

Algorithmic Labor and Information Asymmetries: A Case Study of Uber's Drivers

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Uber manages a large, disaggregated workforce through its ridehail platform, one that delivers a relatively standardized experience to passengers while simultaneously promoting its drivers as entrepreneurs whose work is characterized by freedom, flexibility, and independence. Through a nine-month empirical study of Uber driver experiences, we found that Uber does leverage significant indirect control over how drivers do their jobs. Our conclusions are twofold: First, the information and power asymmetries produced by the Uber application are fundamental to its ability to structure control over its workers; second, the rhetorical invocations of digital technology and algorithms are used to structure asymmetric corporate relationships to labor, which favor the former. Our study of the Uber driver experience points to the need for greater attention to the role of platform disintermediation in shaping power relations and communications between employers and workers.

Keywords: on-demand economy, Uber, design, platform, ridesharing, ridehailing, algorithm, data, labor, management, rating, surge pricing, entrepreneurship, independent contractor, sharing economy

Uber is a San Francisco-based company founded in 2009 that owns and operates a smartphone application for “ridesharing,” connecting drivers of privately held vehicles with riders who pay a fare set by the company. Uber is reputedly valued at \$62.5 billion in its latest funding rounds (Newcomer, 2015), and is available in 195 cities in North America (Uber, 2016) and 68 countries worldwide (Uber Newsroom,

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2016), although its operations continually expand (and occasionally contract via conflicts with local regulators over the legality of its contested business practices).² Uber is the most visible and controversial of a category of businesses, such as Airbnb or TaskRabbit, which represent themselves as part of a "sharing economy," also known as the "on-demand" or "platform" economy.

Previous work on ridesharing in general has explored the phenomena in its ad hoc, not-for-profit, or cooperative contexts (Anderson, 2014; Chan & Shaheen, 2012; Cohen & Kietzmann, 2014; Furuhata et al., 2013). Lee, Kusbit, Metsky, and Dabbish (2015) provide the most granular independent look to date at the driving habits and preferences of Uber drivers, coining the term *algorithmic management* to describe the mechanisms through which Uber and Lyft drivers are directed. We extend that understanding of algorithmic management to elucidate on the automated implementation of company policies on the behaviors and practices of Uber drivers. A growing body of journalistic (Griswold, 2014; Hill, 2015; Hockstein, 2015; Johnson, 2014; Porter, 2015; White, 2015) and academic research has begun to examine the conditions of labor and work in online labor markets (Irani, 2015; Kingsley, Gray, & Suri, 2015) and the digital on-demand economy. Sociologists such as Zwick (2015) have critically assessed new terms, such as *prosumer* (Ritzer & Jurgenson, 2010), that seek to reify the consumer's role as a producer and manager of goods and services. Scholz (2013) along with the contributors to the volume *Digital Labor: The Internet as Playground and Factory* lay out a range and diversity of questions surrounding digitally mediated labor and new models of production and consumption. As Scholz notes, "Web-based work environments have emerged that are devoid of the worker protections of even the most precarious working-class jobs" (p. 1). Gregg (2015) observes that the asymmetries between app designers, owners, and the service providers—"those who offer the infrastructure for labor but no stability or benefits to accompany it" (para. 6)—are a defining feature of many of these on-demand companies.

Our research extends these critiques of platform-based employers by examining how Uber drivers experience labor under a specific regime of automated and algorithmic management. This work combines a qualitative study of Uber drivers in both digital and physical spaces with a design critique of Uber's technical systems and a discursive critique of its corporate communications (advertisements, public interviews, and written policies). We conclude that Uber's rhetorical invocations of digital technology and algorithms are used to structure unequal corporate relationships to labor that favor the former. Through tools such as dynamic, algorithmic pricing and a number of other elements of the Uber application's design, Uber is empowered via information and power asymmetries to effect conditions of soft control, affective labor, and gamified patterns of worker engagement on its drivers.

Study Method and Scope

For this case study, we performed archival and real-time analysis of posts by Uber drivers in online forums between December 2014 and September 2015. Drivers use these forums to learn tricks and tips for success on Uber's platform; compare and share practices and screenshots; complain socially about passengers and the company; and debate Uber's practices, including discrepancies between the passenger and driver apps (Clark, 2015; Rosenblat, 2015). Given that a driver's in-person contact with Uber staff is

² The number of cities and countries listed here will likely be out of date in the near future.

primarily limited to, if anything, the initial recruitment process (Uber communicates with its drivers almost exclusively via e-mail and text), these unofficial communication networks can function as primary sites for knowledge-building.

Data were collected from five dedicated forums (three larger and two smaller).³ Of these larger forums, Forum "UberDrive" is a standalone website with 700–1,000 daily visitors.⁴ Forum "UberOps" is a closed-membership forum hosted on a social media platform with approximately 5,100 members (the numbers change marginally on a daily basis after increasing by hundreds over the nine-month period) and administrators that impose standards of basic civility. Forum "UberCool" is another standalone website: It has numerous participants and appears to be the largest, but the exact number of participants is unavailable.⁵ Approximately 1,350 total archival items were collected from these forums, documenting the activities and conversations of drivers through forum posts, interviews, and other personal contacts, including e-mail correspondence with Uber community support representatives (CSRs). To contextualize and build on the data gathered from forums, we also conducted in-depth, semi-structured interviews with seven drivers.

The experiences reported on these forums and described by our interview subjects are not necessarily representative of the Uber driver population as a whole. For instance, drivers who seek out and participate in online forums may be more strongly opinionated than other drivers, or may have had individual difficulties that drove them to seek help and information online. The ability to generalize from reported driver experiences is also complicated by the range of Uber services,⁶ the differences between drivers who rely on it for their primary income and have made significant financial and social investments in it compared with those who are hobbyists and work fewer hours, and how long Uber has been in operation in a driver's market. Yet, although these accounts may not describe every driver's experience, the evidence we have collected nonetheless reveals structural features of the Uber system that could potentially affect any driver using the application.

What Uber Promises Drivers

Uber recruits heavily, growing from 160,000 drivers in the United States in 2014 to 400,000 drivers a year later (Uber Newsroom, 2015). Retention rates are poor: Slightly more than half of drivers on-boarded in 2013 remain active (having completed at least one trip in the previous six months) on the platform a little over a year later, according to Uber's own data (Hall & Krueger, 2015, p. 16). Once approved, active drivers can log into Uber's system via a smartphone app to indicate that they are available to receive ride requests from passengers. Passengers pay a total fare for each ride via credit card directly to Uber. Uber later passes the payment on to drivers after deducting a commission, which generally ranges between 20% and 30% for uberX, a "safe rides fee" (now a "booking fee"), and any

³ For confidentiality reasons, we modified the names of these forums and driver identities and quotations.

