose, CA.
- Okoli, C. and K. Schabram (2009). Protocol for a systematic literature review of research on the wikipedia. *Sprouts: Working Papers on Information Systems* 9(65).
- Oktay, H., B. J. Taylor, and D. D. Jensen (2010). Causal discovery in social media using quasi-experimental designs. In *Proceedings of the First Workshop on Social Media Analytics, SOMA '10*, New York, NY, USA, pp. 1–9. ACM.
- Oliver, P. E. (1993). Formal models of collective action. *Annual Review of Sociology* 19(1), 271–300.
- Olson, M. (1965). *The logic of collective action: public goods and the theory of groups*. Cambridge, MA: Harvard University Press.
- O'Mahony, S. and F. Ferraro (2007). The emergence of governance in an open source community. *Academy of Management Journal* 50(5), 1079–1106.
- Ortega, F. and J. M. Gonzalez Barahona (2007). Quantitative analysis of the wikipedia community of users. In *Proceedings of the 2007 international symposium on Wikis, WikiSym '07*, New York, NY, USA, pp. 75–86. ACM.
- Ostrom, E. (1990). *Governing the Commons: The Evolution of Institutions for Collective Action*. New York, NY: Cambridge University Press.
- Ouchi, W. G. (1980, March). Markets, bureaucracies, and clans. *Administrative Science Quarterly* 25(1), 129–141.
- Panciera, K., A. Halfaker, and L. Terveen (2009). Wikipedians are born, not made: a study of power editors on wikipedia. In *Proceedings of the ACM 2009 international conference on Supporting group work, GROUP '09*, New York, NY, USA, pp. 51–60. ACM.
- Panciera, K., R. Priedhorsky, T. Erickson, and L. Terveen (2010). Lurking? cyclopaths?: a quantitative lifecycle analysis of user behavior in a geowiki. In *Proceedings of the 28th international conference on Human factors in computing systems, CHI '10*, New York, NY, USA, pp. 1917–1926. ACM.

- Phillips, D. L. and K. J. Clancy (1972). Some effects of "Social desirability" in survey studies. *The American Journal of Sociology* 77(5), 921–940.
- Powell, W. W. (1990). Neither market nor hierarchy: Network forms of organization. In B. M. Staw and L. L. Cummings (Eds.), *Research in Organizational Behavior*, Volume 12, pp. 295–336. Greenwich, CT: JAI Press.
- Preece, J. and B. Shneiderman (2009). The reader-to-leader framework: Motivating technology-mediated social participation. *AIS Transactions on Human-Computer Interaction* 1(1), 13–32.
- Prelec, D. (2004). A bayesian truth serum for subjective data. *Science* 306(5695), 462–466.
- Quinn, A. J. and B. B. Bederson (2011). Human computation: A survey and taxonomy of a growing field. In *Proceedings of ACM CHI 2011 Conference on Human Factors in Computing Systems*.
- Raban, D. R. (2008). The incentive structure in an online information market. *Journal of the American Society for Information Science and Technology* 59(14), 2284–2295.
- Rafaeli, S. and Y. Ariel (2008). Online motivational factors: Incentives for participation and contribution in wikipedia. In A. Barak (Ed.), *Psychological Aspects of Cyberspace*. New York, NY: Cambridge University Press.
- Rafaeli, S., D. R. Raban, and G. Ravid (2007). How social motivation enhances economic activity and incentives in the google answers knowledge sharing market. *International Journal of Knowledge and Learning* 3(1), 1 – 11.
- Reagle, J. (2010). *Good faith collaboration: The Culture of Wikipedia*. Cambridge, MA: MIT Press.
- Restivo, M. and A. van de Rijt (2012). Experimental study of informal rewards in peer production. *PLoS ONE* 7(3), e34358.
- Reynolds, G. (2006). *An Army of Davids: How Markets and Technology Empower Ordinary People to Beat Big Media, Big Government, and Other Goliaths*. Nashville, TN: Thomas Nelson.
