How Do People Change Their Technology Use in Protest?: Understanding "Protest Users"

HANLIN LI*, Northwestern University, USA
NICHOLAS VINCENT*, Northwestern University, USA
JANICE TSAI, Mozilla, USA
JOFISH KAYE, Mozilla, USA
BRENT HECHT, Northwestern University, USA
* indicates equal contributions

Researchers and the media have become increasingly interested in *protest users*, or people who change (protest use) or stop (protest non-use) their use of a company's products because of the company's values and/or actions. Past work has extensively engaged with the phenomenon of technology *non-use* but has not focused on non-use (nor changed use) in the context of protest. With recent research highlighting the potential for protest users to exert leverage against technology companies, it is important for technology stakeholders to understand the prevalence of protest users, their motivations, and the specific tactics they currently use. In this paper, we report the results of two surveys (n = 463 and n = 398) of representative samples of American web users that examine if, how, and why people have engaged in protest use and protest non-use of the products of five major technology companies. We find that protest use and protest non-use are relatively common, with 30% of respondents in 2019 reporting they were protesting at least one major tech company. Furthermore, we identify that protest users' most common motivations were (1) concerns about business models that profit from user data and (2) privacy; and the most common tactics were (1) stopping use and (2) leveraging ad blockers. We also identify common challenges and roadblocks faced by active and potential protest users, which include (1) losing social connections and (2) the lack of alternative products. Our results highlight the growing importance of protest users in the technology ecosystem and the need for further social computing research into this phenomenon. We also provide concrete design implications for existing and future technologies to support or account for protest use and protest non-use.

CCS Concepts: • **Human-centered computing → Collaborative and social computing → Empirical studies in collaborative and social computing**

KEYWORDS: Protest users; technology non-use; online survey

1 INTRODUCTION

Protests against technology companies that involve people stopping or changing their use of these companies' products have attracted increasing public attention. High profile examples include boycotts against Facebook to protest illicit data harvesting and the spread of misinformation [16,17], boycotts against Uber to protest its behavior surrounding a taxi strike and

sexual harassment in the company [52], and boycotts against Amazon to protest working conditions and anti-tax lobbying [26].

Researchers have also become increasingly interested in these types of protests against technology companies [32,40,45,57]. For instance, Vincent et al. recently explored the concepts of "data strikes" and "data boycotts" against large-scale machine learning systems [57], Posner and Weyl argued for the formation of "data unions" [45] or other mediators of individual data [31], and Li et al. developed technologies to scaffold these and other types of protests [32]. More generally, human-computer interaction (HCI) researchers [2,6,50,59] have called for studying specific forms of *non-use,* of which recent protests against technology companies can be understood as a part.

However, despite the growing public and scholarly interest in protests against technology companies, we lack critical empirical information about these protests. Core questions surrounding participation rates, tactics, and motivations remain unaddressed. Put another way, we do not know the extent of the population that is participating in one of these protests, nor do we have a rigorous understanding of their specific protest tactics or motivations for protesting. Additionally, we lack knowledge about what challenges people face in these protests and what roadblocks prevent people from protesting.

Through the results of two nationally-representative surveys, this paper contributes an improved descriptive understanding of whom we are calling *protest users.* These people are current or past users of a technology who change (*protest use*) or stop (*protest non-use*) their use of the technology due to the values or actions of the company behind the technology. Our surveys sampled adult Internet users in the United States. The first exploratory survey was conducted in 2017 (n = 463). The second survey was conducted in 2019 and directly targeted specific research questions about protest users (n = 398). In particular, we examined *if, how,* and *why* people have become protest users of five major technology (tech) companies (Amazon, Apple, Facebook, Google, Microsoft; the five most valuable tech companies on the U.S. markets), and the challenges and roadblocks experienced by active and potential protest users, respectively.

Our results suggest that a surprisingly large share of web users in the United States are protest users. 30% of our 2019 respondents reported being active protest users of at least one tech company. This number is a meaningful increase from the 9% of respondents in our 2017 survey (although as we detail below, this comparison must be interpreted with caution). Furthermore, an additional 19% of our 2019 respondents who were not actively protesting expressed interest in doing so. In total (after rounding to the nearest percent), 48% of respondents indicated that they were either active or potential protest users.

Among active protest users, the most commonly reported motivations were concerns about business models that profit from user data and concerns about privacy (echoing previous findings about technology non-use and privacy concerns [5,56,60]). Furthermore, stopping use entirely and using ad blockers were the most common tactics that our protest users reported employing against tech companies, and losing social connections was the most prevailing challenge protest users faced.

Among our potential protest users, we observed that a major roadblock to protesting was a lack of alternative products. This finding is in alignment with current concerns around the monopoly power of technology companies and corresponding effects on the consumer's ability to shape company behavior [48]. We also observed some roadblocks that were especially prominent for particular companies. For instance, consistent with prior work [5], respondents reported that the possibility of "losing connections with others" and "missing out on information" prevented them from leaving Facebook.

From the lens of the literature on protests against technology companies, our study provides evidence that there could be substantial demand for technologies to support protest users and provides guidance for the design of these technologies. This guidance includes helping people protest collectively and aiding them in accessing alternative products and services. Our work also replicates some findings from the non-use literature (e.g. the importance of privacy concerns and demographic differences in non-use behavior) and identifies some characteristics of protest users that are unique relative to other types of non-use (e.g. motivations and tactics, specific demographic trends in protest non/use).

We begin below by covering work that inspired this research. We then discuss our survey methodology and results, before entering into our discussion of implications.

2   RELATED WORK

In this section, we discuss the two literatures that most informed our overall thinking for this research: the technology non-use literature and the literature on protests against technology companies.

2.1 Technology Non-Use and "Non/Use"

Our ideation and study design for this project was influenced by the literature on *non-use* in science and technology studies (STS) and human-computer interaction (HCI) (e.g. [5,6,22,50,51,59]). This body of work argues that, in contrast to prevailing perspectives in HCI, non-use can be a meaningful and productive behavior. As early as 2003, Wyatt explicitly urged scholars to "take non-users and former users seriously as relevant social groups...who might influence the shape of the world" [59]. Moreover, in 2009, Satchell and Dourish similarly called for HCI researchers to consider non-users, and sought to dispel the notion that non-use is an "absence" or "negative space" [50]. A key theme in this literature is the relationship of the phenomenon of non-use to structural inequality across demographic groups [22,25,46,47,54], a relationship we consider below.

The protest behaviors we study can be seen as a subset of the broader non-use phenomena observed and theorized in prior work. In a recent publication, Baumer et al. specifically emphasized the need to study different types of motivations for non-use [4]. This paper can be understood as addressing this call, with our work focused specifically on non-use in protest of the values or actions of a technology company.

One important recent contribution of the non-use literature has been to problematize the term "user" and even "non-use". Specifically, researchers have called for treating non-use as a "continually negotiated practice" [3] which is not characterized by a binary distinction between users and non-users [2,4,7]. In this view, the complex spectrum of use and non-use includes a variety of behaviors, e.g. deactivating an account, considering deactivating an account, taking a break from a platform, creating fake accounts, and many other behaviors [2,5]. Baumer and others [2,3,6] have adopted the term "non/use" to encompass the spectrum of use and non-use behaviors, with "non-use" reserved for behaviors very close to one end of the spectrum.

Our study reflects the complexity highlighted by Baumer and colleagues: we consider both people who remain users of a technology but protest by altering their use behavior and people who are protesting by ceasing their use entirely. As such, following Baumer et al.'s guidance, for the remainder of the paper, we leverage the term "*protest non/use*" when referring to the spectrum of behaviors exhibited by our respondents who are protesting a technology company. We use the term "protest non-use" when specifically referring to people who reported entirely stopping use of

a technology. As we have above, we leverage the term "protest user" to describe all users who have engaged in protest non/use, as all people in this class *are or were* users of a technology.

2.1.1 Existing Empirical Information Relevant to Protest Non/Use

A large body of research on non-use and non/use investigated these behaviors' association with structural inequalities on a variety of platforms (e.g. [22,25,46,47,54]), and this line of work informed our analysis and thinking of the relationships between demographic factors and protest non/use. For instance, using a sample of U.S. households and focusing on Facebook, Baumer showed that age, gender, and income are predictive of various types of Facebook non/use [2]. Below, in our Results section, we compare our demographic findings with those from Baumer and reflect on the implications of our observed demographic trends in protest non/use.