⁴ These numbers are according to the forum operator.

⁵ Posters are required to enter minimal contact information to register and post on it; the majority of forum participants identify as drivers in the United States.

⁶ UberX appears to be the most common: Drivers tend not to identify for which tier of service they drive.

additional fees based on local jurisdiction. Uber's policies require drivers to maintain a low cancellation rate, such as 5% in San Francisco (as of July 2015), and a high acceptance rate, such as 80% or 90%.

One of Uber's undoubted appeals for workers is its promise of "flexible employment" (O'Brien, 2015). Uber advertises to drivers that, "With Uber, you have total control. Work where you want, when you want, and set your own schedule" and "Freedom pays weekly." In a 2015 survey commissioned by the company, 85% of respondents agreed that flexibility was a major motivator for driving for Uber (Hall & Krueger, 2015, p. 11). The rhetorical markers of freedom, flexibility, and entrepreneurship enabled through an app-based platform are further hallmarks of the on-demand economy, and, in the case of Uber, they have proven broadly successful (Griffith, 2015). The promotion of entrepreneurship and freedom permits employers, the public, and regulators to imagine that workers "work by un-coerced choice" (Irani, 2015, p. 227). Yet, the labor that Uber drivers do is shaped by the company's deployment of a variety of design decisions and information asymmetries via the application to effect a "soft control" over workers' routines (Boltanski & Chiapello, 1999/2007; Deleuze, 1990).

Uber refers to drivers as "driver-partners," thus disassociating the company from an employer-employee relationship. Drivers in this study generally treated the language as either a formality or hypocrisy, as irrelevant, or as a lever to press negotiations for more autonomy. The terms *partner* and *sharing economy* and even *rideshare* suggest that Uber and its drivers possess a mutual commitment to common goals (Gregg, 2011, p. 85), despite the significant information and power asymmetries between the two. In Uber's contract with its UK-based drivers, drivers are instead legally framed as consumers: "Customer [driver] is authorized to provide Transportation Services . . ." (Uber B.V., 2015). The term *customers* specifies that drivers are "end-users" of the application, similar to passengers, which potentially obviates their role and rights as workers.

Uber, like other companies in the on-demand economy (Smith & Leberstein, 2015), uses its identity as both a platform and a technology company to define its role (Gillespie, 2010) as a neutral intermediary that facilitates access to underused and undercommoditized goods and services (Lobel, 2015, p. 1; Lowrey, 2015). Uber claims in its contract with drivers that it is "a technology services provider that does not provide transportation service" (Uber Technologies, 2014). In response to multiple lawsuits against Uber alleging that it discriminates against blind and disabled passengers, Uber has argued that the Americans With Disabilities Act did not apply to it as it does to taxi companies because it is a technology, and not a transportation, company (Strochlic, 2015).⁷

The most explicit legal tensions in which the company is embroiled are highlighted by a class action lawsuit in California, which effectively contests the neutrality of Uber's relationship to its drivers: The plaintiffs (drivers) assert that they should be classified as employees, not independent contractors (O'Connor, Colopy, Manahan, and Gurfinkel v. Uber Technologies, Inc., 2015b). Uber's contract with its American drivers states that Uber "provides lead generation to independent providers of rideshare or peer to peer passenger transportation services" (Raiser, 2015, para. 9.2). In a legal brief Uber submitted in the

⁷ We observed communications from Uber to drivers warning them about their prospective obligations under the Americans with Disabilities Act.

California employment misclassification lawsuit, Uber asserts that “We make our money from licensing software. . . . And we happen to have a compensation model that, when they [drivers] use it successfully, we get compensated” (O’Connor et al., 2015a, p. 16). This framing implies that any negative consequences are features of software connectivity. Yet, Uber’s self-proclaimed role as a connective intermediary belies the important employment structures and hierarchies that emerge through its software and interface design.

Power Asymmetries and Pay Rates

Regardless of the language used by Uber to describe its legal and rhetorical relationship to its drivers, an analysis of driver experiences with the company’s system reveals numerous manifestations of algorithmic management. Most notable are the combination of blind passenger acceptance with low minimum fares and the algorithmic determination of surge pricing. These two features of the Uber system reveal, respectively, how little control Uber drivers have over critical aspects of their work and how much control Uber has over the labor of its users (drivers).

Blind Passenger Acceptance and Minimum Fares

When active Uber drivers receive a ride request through the system, they have about 15 seconds to accept it or reject it. When Uber drivers accept a ride request, they take on the risk that the ride’s fare will not be profitable; yet, drivers are not shown destination or fare information before they accept a ride. Jason from Raleigh, North Carolina, who had driven for about a year, said, “You’re driving around blind. When it does ping, you might drive 15 minutes to drive someone half a mile. There’s no money in it in that point, especially in my SUV.” Although hiding the destination before a driver chooses to accept or decline a ride request can potentially prevent destination-based discrimination (Smart et al., 2015), it can also foster reduced wages for drivers.

In addition, drivers risk “deactivation” (being suspended or removed permanently from the system) for cancelling unprofitable fares. Ron, an interviewee who had been driving in New Jersey and New York City for over a year, said,

Show the destination before. If we’re independent contractors, we should have the right to refuse. If I look down and it’s 3:00 in the afternoon and the guy is going to JFK [NYC-based airport], I’m not going to take it. When I get to the guy’s location and I get to JFK, I’m not going to make \$40 for 3 hours of work. . . . They tell us it’s our choice whether to take a trip or not, so how can they penalize us for that?

Blind ride acceptance is made even more risky by Uber’s imposition of minimum fares. In Savannah, Georgia, the minimum fare is \$5 for uberX (as of September 2015). Uber takes a \$1 safe rides fee off that amount and a commission of at least 20% on the remaining \$4. That leaves the driver with \$3.20 at Uber’s lowest commission, which does not account for any of the driver’s expenses.⁸

⁸ Uber’s rates and fees are subject to perennial change, and these amounts will vary accordingly.

These structures of the Uber system contradict the rhetorical framing of drivers as entrepreneurs. Uber advertises that a driver can "be your own boss" and has made attempts to induce drivers to protest the regulation of ridesharing by sending them e-mails that say, for example, "State leaders need to hear from entrepreneurs like you." In Uber's Newsroom (2014), Uber states, "Our powerful technology platform delivers turnkey entrepreneurship to drivers across the country and around the world" (para. 4). None of the interviewees we spoke with thought of themselves as entrepreneurs because of their work with Uber. As Mike, an interviewee from Savannah who had driven for Uber for two to three months, said,

Entrepreneur is, I feel like a bit of a stretch. I mean, I feel like the definition of an entrepreneur is, you know, having your own idea and taking off with that. I feel like Uber is just like a side gig, not any kind of entrepreneur endeavor. . . . I don't feel like entrepreneur is a great classification for drivers, unless you're running a business out of your Uber car, I guess that's something an entrepreneur could do.