- Ridgeway, C. L. (1982). Status in groups: The importance of motivation. *American Sociological Review* 47(1), 76–88.
- Rogstadius, J., V. Kostakos, A. Kittur, B. Smus, J. Laredo, and M. Vukovic (2011). An assessment of intrinsic and extrinsic motivation on task performance in crowdsourcing markets. In *Fifth International AAAI Conference on Weblogs and Social Media*.
- Rosenthal, R. and D. B. Rubin (1984). Multiple contrasts and ordered bonferroni procedures. *Journal of Educational Psychology* 76(6), 1028–1034.

- Ross, J., L. Irani, M. S. Silberman, A. Zaldivar, and B. Tomlinson (2010). Who are the crowdworkers?: shifting demographics in mechanical turk. In *Proceedings of the 28th of the international conference extended abstracts on Human factors in computing systems*, Atlanta, Georgia, USA, pp. 2863–2872. ACM.
- Salganik, M. J., P. S. Dodds, and D. J. Watts (2006). Experimental study of inequality and unpredictability in an artificial cultural market. *Science* 311(5762), 854–856.
- Salganik, M. J. and D. J. Watts (2008). Leading the herd astray: An experimental study of self-fulfilling prophecies in an artificial cultural market. *Social Psychology Quarterly* 71(4), 338–355.
- Schlozman, K. L., S. Verba, and H. E. Brady (2010). Weapon of the strong? participatory inequality and the internet. *Perspectives on Politics* 8(2), 487–509.
- Schradie, J. (2011, April). The digital production gap: The digital divide and web 2.0 collide. *Poetics* 39(2), 145–168.
- Schroer, J. and G. Hertel (2009). Voluntary engagement in an open web-based encyclopedia: Wikipedians and why they do it. *Media Psychology* 12(1), 96.
- Schudson, M. (1989). The sociology of news production. *Media, Culture & Society* 11(3), 263–282.
- Schudson, M. (2002). The news media as political institutions. *Annual Review of Political Science* 5(1), 249–269.
- Scott, J. (1998). *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven, CT: Yale University Press.
- Shaffer, J. P. (1995). Multiple hypothesis testing. *Annual Review of Psychology* 46, 561–584.
- Shaw, A. and Y. Benkler (2012). A tale of two blogospheres: Discursive practices on the left and right. *American Behavioral Scientist* 56(4), 459–487.
- Shaw, A., J. J. Horton, and D. L. Chen (2011). Designing incentives for inexpert human raters. *Proceedings of the 2011 ACM Conference on Computer Supported Cooperative Work (CSCW '11) Hangzhou, China*.
- Sheng, V. S., F. Provost, and P. G. Ipeirotis (2008). Get another label? improving data quality and data mining using multiple, noisy labelers. *Knowledge Discovery and Data Mining 2008 (KDD-2008)*.
- Shirky, C. (2008). *Here Comes Everybody: The Power of Organizing Without Organizations*. New York: Penguin Press.
- Shoemaker, P. J. and T. P. Vos (2009). *Gatekeeping Theory*. New York: Routledge.

- Skocpol, T. (2003). *Diminished Democracy: From Membership to Management in American Civic Life*. Norman: University of Oklahoma Press.
- Smith, A. (2009). The internet's role in campaign 2008. Technical report, Pew Internet & American Life Project, The Pew Research Center for the People and the Press.
- Snow, R., B. O'Connor, D. Jurafsky, and A. Y. Ng (2008). Cheap and fast—but is it good? evaluating non-expert annotations for natural language tasks. *Proceedings of the Conference on Empirical Methods in Natural Language Processing (EMNLP 2008)*.
- Starr, P. (2005). *The Creation of the Media: Political Origins of Modern Communication*. New York: Basic Books.
- Sunstein, C. R. (2002). *Republic.com*. Princeton, NJ: Princeton University Press.
- Sunstein, C. R. (2007). *Republic.com 2.0*. Princeton, NJ: Princeton University Press.