Past research has also identified how individual and social factors relate to behaviors on the non-use end of the non/use spectrum, providing helpful lenses for us to interpret our findings. Guha et al. discussed how the lack of agency and control on Facebook plays a role in users leaving Facebook [19]. Baumer et al. identified a number of individual and social factors that predict reversion after leaving Facebook, including the concerns about impression management and friends' reactions [7]. Lampe et al. found social capital is a strong negative predictor of whether somebody will join Facebook at all [30]. Although we did not collect or analyze these types of individual or social factors, we interpret and discuss our findings in light of the context provided by these studies.

Finally, studies on privacy-driven behaviors have identified several forms of non/use that can be seen as protest non/use, directly influencing our construction and understanding of protest non/use. As privacy concerns are a prevalent motivation for non/use [5,30,56], prior work has shown technology users adopt a variety of obfuscating strategies in protest, e.g. providing fake personal information [21,49]. Additionally, Mathur and colleagues' work on browser-based blocking extensions revealed some people's overwhelming discomfort with online tracking as well as their corresponding blocking strategies (e.g. using anti-tracking and ad-blocking extensions) [39]. Our study bolsters these findings and we discuss the implications of protest users for privacy research and vice versa.

2.2 Protests against Technology Companies

2.2.1 Consumer Boycotts and Technology Companies

Many recent protests against technology companies, such as Amazon, Uber, and Facebook [16,17,26,52], are similar to traditional consumer boycotts: a group of people withholds engagement with a company to attempt to force the company to change some practices. As such, the large body of research on consumer boycotts (e.g. [27,28,41]) can provide important context for our work.

There has been some research on participation rates and outcomes of consumer boycotts. Based on a survey of the American consumers, more than 28% of participants have engaged in "political consumption", which means either boycotting or "buycotting" (i.e. deliberately purchasing products to support a company) [43]. The number is even higher among some European countries, such as Sweden and Switzerland, where about 35% of people have engaged in boycotts and around 58% in "buycotts" [29]. Importantly, evidence from historical boycotts suggests that they are not only prevalent but have had economic and societal impact (see for instance [34,61,62]), setting a precedent for potentially impactful boycotts against technology companies and raising the stakes for the study of protest users. For example, the boycott against

Uber in 2017 attracted widespread participation and subsequently, the company made a public apology corresponding to the boycott [52].

Protesting behaviors in the technology domain can take on various forms corresponding to the different ways tech companies generate revenue. For instance, advertisements are a primary source of profit for some major tech companies (e.g. Google and Facebook) [35], whereas companies in other sectors sell products and services directly to consumers. Thus, protesting behaviors in the tech domain include avoiding visiting the website of an ad-driven tech company (e.g. boycotts against Facebook), refusing to purchase goods or services from a company (e.g. boycotts against Uber and Amazon), or disrupting an ad-revenue generating platform (e.g. the 2015 Reddit blackout by sub-Reddit moderators [40]). In addition to these protesting behaviors that attempt to reduce a company's ad revenue, a "data strike", i.e. a group of users withholding their "data labor", can also negatively impact many profitable intelligent technologies. We unpack this form of protest in detail in the immediately following section.

Our research is also motivated by recent interest in "boycott-assisting technologies" [32] such as Buycott [63] and Out of Site [32] that aim to facilitate consumer boycotts offline and online, respectively. In particular, these technologies emphasize the collective nature of boycotts and inform boycott participants of recommended actions and their collective outcome. As we discuss below, our study provides concrete design implications for designers of boycott-assisting technologies to specifically support people protesting tech companies.

2.2.2 Data Labor

Recent work [44,45,57] has identified that protests like those we consider here may be especially powerful compared to protests against non-tech companies [57], making understanding the prevalence and motivations of protest users all the more important. This research highlighted how, due to the reliance of most tech companies on intelligent technologies, users of these companies' products generally have two roles, each with its own source of power: users are consumers of services with "consumer power" [57] and users are also data-generating "laborers" [45] with "data labor power" [57]. The latter role emerges from the critical dependence on user-generated data of many tech companies' intelligent technology-driven core services (e.g. recommender systems, search engines).

Protest users exercise their consumer power when they stop or change their use of a technology and thereby reduce their contributions to sales and advertising revenue. Protest users exercise their data labor power when their stopped or changed use of a technology results in fewer products being rated, fewer pages being liked, and/or less implicit feedback being collected, thus damaging profitable recommender systems, search engines, and related intelligent technologies. These two roles and their corresponding sources of power make protest users particularly influential relative to traditional protests against non-tech companies, in which participants largely only have consumer power.

3 METHODS

This paper reports findings from two web-based surveys conducted in 2017 and 2019. The first survey was designed to broadly explore the prevalence of and the reasons for protest non/use (protest use and protest non-use). Our second survey focused on five prominent technology companies and elicited in-depth responses about motivations, tactics, challenges, and roadblocks associated with protest non/use. Both surveys used nationally representative sampling by a third party, as is common in large-scale studies that have examined non-use and non/use (e.g. [2,5,19]).

Below, we present details about our survey design, recruitment methods, and respondents.

3.1 Survey Design and Recruitment

Two authors designed the first survey in October 2017, and it was intended to be exploratory in nature. It was funded by a large non-profit organization at which these two authors are employed. Respondent recruiting was completed by the professional survey company SurveyMonkey, which used its proprietary approach to generate a nationally representative sample of Internet users who live in the United States and were at least 18 years old. The survey was completed by 463 people and contained both fixed-response and free-response questions. The fixed-responses questions were generally targeted at understanding the prevalence and motivations of protest users, and the free-response questions were open-ended. Some of the demographic information about respondents in this survey came from SurveyMonkey, and the survey asked directly about respondents' political views.

The results from the first survey indicated that a non-trivial portion of the public was engaged in protest non/use against tech companies (as reported below, 9% of respondents reported themselves as protest users of at least one prominent tech company). These results – along with increasing media coverage and public interest in protesting tech companies – motivated us to launch a second, in-depth, and more focused survey in 2019. All authors were involved in the design of the second survey. Building off the basic structure of the first survey, the second survey sought to acquire more detailed and structured information about protest non/use, as well as to update the top-line numbers to assess whether the ranks of protest users were growing. More specifically, our second survey was designed around two structured research questions:

RQ1 – Basic Descriptive Information: (a) What is the prevalence of protest non/use? (b) What are the motivations behind protest non/use? (c) What tactics are employed?

RQ2 – Challenges and Roadblocks: What challenges do protest users face and what roadblocks prevent people from becoming protest users?

Our 2017 and 2019 surveys have important differences, both in terms of the questions we asked and how the questions were specifically framed.

We made a number of additions to the 2019 survey to obtain data more explicitly targeted at our research questions. In order to gather data to directly answer RQ1(c) and RQ2, we added questions about protest tactics, challenges protest users faced, and roadblocks faced by potential protest users. The answer choices for questions regarding challenges and roadblocks were drawn from the free-response answers provided by respondents to the first survey, as well as themes in the non/use literature and in media coverage of protests. Additionally, whereas the 2017 survey focused on multiple-choice questions with single answers, the 2019 survey was primarily based around multiple-choice multiple-answer (i.e. select-all-that-apply) questions with an option to provide free-text input to explain or expand upon one's answer. The 2019 survey also integrated answer choices that were not included in our first survey but were reported by 2017 respondents in the free-response questions (e.g. "the company profits from my data" and "I have concerns about the company's bias against gender, race, or other demographics" as motivations for protest non/use). Additionally, the 2019 survey included a Likert-type question about how difficult it is to protest a given company (on a scale from 1 to 5) after a respondent reported being a protest user of the company.

In terms of how we framed the survey questions, although both surveys used the term "boycott" as a shorthand for "protest use and protest non-use" as we hypothesized this term would

be much easier to understand for respondents, we altered the exact definition of "boycott" provided in the 2017 survey for the 2019 survey. In the 2017 survey, boycotting was defined for respondents as "deciding to stop using, or use much less of, a technology or company as a protest or statement, or because you disagree with the company's values." In 2019, we updated this definition to be "stopping or changing your use of a company's products or services, because you disapprove of the company's values or actions." This updated definition was meant to capture the many forms protest non/use can take against tech companies (as discussed in Related Work).

As mentioned above, the 2019 survey asked additional questions about specific tactics compared with the 2017 survey, and some of these answer choices about tactics can be employed for non-protest reasons (e.g. private browsing and ad blockers might be used for reasons unrelated to protesting a company's values or actions). As such, we took care in survey design to avoid confounds surrounding the reasons for the use of a potential protest tactics. Respondents were first asked if they were protest users of a given company, and then they were asked which tactics they used in their protest. While this avoided confounds in our top-line numbers about participation rates, we did still see some confusion when respondents were enumerating the tactics that they used to implement a specific protest, and we discuss this more below. A full copy of both surveys is available online [1].