Uber's discourse of entrepreneurship may be tied to the legacy of a Silicon Valley environment where highly skilled and mobile workers could take on risks and trade-offs to be part of the start-up technology world (Neff, 2012, p. 24). However, this rhetoric of risk and reward has been retooled to suit a contingent of lower-income workers who are recruited to perform service labor under working conditions controlled by the design and affordances of Uber's platform.⁹

The practices of blind rider acceptance and minimum fares are two manifestations of the larger fact that Uber has full power to control and change the base rates its drivers charge.¹⁰ Uber's agreement with its "partners" (drivers) permits drivers to negotiate a lower fare, but not a higher one (Uber Technologies, 2014).¹¹ Base rates, as well as minimum fares, vary across cities. For instance, in New York City, uberX services as of September 2015 were \$0.40/minute and \$2.15/mile, with a minimum fare of \$8. In Austin, Texas, the minimum fare was \$2 and the rate was \$0.18/minute and \$1.10/mile.

When Uber sets low rates for routine work, incentive-based pay steers drivers into working under much stricter and less flexible conditions in the hopes of higher earnings, such as hourly wage guarantees which vary according to the terms of each guarantee, such as \$22 per hour or \$40 per hour, but these are moot if drivers earn the equivalent or more in fares. Uber does not disclose the criteria by which certain drivers are selected for hourly guarantees, but Uber Support CSRs explain, "Some guarantees are only offered to a specific group of partners. We rotate these guarantees to make the guarantee structure

⁹ While we primarily examine how control takes shape through less visible mechanisms, it is worth noting that (1) Uber maintains a list of eligible vehicles (make and year) in each city, which it sometimes changes, and (2) that drivers are responsible for all the costs of operating their vehicles and running a small business.

¹⁰ Uber also implements perennial rate cuts. In January 2016, Uber slashed rates in 100 cities in North America. In New York City, rates for uberX were lowered by 20%; in Detroit, rates were set at \$0.30/mile (Campbell, 2016a).

¹¹ Some drivers report strategically ending a trip early, thus lowering the fare for the passenger, in the hopes of getting a higher rating.

as fair as possible.” The conditions for receiving this guarantee follow this typical template: RSVP or “opt-in” to the guarantee; accept 90% of ride requests, complete one trip per hour, be online for at least 50 minutes of every hour, and maintain a specified high rating during those trips. Additional requirements could be that drivers are required to start eligible trips from a particular location, such as the core of Los Angeles (Campbell, 2016b). Effectively, hourly guarantees function to schedule on-demand shift work, but the language of opt-in or RSVP buffers the narrative of freedom and choice that Uber promotes to its drivers, while simultaneously masking a hierarchy in which select drivers are invited to earn more based on opaque criteria. Drivers have the freedom to drive at “flexible” hours at lower rates, but their flexibility is tailored to and dependent on demand as well as on the viability of base rates.

When Uber implements lower rates, drivers express strong distrust of Uber’s system and explanations. To promote rate cuts, Uber typically shows drivers graphs demonstrating that lower fare rates lead to a “huge boost in demand, and partner earnings per hour increased by 25%—that’s a lot of extra money!” Uber’s logic is that drivers will earn more through increased trip, and greater optimization of their time online, from the “boost in demand.” In reactions that echo other driver responses to rate decreases in other cities, including Austin, drivers in forums respond with incredulity, calling it “Uber math,” “propaganda,” and Orwellian double-speak. Drivers contend that they have to work longer hours and accrue additional expenses to earn what they made prior to rate cuts. The reactions drivers have to Uber’s logic around rate cuts is echoed in other changes Uber makes to drivers’ compensation structure. As interviewee Jason from Raleigh observed in 2015:

They keep bumping around with the rates and the different terms of service. . . . You gotta log in and all of a sudden there’s new terms and conditions and you can’t drive until you accept the new terms and conditions and if you’re on your phone you have to really look try and read everything. I read it because originally they had the X and then they had the XL platform here and then with the XL platform all of a sudden their percentage went from 20% to 28%. I sent ‘em an e-mail and said what’s going on? You’re not doing anything different. Why do you get an extra 8%? And they said you’re gonna make more money and I said no, you’re gonna make more money.

Uber’s position as a technology company that offers software to connect passengers with drivers implies that any emergent (and negative) effects of its system are a natural feature of connectivity rather than an enforced hierarchy or employment power structure. Yet, Uber has the power to carve out which parts of “connected work” are taskified as paid or unpaid services. For example, Uber advertises that passengers can retrieve items they leave behind in drivers’ cars because of that connectivity, and it provides passengers with a masked phone number to contact drivers in such cases, but Uber does not advertise that drivers are not paid for the time and energy they spend returning items passengers have left behind. Uber even advises drivers that, “It is not acceptable to ask the rider for payment for returning their lost item.” If a driver protests to Uber Support, a typical CSR response is, “I understand that it does take you time to return items that passengers left behind in your car. On the Uber system, you are only paid for the trips that are requested through the Uber app.” Some drivers say they might receive a fee of \$25 or \$10, or simply a “thanks” from Uber, but like fare acceptance, they are prevented from setting or

even knowing the rate for their work. In essence, Uber communicates that some services have prices and some services do not, but the power for determining these distinctions resides with Uber alone.

Similarly, Uber claims that it has the data to adjudicate disputes between passengers and drivers, such as for criminal matters such as assault claims (LaFrance, 2015) or smaller concerns such as payment/wage disputes. Its claim to adjudication is rooted in the notion that its data on both passengers and drivers are akin to an objective, third-party witness, and thus that its interpretation should be conclusive. Some drivers appreciate the accountability created by Uber's system of surveillance. As Sarah, an interviewee from Seattle, said,

They actually log the exact route that you took. . . . Uber drivers pretty much knows they can see whatever route they took, I think taxi drivers have done that forever, they'll just take you for a ride. . . . I like that Uber and Lyft has a little more of a specific tally because they don't want them doing that to customers.