- Tapscott, D. and A. D. Williams (2006). *Wikinomics : How Mass Collaboration Changes Everything*. New York: Portfolio.
- Tilly, C. (1999). *Durable inequality*. Berkeley: University of California Press.
- Tilly, C. (2001). Relational origins of inequality. *Anthropological Theory* 1(3), 355–372.
- Tilly, C. (2006). *Why?* Princeton, NJ: Princeton University Press.
- Viegas, F. B., M. Wattenberg, J. Kriss, and F. Van Ham (2007). Talk before you type: Coordination in wikipedia. In *40th Annual Hawaii International Conference on System Sciences (HICSS 2007)*, Manoa, Hawaii, pp. 78–78.
- Viégas, F. B., M. Wattenberg, and M. M. McKeon (2007). The hidden order of wikipedia. In *Proceedings of the 2nd international conference on Online communities and social computing*, OCSC'07, Berlin, Heidelberg, pp. 445–454. Springer-Verlag.
- Von Ahn, L. and L. Dabbish (2004). Labeling images with a computer game. In *Proceedings of the SIGCHI conference on Human factors in computing systems*, pp. 319–326.
- Wallsten, K. (2007). Agenda setting and the blogosphere: An analysis of the relationship between mainstream media and political blogs. *Review of Policy Research* 24(6), 567–587.
- Wallsten, K. (2008). Political blogs: Transmission belts, soapboxes, mobilizers, or conversation starters? *Journal of Information Technology & Politics* 4(3), 19–40.
- Wasserman, S. and K. Faust (1995). *Social Network Analysis: Methods and Applications*. New York, NY: Cambridge University Press.
- Weber, M. (1978). *Economy and Society*. Berkeley, CA: University of California Press.

- Weber, S. (2004). *The Success of Open Source*. Cambridge, MA: Harvard University Press.
- Welser, H. T., D. Cosley, G. Kossinets, A. Lin, F. Dokshin, G. Gay, and M. Smith (2011). Finding social roles in wikipedia. In *Proceedings of the 2011 iConference*, iConference '11, New York, NY, USA, pp. 122–129. ACM.
- White, D. M. (1950). The 'Gatekeeper': a case study in the selection of news. *Journalism Quarterly* 27, 383–390.
- Wilkinson, D. M. (2008). Strong regularities in online peer production. In *Proceedings of the 9th ACM conference on Electronic commerce*, EC '08, New York, NY, USA, pp. 302–309. ACM Press.
- Willer, R. (2009a). Groups reward individual sacrifice: The status solution to the collective action problem. *American Sociological Review* 74(1), 23 –43.
- Willer, R. (2009b). A status theory of collective action. In *Advances in Group Processes*, Volume 26, pp. 133–163. Bingley: Emerald Group Publishing.
- Winner, L. (1986). Do artifacts have politics? In *The Whale and the Reactor: A Search for Limits in an Age of High Technology*, pp. 19–39. Chicago: University of Chicago Press.
- Wu, F., D. M. Wilkinson, and B. A. Huberman (2009). Feedback loops of attention in peer production. In *Proceedings of the 2009 International Conference on Computational Science and Engineering - Volume 04*, CSE '09, Washington, DC, USA, pp. 409–415. IEEE Computer Society.
- Yamagishi, T. and K. S. Cook (1993). Generalized exchange and social dilemmas. *Social Psychology Quarterly* 56(4), 235–248.
- Zelizer, V. A. (2005). *The Purchase of Intimacy*. Princeton, NJ: Princeton University Press.
- Zhang, X. M. and F. Zhu (2010). Group size and incentives to contribute: A natural experiment at chinese wikipedia. *American Economic Review* 101, 1601–1615.
- Zittrain, J. (2008). Ubiquitous human computing. *Philosophical Transactions of the Royal Society A* 366, 3813–3821.
- Zukin, C., S. Keeter, M. Andolina, K. Jenkins, and M. X. Delli Carpini (2006). *A New Engagement? Political Participation, Civic Life, and the Changing American Citizen*. New York, NY: Oxford University Press.