2019 survey was conducted through Qualtrics (following prior research on non-use, see [8]), which also uses proprietary methods to perform nationally representative sampling (we detail the demographics of our respondents in Table 1). The survey was deployed in early 2019 by a subset of the authors who are employed at an academic institution, in accordance with their institution's IRB. This survey had 429 responses in total. However, we found that some responses appeared to be low-quality (e.g. free response fields filled with random characters). The first two authors examined all the responses independently to identify low-quality responses and then compared and discussed their findings to build a merged set of low-quality responses. In total, 31 responses were flagged as low-quality and were removed from all analyses, leaving us with 398 valid responses.

Given that we modified the survey design and used two different companies for proprietary sampling, we must interpret any observed trend in the two survey results with some caution. However, considering that some differences between the two nationally representative samples' results are very large (e.g. the increases in our top-line participation rates), they very likely represented movements in the underlying phenomenon.

3.2 Respondent Demographics

Table 1 shows the demographic data we obtained from our surveys. In the 2019 survey, all demographic questions were optional, but 90% of the 2019 respondents answered all the demographic questions. Comparing Table 1's "All respondents" column with U.S. Census Bureau data [10], we find that our samples were reasonably balanced across a number of demographic factors, with a slight over-representation of the low- to middle-income population. The 2017 sample also has a relatively large share of respondents who are at least 60 years-old compared with the U.S. Census Bureau's population estimates (with 28% of the U.S. adult population being at least 60 years old) [11]. On the other hand, the 2019 survey has a relatively small share of this population.

---

[1] psagroup.org/protest_nonuse_survey.pdf

Table 1. Self-reported demographic information of respondents, broken down by the percentage of total respondents ("All respondents" column) and the percentage of respondents who were protest users for at least one company ("At least one company" column)

	2017 Survey		2019 Survey	
	All respondents	At least one company	All respondents	At least one company
Age				
18 - 29 years old	20%	19%	26%	32%
30 - 44 years old	21%	22%	41%	42%
45 - 59 years old	25%	27%	23%	20%
60+ years old	35%	32%	10%	5%
Gender				
Female	55%	45%	48%	35%
Male	45%	54%	51%	63%
Non-binary	-	-	0.5%	2%
Agender	-	-	0.3%	0%
Transgender	-	-	0.3%	0%
Political stance				
Democrat	36%	30%	38%	43%
Republican	21%	14%	24%	22%
Independent	33%	38%	31%	31%
Other	10%	19%	6%	3%
Income				
< 25,000	18%	9%	23%	18%
25,000−49,999	25%	19%	33%	33%
50,000−74,999	19%	31%	20%	24%
75,000−99,999	12%	9%	10%	13%
100,000−124,999	13%	22%	7%	7%
125,000−149,999	5%	3%	4%	4%
150,000+	8%	6%	2%	1%

Below, we constructed logistic linear regression models to further examine the relationships between protest non/use and demographics. Age and income were represented as ordinal variables using the levels shown in Table 1. Political stance and gender were represented as categorical variables.

3.3 Margin of Error and Confidence Intervals for Percentages and Instances

Using margin of error calculations for a random sample, each survey had a large enough sample to achieve a margin of error of 5% at a confidence level of 95% for our target population (web users in the United States who are at least 18 years old). Many of our results are simple percentages of respondents, such as the percent of users protesting a given company. For these percentages, following recent suggestions for reporting results in HCI research [12], we compute non-parametric 95% confidence intervals (CI) using empirical bootstrap resampling (a popular approach for generating CIs for survey results [53]). Specifically, we used software from Beecher et al. [9] and used 10,000 resampling iterations for each CI.

Not all of our results are reported as percentages. For results relating to motivations, tactics, challenges, and roadblocks, our survey provided the numbers of instances of each motivation,

tactic, challenge, and roadblock. An instance refers to one respondent reporting one motivation (or tactic, challenge, or roadblock) for one company. Thus, one respondent can have multiple instances spread across multiple companies. For example, one person might protest Facebook because of privacy concerns *and* the company's political stance, which would correspond to two difference instances of motivations (privacy and political). In our results, we report both the number of instances for each company, and instances summed across companies. These summed instances do not represent estimates about the national population, but instead represent how frequently a motivation, tactic, challenge, or roadblock was reported by our respondents, allowing for a single individual to contribute many instances. For these results, instead of reporting percentages with confidence intervals, we report only the total count of instances and interpret our results accordingly.

4   RESULTS

Below we unpack the results from the surveys. As our 2019 survey was targeted specifically at our research questions, we focus primarily on our 2019 results below and provide the 2017 results for context. We first give an overview of the percentages of people who reported being protest users, and then detail the percentages of protest users for each company. We further unpack the motivations, tactics, challenges, and roadblocks associated with protest non/use.

4.1 RQ1a: Prevalence of Protest Users

The highest-level result from our 2019 survey is that a substantial share of respondents – 30% (CI: 25 – 34%) – reported being protest users. The majority of the protest users (21%) were protesting one company only, followed by 5% reporting two companies. Very few protest users were protesting more than two companies. 33% (CI: 28-37%) of respondents expressed interest in becoming protest users of at least one tech company against which they were not currently engaging in protest non/use, approximately half of whom (19% of respondents; CI: 15-22%) were not currently protest users of any company. In total, 48% of respondents (CI: 44-54%) were either actively engaging in protest non/use (30%) or were only interested in doing so (19%), after rounding to the nearest percent. Notably, the prevalence of active protest users we observed (30%) is very close to estimates of the prevalence of political consumption (i.e. boycotts and buycotts) in the United States in 2011 and 2012 (28%) [29,43].
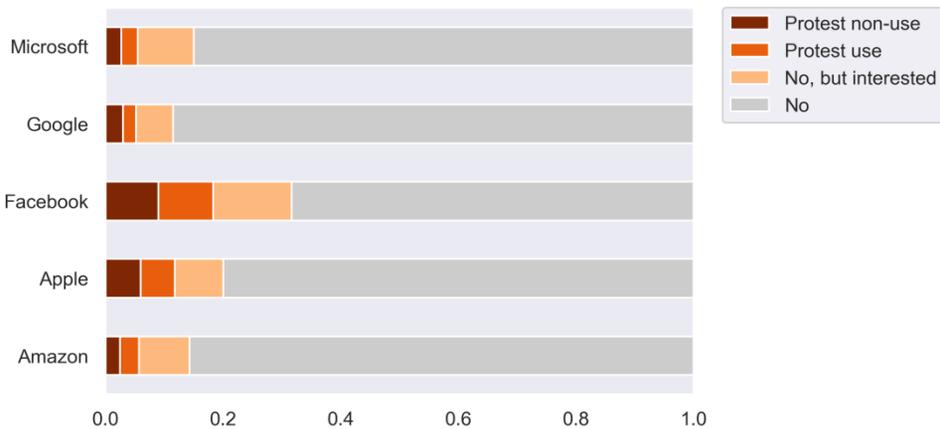
Figure 1. Protest non/use against five major tech companies from our 2019 survey. The x-axis indicates the fraction of respondents who engaged in protest non-use, protest use, or were interested in becoming

protest users.

Figure 1 unpacks our results about the prevalence of protest non/use on a company-by-company basis. Facebook stands out as a particularly common target of protest users and potential protest users: nearly one-third of respondents reported that they were currently a protest user of Facebook or were interested in becoming one. In Baumer's 2018 study, 17.6% of respondents stopped using Facebook (through account deactivation) and 22.4% considered doing so, meaning 40% of respondents were, or considered, stopping Facebook use. Our observed number of active and potential Facebook protest users is thus slightly lower than Baumer's 2018 result. Note that in Baumer's study, the number of active and potential Facebook non-users included those who might not be protesting Facebook. Such respondents in our study would not identify themselves as protest users, potentially explaining our lower percentage.

Also of note in Figure 1 is that Amazon, Google, and Microsoft have more potential protest users than actual protest users, suggesting a lower protest "conversion rate" for these companies. Below, we present the specific roadblocks reported by potential protest users of these companies. These roadblocks may play a role in influencing the conversation rate of potential protest users to active protest users.

Table 2. The percent of protest users against five major tech companies in 2017 and 2019.