In other cases, drivers perceive that Uber favors the passenger in adjudications, and even report having to gather their own data to prevent wages from being retracted. One interviewee, Larry, who drove near Austin, Texas, and had been working for Uber for 9–10 months, described one incident when he used his dash-cam footage to prove his story to Uber:

Once I had driven some guy somewhere and as soon as I got home I had checked and Uber had cut the pay in like half because the guy claimed I took him on an inefficient route, so I sent Uber the footage of the entire trip and I explain to them that if you watch the video he actually directs me turn by turn, you know, where to go, and it's the most drunk he's ever been. They reversed them, and gave me back my money. . . . Uber will always 100% go with the customer because that's how they make business. But I don't think that should come out of the driver's pay, because it's just customer satisfaction.

Drivers in forums and interviews, including Sarah, express how they resist Uber's power of interpretation by tracking their trips with manual or electronic logs and dash-cams. Even in cases of disputed fares, drivers are only able to exert control on the wages paid for completed work after the fact. The power imbalance is quite clear: Uber can hold drivers accountable to the "most efficient" routes, but drivers need their own data to hold Uber accountable for the wages they are owed. On a larger scale, Uber's ability to set and change its rates and commissions unilaterally and without driver buy-in foments driver distrust and dissatisfaction with Uber's platform.

Surge Pricing and Algorithmic Logistics Management

Among drivers interviewed and posts collected from forums, the ambiguity and resistance surrounding "surge pricing" surfaced as the most obvious intersection of data collection and information asymmetry in everyday driver experience. Surge pricing is displayed to drivers through a type of heat

map visualization, where the algorithmic assessment of supply and demand will temporarily raise fares for a particular geographic location (see Figure 1).

Visible to both riders and drivers, the creation of such surge pricing zones is billed by Uber as a means to ensure positive customer experience by enticing new supply to an area of high demand (Kedmey, 2014; Uber Technologies, 2015b). Uber's surge pricing patent (Lin et al., 2014) and its vernacular explanations contend that surge pricing prompts more drivers to get on the road (Uber, 2014) when demand is high, but there is some evidence that surge primarily redistributes the existing supply of drivers rather than adding to it (Diakopoulos, 2015).

Surge pricing is unreliable for drivers: Notably, pricing is based on the passenger's geolocation, not the driver's. Drivers travel to surge pricing zones in search of fares advertised at a given rate, but they can and do receive ride requests from passengers in other, adjacent areas. A driver may enter a zone that is surging at 3.5x, but receive ride requests at a lower surge rate, such as 1.5x. Some drivers report that passengers game the system by placing their pick-up location pin outside a surge zone, and then calling drivers to redirect them to their actual pick-up location. Drivers also noted that they would sometimes converge en masse at a surging area, find that supply was no longer too low, and the surge would disappear. Some drivers reported experimenting with trying to game these algorithms themselves, and many developed responses to surge pricing based on their experience with its duration, reliability, and potential reward in their respective locations. It is unclear whether surge is designed equally to optimize for satisfying passenger demand or for increasing driver earnings, but Uber's stance against "surge manipulation" by drivers suggests the former. In one e-mail exchange from September 2014, an Uber CSR advised a driver against surge manipulation by writing, "A passenger let us know that they felt you unfairly canceled their trip to wait for surge to kick in, or that you otherwise unfairly gave preference to surge trips instead of their request." The e-mail went on to advise that the driver risked deactivation if Uber received more negative passenger feedback. In effect, drivers are penalized for rejecting lower paid work in favor of higher paid work, which is illustrative of another constraint on their "freedom" as independent entrepreneurs.

Uber claimed in 2014 that surge pricing "affects a tiny minority of all Uber rides, less than 10% of all trips" (Gurley, 2014, para. 6), but surge (algorithmic) pricing recurs in driver discussions as a central preoccupation, and it remains a popular incentive: Screenshots of surge rates and zones are often posted to forums to display enthusiasm for a pay lottery. "Waking up dreamin' of surge. Haha." Others commented that they check the app for surge as soon as they get up in the morning. Some drivers are propelled into a similar emotional space as gambling or gaming (Cherry, 2012; Schüll, 2012) by algorithmic pricing.

Through surge pricing's appeal to the concept of algorithms and automated management, Uber can generate and coordinate clusters of labor in response to dynamic market conditions (Aneesh, 2009, p. 356) without explaining the reliability of its cluster incentives or guaranteeing the validity, accuracy, or error rates of its labor deployments. Many drivers express frustration and enthusiasm alike for surge pricing because its very dynamism is characteristically fickle and opaque, a finding supported by Lee et al. (2015, p. 1609). "Don't chase the surge" is offered in forums as standard advice to new drivers. Uber's

rhetorical appeal to algorithmic certainty and authority (Gillespie, 2014) also appears in the effective messaging that Uber sends to its drivers at key moments, such as when they are about to log off. Rather than an appeal from Uber's position as employer—"We'd like for you to keep working"—these messages cite the (presumably algorithmically derived) idea that demand is high in that driver's location at that exact time.

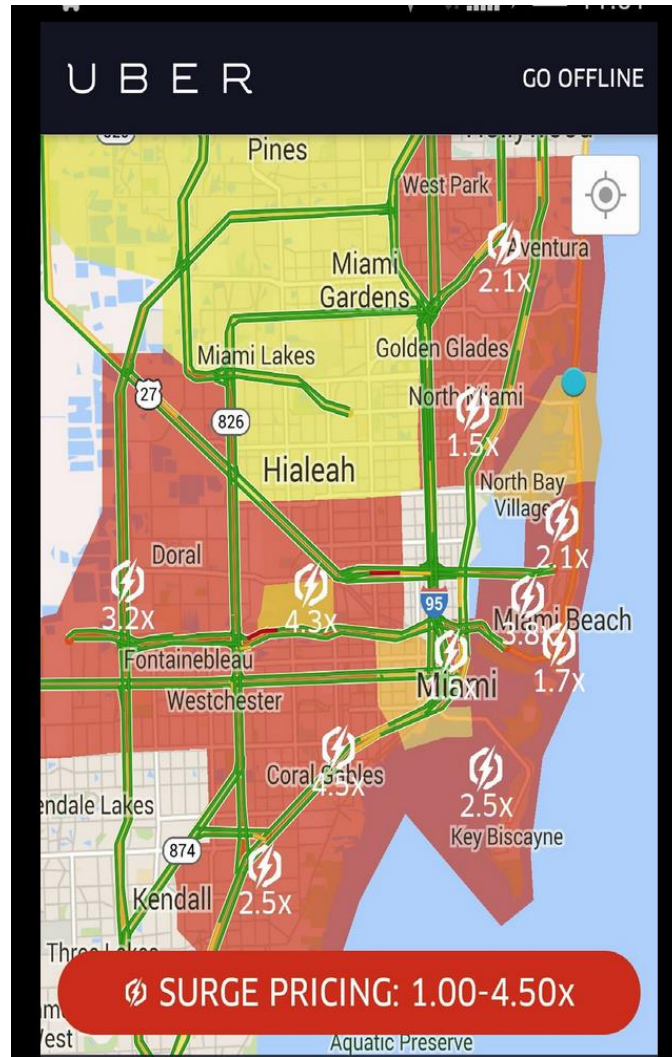


Figure 1. Sample surge map. Red means that demand is surging, orange indicates that rising demand, and yellow shows moderate demand.