YEAR	FACEBOOK	APPLE	MICROSOFT	GOOGLE	AMAZON	TOTAL
2017	5%	3%	2%	2%	2%	9%
2019	18%	12%	6%	5%	6%	30%

Table 2 puts our top-line results from the 2019 survey in context with those from 2017. Whereas 30% (CI: 25-34%) of respondents in 2019 reported being protest users of at least one company, the equivalent number in 2017 was only 9% (CI: 6–11%). In particular, we see significant increases in protest rates of Facebook and Apple. The percentage of respondents protesting Facebook more than tripled in 2019 from 5% to 18%, and the percentage for Apple in 2019 is four times that of 2017, going from 3% to 12%. The remaining three companies, Microsoft, Amazon, and Google also see an increased rate of protest users, with the percentages roughly doubling. Overall, we see rising protest rates across all five companies, but Facebook and Apple see the largest increases.

Recall that these comparisons need to be interpreted with caution: the two surveys were not identical in design or sampling (see Methods). Furthermore, differences in protest prevalence rate will be affected by changes in company user bases (e.g. people who didn't use Facebook at all in 2017 may have joined Facebook and engaged in protest use in 2019). Nonetheless, the size of the delta we observed suggests that the prevalence of protest non/use has increased in the last two years.

4.1.1 Who Are Protest Users?

According to our 2019 data, certain groups are more likely to protest: it appears that respondents who identified as male protested more than other gender identities, and younger respondents protested more than older respondents. A logistic regression that uses self-reported demographics as the independent variables and protest non/use for at least one company as the dependent variable suggests that both of these are statistically significant associations ($p < 0.05$, see Table 3).

Table 3. Who are protest users overall?
Coefficients and odds ratios for a logistic regression with self-reported demographic information as independent variables and engagement in protest non/use of any company as the dependent variable. The pseudo R-squared of the model is 0.06.

	Coef.	Std. err	p	Odds Ratio
Intercept	-0.237	0.351	0.499	0.789
Political stance - Independent	-0.115	0.283	0.683	0.891
Political stance - Other	-2.017	1.059	0.057	0.133
Political stance - Republican	-0.066	0.318	0.836	0.936
age	-0.459	0.141	0.001 *	0.632
income	-0.035	0.076	0.649	0.966
gender - male	0.892	0.258	0.001 *	2.439

* indicates p-value less than 0.05.

Table 4. Who are Facebook protest users?
Analogous to Table 3, but with protest non/use of Facebook specifically as the dependent variable. The pseudo R-squared of the model is 0.07.

	Coef.	Std. err	p	Odds Ratio
Intercept	-0.786	0.412	0.056	0.455
Political stance - Independent	-0.752	0.349	0.031 *	0.472
Political stance - Other	-27.891	476144.631	1	0.000
Political stance - Republican	-0.360	0.370	0.330	0.698
age	-0.390	0.168	0.020 *	0.677
income	-0.059	0.091	0.516	0.943
gender - male	0.901	0.311	0.004 *	2.462

In particular, male respondents were 2.4 times more likely than female respondents to protest when holding other factors constant, which is consistent with the descriptive statistics in Table 1. With one increment of the age groups in Table 1, older respondents were only 0.632 as likely as younger respondents to protest.

With respect to Facebook specifically, analogous to Baumer's finding that younger respondents are more likely to deactivate their Facebook account [2], our model (Table 4) shows that younger respondents are more likely to be protest users of Facebook than older respondents. However, in contrast with the insignificant relationship between gender and Facebook deactivation that Baumer observed, men in our study were 2.4 times more likely than women to protest Facebook (very slightly more than our result for overall protest users). This difference may be due to the divergence in the definitions of protest users and non-users as mentioned above. In other words, although men and women are equally likely to be Facebook non-users, men may be more likely to do so as an action of protest than women. Also of note is that compared with Democratic respondents (the default intercept in Table 4), Independent respondents were less likely to protest Facebook (odds ratio=0.472), a relationship that we do not observe in the model considering all companies.

4.2 RQ1b: Motivations for Protest Non/Use

Our 2019 data provides us with rich information about motivations for protest non/use, with active and potential protest users selecting two motivations per company on average (respondents

could select all motivations that applied). We focus here on reporting the number of instances of each motivation, where an instance is a single motivation for protesting a single company (selected by a single respondent).

Instances of Protest Non/use Motivations

	Protest Users						Potential Protest Users					
Company profits off my data	3	11	34	5	6	59	7	8	24	8	7	54
Privacy violations	2	9	37	6	3	57	7	4	32	8	7	58
Too expensive	3	27	5	3	5	43	4	16	2	2	6	30
Company is too large	5	10	11	7	8	41	11	9	6	7	8	41
Personal values	4	10	18	4	1	37	5	1	16	5	6	33
Terrible service	6	11	12	4	4	37	8	6	6	4	4	28
Self-care or well-being	3	4	23	4	2	36	0	0	4	4	3	11
Company political stance	4	7	15	4	2	32	5	3	13	6	6	33
Demographic bias	1	6	15	3	4	29	3	3	5	2	4	17
Company exploits workers	8	7	5	2	6	28	14	8	4	5	4	35
Other	1	4	9	2	2	18	6	2	4	0	2	14
Total # protest users (left) and potential protest users (right) for each company	23	47	73	21	22		34	33	53	25	38	
	Amazon	Apple	Facebook	Google	Microsoft	All companies	Amazon	Apple	Facebook	Google	Microsoft	All companies

Figure 2. Instances of protest non/use motivations reported by our respondents who were protest users ("Protest Users", left) or interested in protest non/use ("Potential Protest Users", right). Each respondent could select multiple motivations. Includes the total number of (potential) protest users per company in grey for context.

Figure 2 shows our motivation findings in detail. The left side of Figure 2 shows our motivation-related results for active protest users. The right side shows the equivalent findings for potential protest users, i.e. people who expressed interest in becoming protest users of a given company but were not doing so currently. Examining the left side of the figure, we see that the most-common motivations for actively protesting were concerns around companies profiting off of user data (59 instances) and privacy (57 instances). In other words, respondents indicated 59 times that they were motivated to actively protest a tech company because it was profiting off of user data and did the same for privacy 57 times. The next two most common motivations were cost (43 instances) and company size (41 instances).

The most prominent motivation for protesting, concern about companies profiting off of user data, does not align with prior work which has suggested that college students cared little about how their data is used by platforms [60] and placed very small monetary value on protecting data [18]. One reason for this difference may be the increasing awareness of data-driven business models in the past few years. The qualitative data from the 2017 survey was an early signal that profiting off of user data might be a prominent motivation. Some respondents from 2017 took strong stances on the topic, saying "I resent the invasive tentacles of tech companies. They are trying to control and profit from everything we do in life. They don't respect privacy they just want $$" and "they sell my personal information exploiting ME MAKING PROFIT OFF OF ME, without giving me any financial share of their profit pirating." Our quantitative data from 2019 suggests that these sentiments are spreading more broadly.

The prevalence of privacy concerns visible in Figure 2 resonates with HCI studies of privacy and surveillance (e.g. [49,60]). In particular, Baumer et al. found in 2013 that the top motivation for

leaving Facebook or limiting Facebook use was privacy. Our results suggest that, six years later, these concerns remain serious for people who engage in various types of protest non/use of Facebook (including leaving Facebook). Indeed, examining Figure 2, we see that of the 73 users who reported being active protest users of Facebook, 37 (51%) indicated that they were doing so for privacy reasons. We see a similar trend on the right side of Figure 2, where privacy was the number one motivation for being interested in becoming a protest user of Facebook (60% of potential Facebook protest users).

The reported motivations in the two surveys have some other differences, although we did not provide identical options and therefore direct comparisons must be interpreted with substantial caution. For the options that overlap between two surveys, privacy concerns remained the top motivation in aggregate. However, the second-most-popular overall option in 2017, disagreeing with the company's political stance, substantially diminished in prominence in our 2019 data. Furthermore, looking at these trends per company, we observe a large increase in people protesting Amazon because of working conditions, perhaps relating to the media's coverage of the issue (e.g. [26,64,65]).

4.3 RQ1c: The Tactics of Protest Users

Our 2019 survey elicited information on the specific tactics leveraged by protest users in their protest non/use. Overall, non-use was the most-common reported tactic. 93 instances of non-use were reported in total, where an instance in this case means that a single respondent reported entirely halting the use of a single company's products. Respondents also reported 129 specific instances of protest use overall, i.e. still using a technology but with protest tactics, including ad blocking, private browsing, using fake accounts or fake data, using anti-tracking extensions, and using products while logged out. Among these protest use instances, we observed that using ad blocking (41 instances) was the most common tactic. The prevalence of ad blocking is not surprising given a recent survey on Amazon Mechanical Turk (MTurk) showed over half of participants use ad blockers [39]. Also consistent with the MTurk survey, the use of anti-tracking extensions was less prevalent than ad blocking in our study, with 18 instances of anti-tracking reported.

Following using ad blockers, providing fake accounts or data (27 instances) and using private browsing features (24 instances) were the second- and third-most prevalent tactics among our respondents. These tactics largely overlap with privacy-driven obfuscation approaches that have been reported in privacy and surveillance research. For instance, Sannon et al. found that 21.9% of their recruited respondents lie to computing systems to protect their privacy [49]. Our results suggest that protest users were re-appropriating these privacy-protection strategies as a means of protesting, indicating an overlap in tactics among protest use and privacy protection. This overlap may have important implications that we unpack in Discussion.

Focusing on tactics related to protest non/use of Facebook specifically, similar to prior work showing the non-binary nature of Facebook non/use [5], our survey responses imply that protesting Facebook involves nuanced behaviors that are not limited to simply deleting or deactivating one's Facebook account. Among the 37 respondents who were using Facebook but engaging in protest use, using ad blockers (16 instances) was the most common tactic, followed by using anti-tracking extensions (11 instances) and private browsing (9 instances).

In our survey, 53 respondents who reported protest non-use ("stopping entirely") of a specific technology also selected additional protest tactics against the company, e.g. using ad blockers and private browsing. This may indicate very nuanced tactical strategy (e.g. people who stop using Facebook and also use private browsing or anti-tracking to attempt to avoid Facebook tracking on

other websites) but might also indicate confusion on behalf of a respondent (e.g. perhaps people who used an ad blocker for reasons unrelated to protest of a specific company were confused by this question). As our data did not fully explain this behavior, our reported results include only the protest use tactics used by people who indicated that they continued to use a technology.
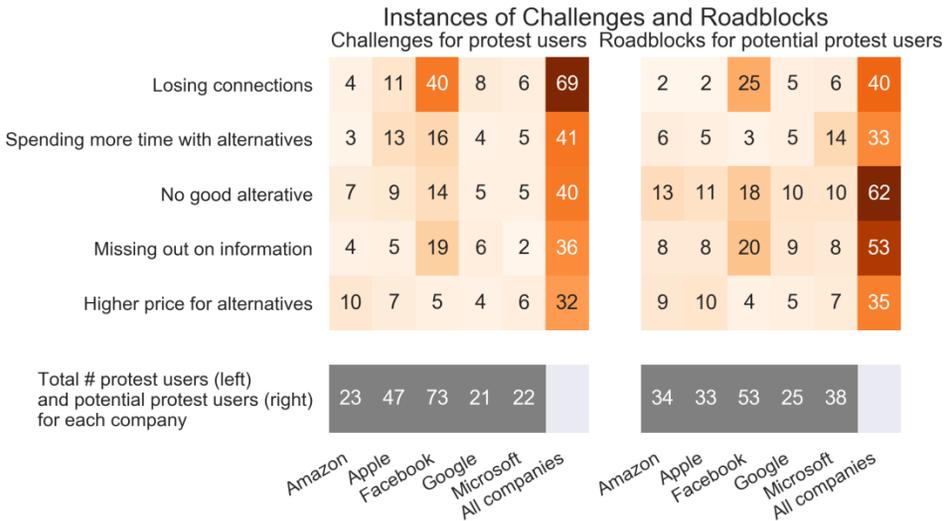
Figure 3. Challenges active protest users reported (left) and roadblocks that potential protest users reported (right). Includes the total number of (potential) protest users per company in grey for context.

4.4 RQ2: Challenges and Roadblocks

Figure 3 presents the challenges reported by active protest users of each company on the left and the roadblocks reported by potential protest users of each company on the right. Unlike was the case for protest non/use motivations, there was a notable difference in responses between those who were actually protesting and those who were interested, but not doing so. Here, we see concerns about "losing connections" was by far the most common challenge for active protestors (driven by people protesting Facebook). On the other hand, and raising important concerns related to the discussions around the possible monopoly power of some technology companies, the lack of alternative products was the most common roadblock to protest non/use for interested respondents (across all the companies).

Missing out on information and losing connections, the two major challenges reported by protest users of Facebook, are consistent with prior work [5]. As Facebook is primarily a social networking site, it is unsurprising that these two options, which represent social challenges (as opposed to economic or technical challenges) are common among active and potential protest users.

In the case of Amazon, we see that paying higher prices for alternatives was the top challenge for active protest users, but respondents who were interested in protesting Amazon identified the lack of alternatives as the top roadblock. This disparity suggests that (perceptions of) higher prices may be a roadblock for some, but a manageable challenge for others, hinting at a role of socioeconomic status in the ability to become a protest user. We discuss these results further below, putting them in the context of related findings from other studies of non/use and non-use (e.g. [59]).

Amazon was rated as the most difficult to protest by active protest users, with an average difficulty of 2.4 on a 1 to 5 scale (with 1 corresponding to "very easy" and 5 to "very difficult") and Apple was rated as the least difficult, with an average of 1.7. For other companies, the average rating was around 2 ("easy") or lower. Overall, it seems our active protest users did not find it to be especially difficult, although data beyond a single Likert-type response will be important to confirm this result.

5 DISCUSSION

At a high level, our survey results suggest that protest users have become a substantial force in the sociotechnical landscape. Although our 2019 survey was small and is just one survey, we observed that three of out of every ten respondents are already protest users, and another almost one-fifth of the respondents have an interest in becoming protest users. These results – along with the more detailed findings about motivations, tactics, challenges, and roadblocks – have important implications for a variety of stakeholders, including researchers in social computing and other areas of computing, technology designers, and institutions that own prominent technologies. We discuss some of these implications below.

5.1 Technologies to Support Protest Users

As noted above, the social computing literature and wider computing community have become increasingly interested in developing technologies to support protest non/use (e.g. boycott-assisting technologies [32,63], protective optimization technologies [44]). One of the most significant implications of our results is that they suggest that there is a truly substantial "market" for these technologies. Our findings indicate that this market may include up to almost half of American Internet-using adults, providing substantial support for more research and development in this area.

Additionally, our findings also present something of a partial roadmap for new technologies to support effective protest non/use. For instance, our results highlight the importance of future technologies that can offload the burden of finding and using alternative products for protest users and thereby lower the threshold to participate in protest non/use. Such tools may meaningfully increase the percentage of people who can actualize their desire to become protest users against the target (i.e. move from the right side to the left side of Figure 3). Although these tools may adopt a number of different approaches, one approach might be to act as an intermediary to a desired service (e.g. purchasing some product), directing people to alternatives whenever possible. For example, a browser extension could autonomously route shopping queries away from a targeted company, with that targeted company being a backstop if there truly is no other company offering the product at a similar price. One could also imagine a similar tool for web search that routes search queries to minority players like DuckDuckGo when those queries reflect information needs that are straightforward to satisfy (e.g. navigational queries like "CSCW 2019").

The large number of existing protest users amongst our respondents and the wide variety of tactics employed also introduce a promising opportunity for "computer-supported collective action" [55]. For instance, new tools could help to identify and mobilize protest users who have the most leverage over the target (e.g. influential members of a social network, people who contributed especially valuable data, etc.). These tools could also make suggestions to existing protest users about particular days to avoid a platform (i.e. a day-long boycott) or specific types of fake data to provide.

Additionally, the prevalence of ad blockers and anti-tracking extensions among protest users suggests that these tools could also coordinate collective action to make individual protests more

effective. In particular, as visible progress of collective action sustains participation [33,55], current ad blockers and anti-tracking browser extensions may consider communicating how many protest users are taking action and estimates of the protest's impact on web traffic [32] or ad revenue [15] (e.g. "Over the last week, n other people have also been using this anti-Facebook tracking extension and m ads have been blocked, costing the company p dollars").

5.2 Designing and Studying with Protest Users in Mind

The results of our survey point to the need for researchers and developers to consider protest non/use in the technology design process. This would involve asking questions like: How and why might people contest a new feature or system? Are there ways to account for this contestation before it starts? How resilient would the system be to such contestation? Designing with protest users in mind may be a useful approach to shift designers' attention to how people might negatively react to technology and means building systems that recognize the value and power of all technology stakeholders, including users, protest users, and non-users. This is an approach that would further supplement existing user-centered design approaches, such as participatory design [42] and value-sensitive design [14], and relates to the notion of "heuristic preventive design" introduced at CSCW last year [32].