Surge pricing thus exists as one example of Uber's institutionalized nudging of the driver workplace as a method for leveraging "soft control" over driver behavior, which also includes heat maps, incentives, and frequent messaging. Messages urging drivers to stay online, or to go online, imply or state explicitly that it will surge because there is high demand are often posted to forums.

A sample push notification (see Figure 2) that drivers receive reads, "Are you sure you want to go offline? Demand is very high in your area. Make more money, don't stop now!" with the surge icon displayed above the message. Drivers' responses range from skepticism of exaggerated demand to an enduring willingness to continue, sometimes despite significant fatigue. Workers thus absorb the costs of being available, accessible, and responsive to their employer without being guaranteed paid work, echoing worker concerns regarding on-demand scheduling software (Kantor, 2014). Frequent nudges are a highly visible part of the "choice architecture" (Sunstein, 2014, p. 2) of the Uber system: Uber can steer drivers to work at particular places at particular times while maintaining that its system merely reflects demand to drivers, who have full freedom of choice to ignore Uber's authoritative nudges. If drivers are mere "consumers" of a lead-generation application, then nudging is just another form of informational advertising, but nudging that comes from an employer has a stronger managerial element of control. In addition, Uber's attempts, through algorithmic management and communications, to mobilize its supply of drivers to meet demand ahead of time complicate its claim that it operates as a neutral intermediary.

In a report by *Wired*, an Uber spokesperson "reiterated that surge pricing only kicks in when there are too many requests made by customers, in real time" (Clark, 2015, para. 6). Travis Kalanick, Uber's founder, has made oft-circulated comments that describe its system as a reflection of the marketplace (Hwang & Elish, 2015). "We are not setting the price. The market is setting the price," [Kalanick noted]. . . . We have algorithms to determine what the market is" (Brustein, 2013, para. 5). Yet, drivers are both alerted to the presence of high demand by real-time surge pricing that occurs in specific geographic zones (Lin et al., 2014) as well as by predictive, speculative messages about future instances of high demand.

The language Uber uses to describe surge pricing is often identical to the language it uses to describe predicted demand: Rhetorically, essentially predictive "guesses" about possible future demand are thus easily confused with real-time "measurements" of existing present demand. This rhetorical device is used by Uber to mobilize its workforce in a way that draws on drivers' experiences of surge pricing in real-time—with the implication that real-time measurements are made with a high degree of accuracy—although the company does not indicate whether a real-time recommendation to go to a surge zone is as accurate as predicted surge (or "high demand"), or if it is a lower-confidence recommendation. Drivers posted many alerts about high demand and surge pricing to forums from a wide variety of markets. In the Dallas-Fort Worth area, a sample text message read, "[UBER ALERT] Happy hour demand is extremely high right now! Log into to your app and take advantage of the extra earnings. #UberOn."

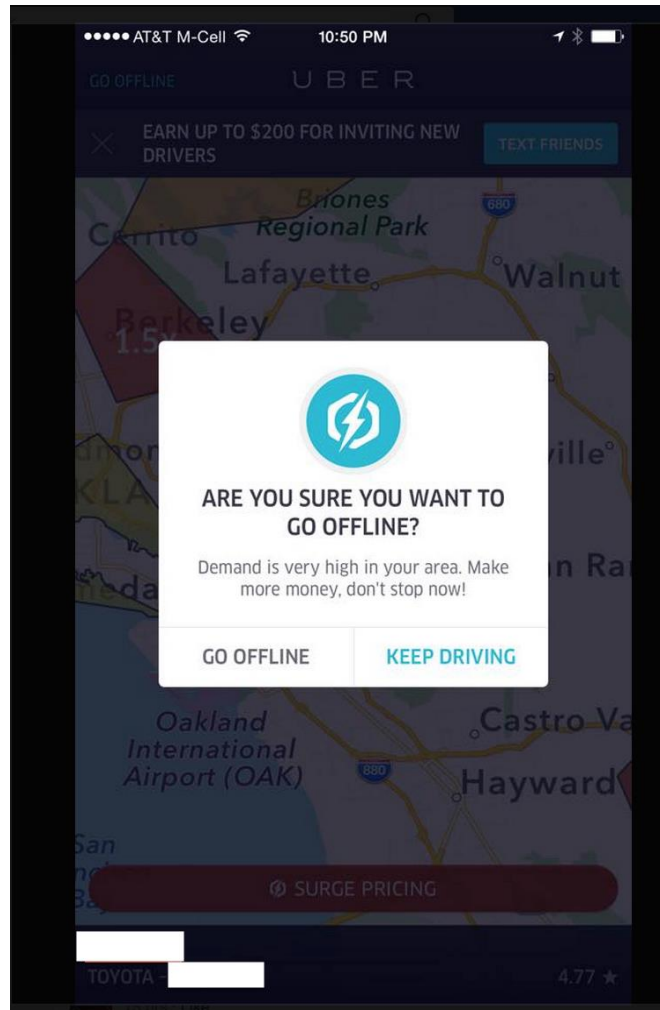


Figure 2. An example of the type of nudge delivered to a driver when logging off the Uber app.

In New Orleans (see Figure 3), a predictive message in an e-mail from Uber read, "GET READY FOR A BIG WEEKEND IN NEW ORLEANS! There are lots of events in New Orleans this weekend where *we expect Uber demand to be high!* [emphasis added]." The driver who posted it to a forum commented, "Going out \$ IT SHOULD SURGE." In advance of New Year's 2016, one driver posted a received message to a forum that read, "We also want to remind you that we predict New Year's Eve will be the busiest night of the year. **With such high demand, it will be a great night to go out and drive!**"

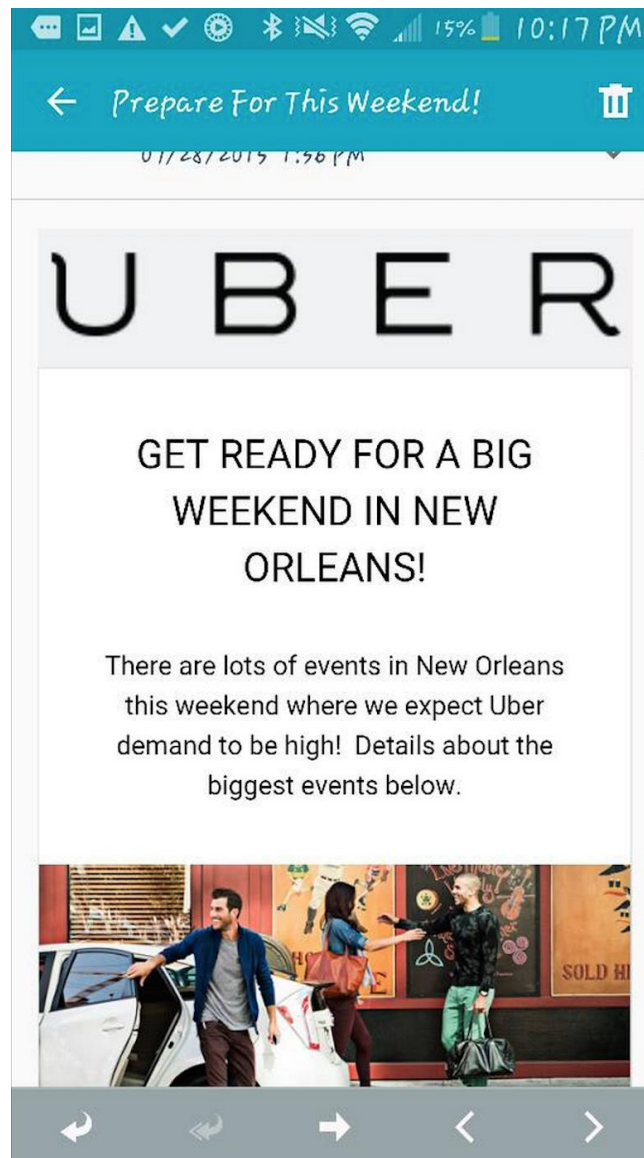


Figure 3. An example of Uber's predictive messages to drivers.

When demand does not reflect Uber's predictions, drivers express frustration and distrust in Uber and in surge pricing generally. Next to an image of his car on the surge map, one driver posted to a forum, "Waiting in this surge for 30 min and not one ping!!!" echoing similar sentiments from other drivers. In a rare articulation from Uber that predictive demand does not imply the same accuracy of real-time notices of high demand, we highlight the following exchange: A driver asked, "Why send messages to

me saying it is the biggest night of the year when everything is dead?" The CSR replied, "We try to predict how busy it is going to be based on the historical data from previous years. This is never going to be 100% accurate." After building a system to nudge drivers, Uber's disavowal of its own predictions is ironic, but also underscores how much control both parties understand Uber to have over the rhythm of a driver's everyday labor.

The gamic elements of behavioral engagement tools, such as surge pricing, the conflation of real-time and predictive demand, and blind passenger acceptance, illustrate the multifaceted ways that Uber influences the relationship between supply and demand. These gamic elements also support the notion that Uber is not responsible for inconsistencies in its system; rather, automated functions, such as algorithmic pricing or blind passenger acceptance, are part of the interaction design. Yet, this system is premised on denying drivers access to certain key pieces of information that would otherwise help them make informed choices about their decisions.

Information Management and Rated Labor

The lines of communication between Uber and its drivers are based on a profound information asymmetry. Whereas numerous channels filter data up from drivers and riders to the corporate system, the paths for drivers to request information from Uber are limited and distributed through decentralized support centers. Drivers can make inquiries and usually receive template responses, but they are not empowered to negotiate the terms of their work by communicating to a representative of higher management. Uber's active voice is relegated to Uber Help or Uber Support through CSRs, who communicate to drivers via e-mail. CSRs represent Uber in name, but some are outsourced abroad to the Philippines (Horwitz, 2015); in the United States, some CSRs work 'for Uber' but are technically employed by staffing agencies such as ZeroChaos (Anonymous, 2015; Bhuiyan, 2016; Horwitz, 2015). The responses they deliver often lack a nuanced understanding of the context or challenges of the work, and drivers have to be persistent to get the answers they seek to questions without a template response. Some believe that software is creating initial responses based on the keywords in their text, and they refer to CSRs as "Uber's robots." The responses drivers receive often resemble generic FAQs, and some drivers write "escalate to manager" in the body of their text in the hopes of flagging a human supervisor more quickly.

The role of the CSR more closely resembles customer service than management, an indication of Uber's larger trend of treating drivers not like employees or even contractors, but as the customers of a "free" service. Although drivers primarily communicate with Uber by e-mail, there is no managerial correspondent empowered with the role of "foreman" to mediate drivers' frustrations with the company. And because there are no formal managers to oversee the quality of individual drivers' job performance, Uber's system recruits passengers to perform a type of managerial assessment through driver ratings. The automation of many managerial functions in the Uber system does not obviate the drivers' need for an Uber representative who is empowered to mediate their concerns in ways that CSRs cannot. A contextually aware manager able to explain what is happening to the software-based infrastructure of such work would be one way to build trust in platform-worker relations, for Uber and other similar companies.

Driver Ratings and Surveillance

In the driver rating system offered to riders, passengers are empowered to act as middle managers over drivers, whose ratings directly impact their employment eligibility (Fuller & Smith, 1991; Stark & Levy, 2015). This redistribution of managerial oversight and power away from formalized middle management (Castells, 2000) and toward consumers is part of a broader trend in flexible labor: Companies or platforms can create expectations about their service that workers must fulfill through the mediating power of the rating system. This business model is rooted in Taylorist traditions of using worker monitoring to identify and create new efficiencies in workflows (Beniger, 1989; Zureik, 2003). For laborers whose work is primarily mediated electronically, worker monitoring is more passive and the prominence of control is not as perceptible (Saval, 2014, p. 297). The loss of worker efficacy as power is transferred from labor to capital (Braverman, 1974) is not new or unique to digitally mediated labor, but digital spaces facilitate and scaffold new systems of monitoring and opportunities for remote control over workers.

To achieve good ratings, drivers must modify their behavior to produce a homogenous Uber experience for riders (Bruder, 2015; Girard & Stark, 2002). Instead of imposing disciplinary measures on drivers, Uber controls how drivers behave through weekly performance metrics (see Figures 4 and 5) delivered after the fact of their work. This homogenizing effect highlights another tension between Uber's claim that drivers are entrepreneurs: They must deliver a standardized service.

The ratings that passengers give drivers constitute the most significant performance metric according to driver discussions. Individualized metrics also foster a "highly individualized sense of responsibility for one's own job stability" (Neff, 2012, p. 28), even though drivers have limited control over how passengers interact with the rating system or how Uber assesses it. By design, systematic accountability for the whole interactive process (Leidner, 1999, p. 83) is downloaded onto individual drivers because passengers do not have the option to rate the Uber system in-app separately from their drivers.