On a related note, social computing researchers also need to be aware of protest users as a dimension (and potential confound) in studies of large-scale online platforms. For instance, our results suggest that a study of Facebook use in the United States may want to consider how the research questions and chosen methodologies (e.g. recruiting through Facebook ads) might be affected by protest non/use. More generally, as the growing literature around social media and other technologies emphasizes the demographic gap in technology use, future work should particularly account for the potential influences of protest non/use on this gap. For instance, will the demographics of Facebook users change because the younger population protest more?

5.3 Protest Users and Technology Non/Use

Our study unpacks the subset of technology non/use behaviors driven by protest, directly responding to Baumer 2018's call for examining "relationships between different form of technology non-use and different types of motivations" [2]. As is discussed above in more detail, our work also points to potentially unique characteristics of protest users with respect to (non)users who are considered in studies about more general non-use and non/use. For instance, although men and women are equally likely to deactivate Facebook, our results suggest that men are more likely to be protest users of Facebook. Similarly, privacy drives both protest users and (non)users to change their Facebook usage or leave Facebook, but protest users are uniquely concerned about Facebook profiting off of their data. More generally, while our paper maps out a new territory within the domain of non/use, our paper also highlights the need for more targeted research on the relationship between protest use, non/use, and non-use.

5.4 Protests, Privacy, and Surveillance

Viewed through the lens of the relevant privacy literature (e.g. [21,38,39,49]), our findings point to an interesting overlap between protest use and privacy-driven behavior, an overlap that is fertile ground for future empirical and theoretical work. In particular, the exact same tactic – e.g. using fake accounts / data and private browsing – can be deployed either as a means to protect individual privacy or as a means to protest a company that makes money off of personal

information or data labor [45]. Likely, in many cases the tactic is the result of both motivations at the same time. This overlap highlights that actions that protect one's privacy may go beyond simple self-interest and are affected by complex sociotechnical contexts, e.g. the company's business model and public image. It also suggests the reverse: the literature on protests against technology company has been dominated by a collective action frame, but there may also be highly self-interested benefits and motivations to these protests.

The overlap between protest non/use and privacy-driven behaviors may additionally present promising opportunities to leverage existing privacy protection tools for protesting purposes. For example, AdNauseam, a browser extension that simulates random clicks on ads to obfuscate tracking by online advertisers, may facilitate protests against technology companies by automatically generating fake data to create "garbage" inputs to trained models [24]. Future work might seek to estimate the economic and social effects of widespread obfuscation-based protests.

Additionally, the reported privacy-driven behaviors by protest users to avoid tracking by tech companies suggest that future work may also want to examine protest non/use through a lens informed by theories of surveillance [1,20]. In particular, past work from Albrechtslund has contrasted vertical "Panopticon / Big Brother" concepts of surveillance (in which there exists a hierarchy of "watchers" and "watched") with horizontal "participatory surveillance" [1]. The participatory surveillance framing argues peer-to-peer surveillance by social networking users is a form of maintaining friendship and thereby empowering, playful, and positive [1]. These potentially conflicting approaches to conceptualizing surveillance suggest conceptual complications faced by protest users. Protest users' obfuscating tactics (e.g. fake data, fake accounts) to resist vertical surveillance may hinder their participation in social surveillance, as they withhold data from target technologies. This is particularly interesting when considering protests against social network companies like Facebook. For example, the Facebook protest users who reported providing fake data to Facebook in our study may not see certain content with which their friends have engaged and thus lose the opportunity to participate in the positive aspects of social surveillance (while simultaneously receiving some protection from the negative aspects of vertical surveillance). Similarly, the Facebook protest users who reported entirely halting the use of Facebook (e.g. protest non-use) or contributing fake content (a protest use tactic we observed), may lack the opportunity to make connections with people that share similar interests. Future work should further investigate how protest non/use influences one's ability to engage with social surveillance.

5.5 Protest Users and Intelligent Technologies

Prior work on collective action campaigns suggests that protest users may be particularly effective at impacting intelligent technologies. Vincent et al.'s work identified two types of collective action campaigns that have the potential to meaningfully reduce the performance of highly-profitable intelligent technologies like recommender systems: "data boycotts" and "data strikes" [57]. Both of these campaigns map closely to the phenomena studied here. Boycotts correspond directly to protest non-use. Some of the behaviors (e.g. anti-tracking) observed in our survey could be used to contribute to a data strike.

Given the close correspondence of protest non/use, data strikes, and data boycotts, the observed prevalence of protest non/use should be of significant concern to companies that use data-driven intelligent technologies. According to Vincent et al.'s research, boycotts and strikes in which 30% of the user base participates - the prevalence of protest users that we observed – can meaningfully reduce the performance of a recommender system for the 70% of the user base that does not protest. As such, given their prevalence, protest users are already likely reducing the

performance of intelligent technologies owned by targeted companies, even for people who are not protest users. If the scale of protest non/use grows, Vincent et al.'s work suggests that this effect will continue to increase.

5.6 Protest Users and Monopolies

A concerning result in our survey is that many people felt they could not stop or change their use of a given technology because there were no alternatives to this technology. This finding provides a data point for the growing discussions about monopoly power of many of the companies in the technology industry [23,36,37,58]. If a user of a technology cannot "put their money where their mouth is" due to the lack of competitors, this supports an argument that there has been a market failure. It may be that much of the protest use we observed would become protest non-use if there were more competitors available. Indeed, this is the motivation for Vincent et al.'s "data strike" concept: data strikes allow people to continue to use a platform while exerting some leverage over it. Overall, it is clear that more research is needed on the relationship between protest use, protest non-use and market competition. Our results provide a useful data point on this relationship, but they come from just one survey of limited size and scope.

5.7 Future Work on Protest Users

At the most basic level, our findings highlight the need for follow-up work that examines the prevalence and character of protest non/use in more detail. This would involve in-depth qualitative research with protest users (and potential protest users), examining protest non/use in more diverse geographic contexts (see Limitations below), and even perhaps running larger-scale surveys.

Following prior work on non-use (e.g. [2,3,22]), social computing research should also examine protest non/use explicitly through a socioeconomic lens. Our results suggest that there are complex socioeconomic contours associated with protest non/use. In particular, there are hints in our results of protest non/use being a privilege of people who can afford it, with lack of alternatives being the most common roadblock to catalyzing interest in a protest into action. In the terms of Wyatt's distinction between voluntary and non-voluntary non-use [59], our study reinforces that technology *use* can be non-voluntary as well. That is, our study provides early evidence showing potential protest users were "stuck" using technologies that they were interested in protesting. These results call out for future work to further investigate the role of socioeconomic factors in protest non/use.

5.8 Limitations

A major limitation of our study was that we sampled only adult web users in the United States. Of course, this population's protest non/use is of interest to many stakeholders: this population is both large in absolute number and is an important revenue source for prominent tech companies [13]. However, we observed – as have others (e.g. [22]) – that technology non/use behavior varies with respect to demographics, prominent tech companies vary around the world, and our population is a small portion of overall web users. Future work should investigate how the prevalence, motivations, and tactics of protest users change across the globe. The challenges and roadblocks facing protest users and potential protest users will likely also be another source of important geographic variation.

Although our use of third-party services to collect nationally representative data was appropriate for our early-stage contribution to the discussion around protest non/use and is a standard practice in the social computing literature (e.g. [2,8]), this approach limits our ability to validate our results. Given that our major findings are based on descriptive results with large effect sizes, it seems unlikely that this is a major validity threat. However, any fine-grained results from our surveys or similar surveys must be taken with a grain of salt and precise estimation about specific phenomena (e.g. "how many people use Private Browsing to view Facebook pages?") are likely inappropriate given the nature of our data.

Our major findings relied on multiple-choice multiple-answer responses. Although we aimed to cover a wide variety of possible answers motivated by themes in the news media, the literature, and our 2017 free text responses, it is possible we missed certain answers or worded them in a way that confused respondents. We mitigated this risk through the inclusion of an "Other" option in most questions and did not see evidence of major omissions in those responses. That said, we must assume there is some risk of design error on top of any sampling error.

Finally, it should be reiterated that the design differences in our two surveys provide important context for any comparison between the 2017 results and the 2019 results. We adjusted our survey design for the 2019 survey to more directly answer our research questions about protest users' motivations and challenges instead of deploying an identical survey. We also used two different survey companies, each with its own proprietary sampling approach. As noted above, these decisions led to us placing more emphasis on the descriptive statistics from the 2019 survey than on any direct comparisons between the two surveys.

6 CONCLUSION

In this paper, we present the results of two surveys that explore if, how, and why people stop or change their usage of major technology companies' products as a form of protest (we call such people *protest users*). We find evidence that such behavior is increasingly common (almost half of our respondents were protest users or interested in becoming protest users), and driven by a variety of motivations, particularly concerns about privacy and business models that profit from user data. Moreover, our survey highlights common tactics that protest users employed in protest, and the challenges and roadblocks that inhibited these protests. This work provides important context for the growing discussion around the relationship and power dynamics between the public and technology companies. We present design implications for new technologies to better support protest users and highlight important follow-up social computing research into their protesting behaviors.

ACKNOWLEDGEMENTS

REFERENCES

[1]   Anders Albrechtslund. 2008. Online social networking as participatory surveillance. *First Monday* 13, 3 (2008).

[2]   Eric P. S. Baumer. 2018. Socioeconomic Inequalities in the Non Use of Facebook. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems* (CHI '18), 616:1–616:14. DOI:https://doi.org/10.1145/3173574.3174190

[3]   Eric P. S. Baumer, Jenna Burrell, Morgan G. Ames, Jed R. Brubaker, and Paul Dourish. 2015. On the Importance and Implications of Studying Technology Non-use. *interactions* 22, 2 (February 2015), 52–56. DOI:https://doi.org/10.1145/2723667

[4]   Eric P.S. Baumer. 2015. Usees. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems* (CHI '15), 3295–3298. DOI:https://doi.org/10.1145/2702123.2702147

[5]   Eric P.S. Baumer, Phil Adams, Vera D. Khovanskaya, Tony C. Liao, Madeline E. Smith, Victoria Schwanda Sosik, and Kaiton Williams. 2013. Limiting, Leaving, and (Re)Lapsing: An Exploration of Facebook Non-use Practices and Experiences. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '13), 3257–3266. DOI:https://doi.org/10.1145/2470654.2466446

[6]   Eric PS Baumer, Morgan G Ames, Jenna Burrell, Jed R Brubaker, and Paul Dourish. 2015. Why study technology non-use? *First Monday* 20, 11 (2015).

[7]   Eric PS Baumer, Shion Guha, Emily Quan, David Mimno, and Geri K Gay. 2015. Missing photos, suffering withdrawal, or finding freedom? How experiences of social media non-use influence the likelihood of reversion. *Social Media+ Society* 1, 2 (2015), 2056305115614851.

[8]   Eric P.S. Baumer, Xiaotong Xu, Christine Chu, Shion Guha, and Geri K. Gay. 2017. When Subjects Interpret the Data: Social Media Non-use As a Case for Adapting the Delphi Method to CSCW. In *Proceedings of the 2017 ACM Conference on Computer Supported Cooperative Work and Social Computing* (CSCW '17), 1527–1543. DOI:https://doi.org/10.1145/2998181.2998182

[9]   Spencer Beecher, Don van der Drift, David Martin, Lindsay Vass, Sergey Goder, Benedict Lim, and Matt Langner. 2019. facebookincubator/bootstrapped. *bootstrapped Github Repository.* Retrieved from https://github.com/facebookincubator/bootstrapped

[10] US Census Bureau. Income and Poverty in the United States: 2017. Retrieved June 23, 2019 from https://www.census.gov/data/tables/2018/demo/income-poverty/p60-263.html

[11] US Census Bureau. 2017 National Population Projections Tables. Retrieved August 12, 2019 from https://www.census.gov/data/tables/2017/demo/popproj/2017-summary-tables.html

[12] Pierre Dragicevic. 2016. Fair statistical communication in HCI. In *Modern Statistical Methods for HCI.* Springer, 291–330.

[13] Kerry Flynn. 2018. Facebook's making more money per user in North America than ever before. *Digiday.* Retrieved April 3, 2019 from https://digiday.com/marketing/facebooks-making-money-per-user-north-america-ever/

[14] Batya Friedman and Helen Nissenbaum. 1996. Bias in Computer Systems. *ACM Trans. Inf. Syst.* 14, 3 (July 1996), 330–347. DOI:https://doi.org/10.1145/230538.230561

[15] José González Cabañas, Ángel Cuevas, and Rubén Cuevas. 2017. FDVT: Data Valuation Tool for Facebook Users. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems* (CHI '17), 3799–3809. DOI:https://doi.org/10.1145/3025453.3025903

[16] Kevin Granville. 2018. Facebook and Cambridge Analytica: What You Need to Know as Fallout Widens. *N. Y. Times* (March 2018). Retrieved from https://www.nytimes.com/2018/03/19/technology/facebook-cambridge-analytica-explained.html

[17] Rebecca Greenfield, Sarah Frier, and Ben Brody. 2018. NAACP Seeks Week-Long Facebook Boycott Over Racial Targeting. *Bloomberg.com* (December 2018). Retrieved from https://www.bloomberg.com/news/articles/2018-12-17/naacp-calls-for-week-long-facebook-boycott-over-racial-targeting

[18] Jens Grossklags and Alessandro Acquisti. 2007. When 25 Cents is Too Much: An Experiment on Willingness-To-Sell and Willingness-To-Protect Personal Information. In *WEIS*.

[19] Shion Guha, Eric P.S. Baumer, and Geri K. Gay. 2018. Regrets, I've Had a Few: When Regretful Experiences Do (and Don'T) Compel Users to Leave Facebook. In *Proceedings of the 2018 ACM Conference on Supporting Groupwork* (GROUP '18), 166–177. DOI:https://doi.org/10.1145/3148330.3148338

[20] Shion Guha and Jeremy Birnholtz. 2013. Can you see me now?: location, visibility and the management of impressions on foursquare. In *Proceedings of the 15th international conference on Human-computer interaction with mobile devices and services*, 183–192.

[21] Shion Guha and Stephen B. Wicker. 2015. Do Birds of a Feather Watch Each Other?: Homophily and Social Surveillance in Location Based Social Networks. In *Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing* (CSCW '15), 1010–1020. DOI:https://doi.org/10.1145/2675133.2675179

[22] Eszter Hargittai. 2007. Whose space? Differences among users and non-users of social network sites. *Journal of computer-mediated communication* 13, 1 (2007), 276–297.

[23] Astead W. Herndon. 2019. Elizabeth Warren Proposes Breaking Up Tech Giants Like Amazon and Facebook. *The New York Times.* Retrieved April 4, 2019 from https://www.nytimes.com/2019/03/08/us/politics/elizabeth-warren-amazon.html

[24] Daniel C Howe and Helen Nissenbaum. 2017. Engineering privacy and protest: A case study of AdNauseam. In *CEUR Workshop Proceedings*, 57–64.

[25] Isaac L. Johnson, Yilun Lin, Toby Jia-Jun Li, Andrew Hall, Aaron Halfaker, Johannes Schöning, and Brent Hecht. 2016. Not at Home on the Range: Peer Production and the Urban/Rural Divide. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems* (CHI '16), 13–25. DOI:https://doi.org/10.1145/2858036.2858123

[26] Jana Kasperkevic. 2018. Amazon faces boycott ahead of holidays as public discontent grows. *the Guardian* (December 2018). Retrieved from https://www.theguardian.com/technology/2018/dec/17/amazon-boycott-customers-holiday-shopping

[27] Brayden King. 2016. Reputation, risk, and anti-corporate activism: How social movements influence corporate outcomes. *The Consequences of Social Movements* (January 2016), 215–236. DOI:https://doi.org/10.1017/CBO9781316337790.009

[28] Brayden G. King and Mary Hunter McDonnell. 2015. Good firms, good targets: The relationship among corporate social responsibility, reputation, and activist targeting. *Corporate Social Responsibility in a Globalizing World* (January 2015), 430–454. DOI:https://doi.org/10.1017/CBO9781316162354.013

[29] Sebastian Koos. 2012. What drives political consumption in Europe? A multi-level analysis on individual characteristics, opportunity structures and globalization. *Acta Sociologica* 55, 1 (March 2012), 37–57. DOI:https://doi.org/10.1177/0001699311431594

[30] Cliff Lampe, Jessica Vitak, and Nicole Ellison. 2013. Users and nonusers: Interactions between levels of adoption and social capital. In *Proceedings of the 2013 conference on Computer supported cooperative work*, 809–820.

[31] Jaron Lanier and E Glen Weyl. 2018. A Blueprint for a Better Digital Society. *Harvard Business Review* (2018).