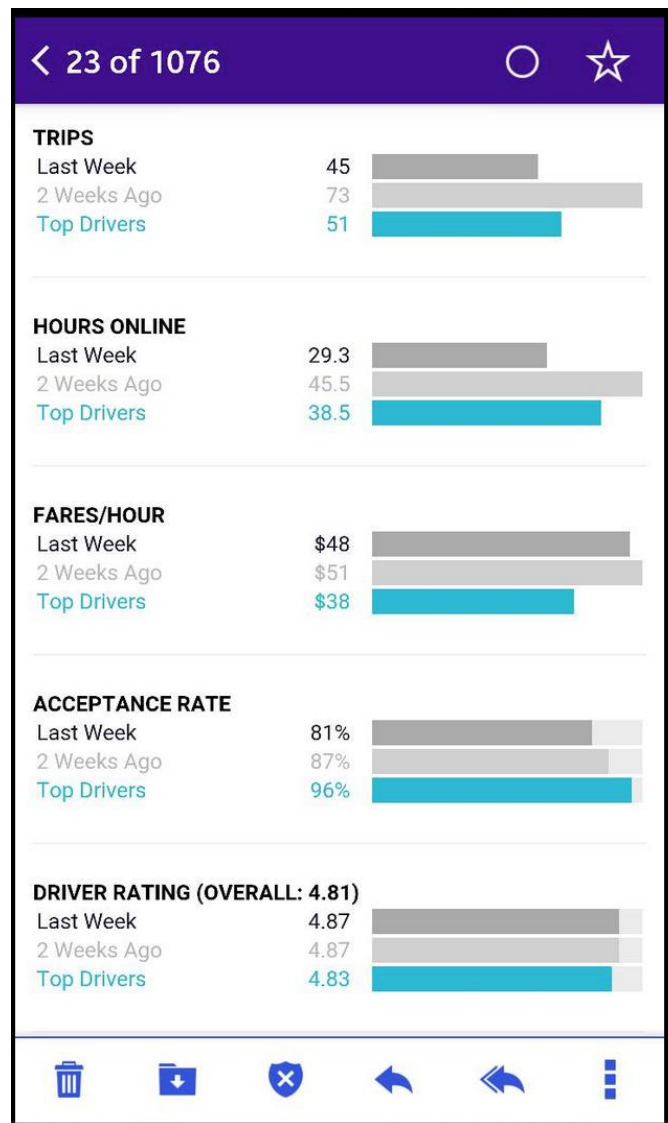


Figure 4. A weekly driver performance report.

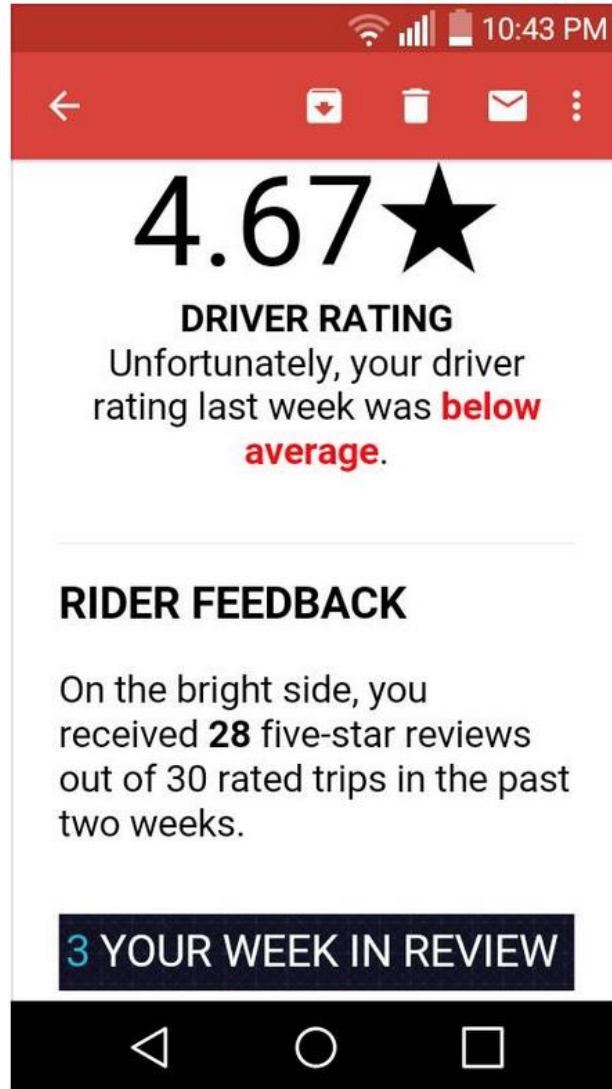


Figure 5. An e-mail assessing a driver's rating in the Uber system.

Passengers have the ability to watch drivers as they approach, surveil their route, and even have the ability to track them after they have departed. The passenger app extends their role as “the watcher” (a stand-in for a traditional manager; Fuller & Smith, 1991; Stark & Levy, 2015). Passengers, who are also rated by drivers (Price, 2015), have begun to learn that they are empowered in Uber’s system in part because of this literal oversight of drivers. Drivers need to maintain a rating of around 4.6/5 to remain active on the app, although this requirement can vary by city. Passengers rate drivers on a scale of one to

five stars, and drivers' ratings are averaged to reflect their last 500 rated trips, although some drivers receive deactivation notices if their previous 25 or 50 trips receive low ratings.

Even though drivers know ratings are averaged and that one rating should not make a difference, drivers express much care and dissatisfaction anytime their rating goes down. A typical comment is, "What's the formula to get these results??" Drivers throughout the course of our study reflected that even when their behavior was unchanged, they would invariably experience a drop in their ratings and were unable to protest successfully to have low ratings (that they perceived they received unfairly) removed. A common sentiment is that passenger education on the rating system is low. Some drivers try to educate passengers, such as relaying that "4" is a failing grade through in-car signs or in conversation.