[32] Hanlin Li, Bodhi Alarcon, Sara Milkes Espinosa, and Brent Hecht. 2018. Out of Site: Empowering a New Approach to Online Boycotts. *Proc. ACM Hum.-Comput. Interact.* 2, CSCW (November 2018), 106:1–106:28. DOI:https://doi.org/10.1145/3274375

[33] Kimberly Ling, Gerard Beenen, Pamela Ludford, Xiaoqing Wang, Klarissa Chang, Xin Li, Dan Cosley, Dan Frankowski, Loren Terveen, Al Mamunur Rashid, Paul Resnick, and Robert Kraut. 2005. Using Social Psychology to Motivate Contributions to Online Communities. *Journal of Computer-Mediated Communication* 10, 4 (July 2005), 00–00. DOI:https://doi.org/10.1111/j.1083-6101.2005.tb00273.x

[34] Michael Livingston. 2018. Here's when boycotts have worked and when they haven't. *latimes.com* (December 2018). Retrieved from https://www.latimes.com/nation/la-na-boycotts-history-20180228-htmlstory.html

[35] Amanda Lotz. 2019. *"Big Tech" isn't one big monopoly – it's 5 companies all in different businesses.* Retrieved from https://theconversation.com/big-tech-isnt-one-big-monopoly-its-5-companies-all-in-different-businesses-92791

[36] Farhad Manjoo. 2018. Stumbles? What Stumbles? Big Tech Is as Strong as Ever. *The New York Times*. Retrieved April 4, 2019 from https://www.nytimes.com/2018/08/01/technology/big-tech-earnings-stumbles.html

[37] Antonio García Martínez. 2019. Facebook Is Not a Monopoly, but It Should Be Broken Up. *Wired*. Retrieved April 4, 2019 from https://www.wired.com/story/facebook-not-monopoly-but-should-broken-up/

[38] Rahat Masood, Dinusha Vatsalan, Muhammad Ikram, and Mohamed Ali Kaafar. 2018. Incognito: A Method for Obfuscating Web Data. In *Proceedings of the 2018 World Wide Web Conference on World Wide Web - WWW '18*, 267–276. DOI:https://doi.org/10.1145/3178876.3186093

[39] Arunesh Mathur, Jessica Vitak, Arvind Narayanan, and Marshini Chetty. 2018. Characterizing the Use of Browser-Based Blocking Extensions To Prevent Online Tracking. *Fourteenth Symposium on Usable Privacy and Security (SOUPS 2018)*, 2018

[40] J. Nathan Matias. 2016. Going Dark: Social Factors in Collective Action Against Platform Operators in the Reddit Blackout. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems* (CHI '16), 1138–1151. DOI:https://doi.org/10.1145/2858036.2858391

[41] Mary-Hunter McDonnell, Brayden G King, and Sarah A. Soule. 2015. A Dynamic Process Model of Private Politics: Activist Targeting and Corporate Receptivity to Social Challenges. *Am Sociol Rev* 80, 3 (June 2015), 654–678. DOI:https://doi.org/10.1177/0003122415581335

[42] Michael J. Muller. 2003. The Human-computer Interaction Handbook. In Julie A. Jacko and Andrew Sears (eds.). L. Erlbaum Associates Inc., Hillsdale, NJ, USA, 1051–1068.

[43] Benjamin J. Newman and Brandon L. Bartels. 2011. Politics at the Checkout Line: Explaining Political Consumerism in the United States. *Political Research Quarterly* 64, 4 (2011), 803–817.

[44] Rebekah Overdorf, Bogdan Kulynych, Ero Balsa, Carmela Troncoso, and Seda Gürses. 2018. POTs: Protective Optimization Technologies. *arXiv preprint arXiv:1806.02711* (2018).

[45] Eric A Posner and E Glen Weyl. 2018. *Radical Markets: Uprooting Capitalism and Democracy for a Just Society.* Princeton University Press.

[46] Joseph Reagle and Lauren Rhue. 2011. Gender Bias in Wikipedia and Britannica. *International Journal of Communication* 5, 0 (August 2011), 21.

[47] Elissa M. Redmiles, Sean Kross, and Michelle L. Mazurek. 2016. How I Learned to Be Secure: A Census-Representative Survey of Security Advice Sources and Behavior. In *Proceedings of the 2016 ACM SIGSAC Conference on Computer and Communications Security* (CCS '16), 666–677. DOI:https://doi.org/10.1145/2976749.2978307

[48] Kenneth Rogoff. 2019. Big tech has too much monopoly power – it's right to take it on. *the Guardian* (April 2019). Retrieved from https://www.theguardian.com/technology/2019/apr/02/big-tech-monopoly-power-elizabeth-warren-technology

[49] Shruti Sannon, Natalya N Bazarova, and Dan Cosley. 2018. Privacy lies: Understanding how, when, and why people lie to protect their privacy in multiple online contexts. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*, 52.

[50] Christine Satchell and Paul Dourish. 2009. Beyond the user: use and non-use in HCI. In *Proceedings of the 21st Annual Conference of the Australian Computer-Human Interaction Special Interest Group: Design: Open 24/7*, 9–16.

[51] Sarita Yardi Schoenebeck. 2014. Giving Up Twitter for Lent: How and Why We Take Breaks from Social Media. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '14), 773–782. DOI:https://doi.org/10.1145/2556288.2556983

[52] Alana Semuels. 2017. Why #DeleteUber and Other Boycotts Matter. *Atlantic* (February 2017). Retrieved from https://www.theatlantic.com/business/archive/2017/02/why-deleteuber-and-other-boycotts-matter/517416

[53] Jun Shao. 2003. Impact of the bootstrap on sample surveys. *Statistical Science* 18, 2 (2003), 191–198.

[54] Aaron Shaw and Eszter Hargittai. 2018. The Pipeline of Online Participation Inequalities: The Case of Wikipedia Editing. *J Commun* 68, 1 (February 2018), 143–168. DOI:https://doi.org/10.1093/joc/jqx003

[55] Aaron Shaw, Haoqi Zhang, Andrés Monroy-Hernández, Sean Munson, Benjamin Mako Hill, Elizabeth Gerber, Peter Kinnaird, and Patrick Minder. 2014. Computer supported collective action. *interactions* 21, 2 (March 2014), 74–77. DOI:https://doi.org/10.1145/2576875

[56] Stefan Stieger, Christoph Burger, Manuel Bohn, and Martin Voracek. 2013. Who commits virtual identity suicide? Differences in privacy concerns, internet addiction, and personality between Facebook users and quitters. *Cyberpsychology, Behavior, and Social Networking* 16, 9 (2013), 629–634.

[57] Nicholas Vincent, Brent Hecht, and Shilad Sen. 2019. "Data Strikes": Evaluating the Effectiveness of New Forms of Collective Action Against Technology Platforms. In *Proceedings of The Web Conference 2019*.

[58] Robert Wright. 2018. Why We Can't Let Google Monopolize AI. *Wired*. Retrieved April 4, 2019 from https://www.wired.com/story/google-artificial-intelligence-monopoly/

[59] Sally ME Wyatt, Nelly Oudshoorn, and Trevor Pinch. 2003. Non-users also matter: The construction of users and non-users of the Internet. *Now users matter: The co-construction of users and technology* (2003), 67–79.

[60] Alyson Leigh Young and Anabel Quan-Haase. 2013. Privacy Protection Strategies on Facebook. *Information, Communication & Society* 16, 4 (May 2013), 479–500. DOI:https://doi.org/10.1080/1369118X.2013.777757

[61] 2018. *History of Successful Boycotts - Ethical Consumer.* Retrieved from https://www.ethicalconsumer.org/ethicalcampaigns/boycotts/history-successful-boycotts

[62] Standing up for what's right | Uber Newsroom. Retrieved June 24, 2019 from https://www.uber.com/newsroom/standing-up-for-whats-right-3/

[63] Buycott. *Buycott App.* Retrieved July 11, 2018 from https://www.buycott.com/

[64] Prime Day: activists protest against Amazon in cities across US. The Guardian. Retrieved August 14, 2019 from https://www.theguardian.com/technology/2019/jul/15/prime-day-activists-plan-protests-in-us-cities-and-a-boycott-of-e-commerce-giant

[65] Why Thousands Of Amazon Workers Are Striking On Prime Day | HuffPost. Retrieved August 14, 2019 from https://www.huffpost.com/entry/amazon-prime-day-minnesota-strike-germany-protest_n_5d2d52f8e4b02fd71dd95281