The result of these metrics' effect on employment behavior can also be seen in the ways drivers treat passengers. Once a passenger is in the car, drivers often provide them bottled water or offer chargers for their smartphones. Drivers try to gauge whether customers want to speak or if they would prefer to stare at their smartphones, using a combination of friendly conversational attempts with eye contact and general demeanor to guess their passenger's preferences. These behaviors on the part of Uber drivers are classic examples of what sociologist Arlie Russell Hochschild (2003) has identified as "emotional labor," whereby service workers like taxi drivers (Facey, 2010, p. 1265) or flight attendants suppress or contain their emergent emotions to present a placating or welcoming demeanor to customers, regardless of that customer's reciprocal emotional state. This behavior is partial compensation by drivers for Uber's overt lack of communication with passengers about the function of driver ratings. Drivers in the Uber system perform emotional labor in exchange for ratings instead of tips. Uber strongly discourages the cultural practice of tipping that historically underwrites taxi labor in the United States (Hansen & Jespersen, 2013; Lynn, 2015). Some drivers, in response to rate cuts, discuss how they no longer go to the expense of providing bottles of water and snacks, but they express concerns that their ratings will be lower compared with their peers.

Although rating systems can be billed as a way to build and scale trust and accountability in platforms, they have other impacts on employment opportunities. Uber's driver rating feature dovetails with another managerial technique meant to structure and control the etiquette and uniformity of drivers' behavior. Uber will send routine messages, as demonstrated in Figure 6, to drivers that recommend that passengers give low or high ratings to drivers who behave in particular ways. This feedback is carefully designed to be indirect, presumably to avoid the appearance of a company policy—instead framed as the results of empirical data. The advice Uber provides about how passengers rate may be valid, but the way the advice is delivered has the effect of creating confusion between what Uber expects of its drivers (as opposed to what it merely suggests). Uber denies that the rating system has the substantive effect of mediating company policies. In its ongoing employment misclassification lawsuit, Uber describes how it provides "suggestions that, if implemented, may (or may not) help them [drivers] raise their star rating. . . . Yet, some drivers, like Plaintiffs, believe they are required to follow these suggestions" (Uber B.V., 2015, p. 7). The power of a nudge directed by an employer at a worker, however, has a stronger element of control than a suggestion directed at a customer.

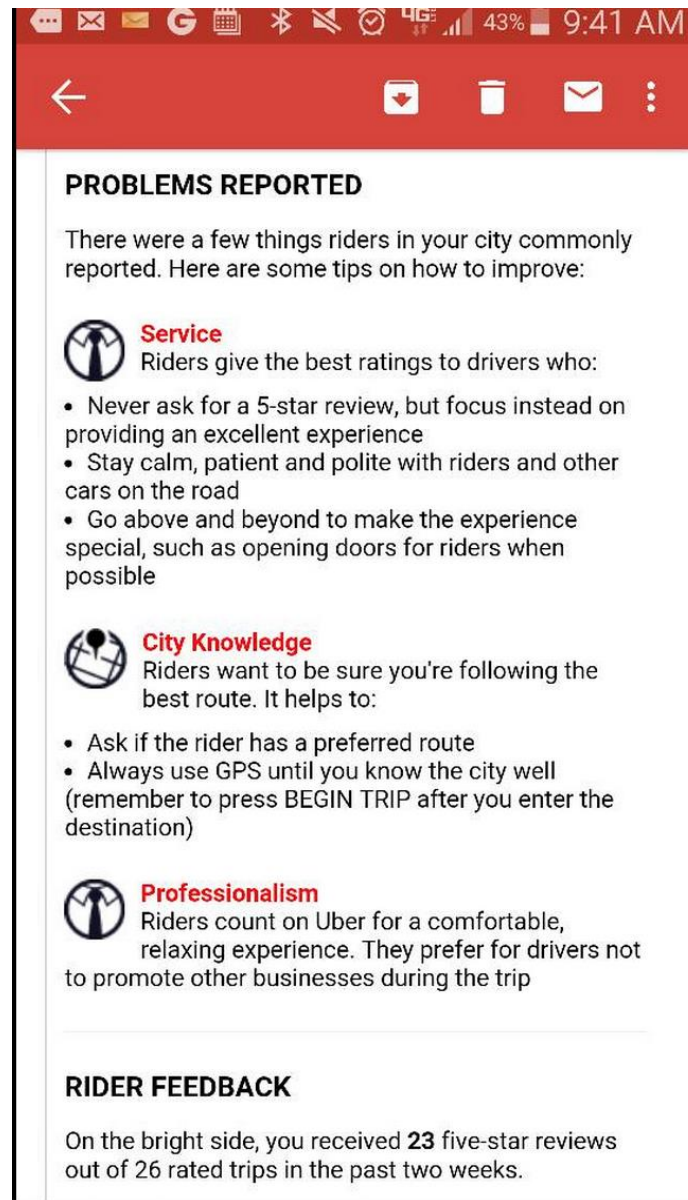


Figure 6. E-mail from Uber explaining desirable driver behaviors.

Conclusion

In this article, we have outlined how Uber's claims regarding its labor model, which center on freedom, flexibility, and entrepreneurship, are complicated and contradicted by the experience of its drivers. Throughout our analysis, we have demonstrated how power and information asymmetries emerge via Uber's software-based platform through algorithmic labor logistics shaping driver behavior, electronic surveillance, and policies for performance targets. Through the Uber app's design and deployment, the company produces the equivalent effects of what most reasonable observers would define as a managed labor force. At the same time, the decentralized structure of Uber's systems and their rhetorical invocation of "platforms" and "algorithms" may render the impression that Uber has a limited managerial role over driver behaviors. Policymakers should take note of the power of automated systems to incentivize, homogenize, and generally control how workers behave within the system despite claims to systematic freedom or flexibility.

The relevance of these power dynamics to drivers or those who aim to organize drivers, such as union leaders, may be variable. The role of platform disintermediation in shaping power relations and communications between employers and workers may be more relevant for drivers who rely on Uber as a source of primary income than for hobbyist or part-time drivers. Prospective interventions into the labor rights and protections of workers in the on-demand economy should note that a minority of drivers may be doing the majority of the work (Hall & Krueger, 2015, p. 20; Zatz, 2016) and thus stand to be most impacted by labor rights interventions. Any intervention into these labor considerations should account for the structure and emergence of employment hierarchies through Uber's platform, especially given that many businesses are seeking to use Uber's business model as a template going forward.

As a case study in the emerging digital economy of on-demand labor, our analysis of the Uber driver experience signals the need for further study of how emergent technical systems are experienced by users of all stripes, constructed and deployed by companies, and represented in public and policy discourse. In particular, as labor laws and regulatory classifications develop in response to the provocations posed by on-demand companies to existing regulations, it is important to recognize that each of these companies will foster different experiences for workers, and these distinctions should be examined before drawing broad conclusions about the applicability of existing laws to them. More work is needed to translate these insights into deployable changes – including new regulations or modifications to existing ones—and must involve the joint participation of regulators (such as the Federal Trade Commission), policy makers, decision makers at Uber, and passengers and drivers themselves.

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