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EXPLAINER:

Algorithmic Management in the Workplace

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Contents

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Algorithmic Management in the Workplace

Executive Summary

Algorithmic management is a diverse set of technological tools and techniques to remotely manage workforces, relying on data collection and surveillance of workers to enable automated or semi-automated decision-making. Many of the characteristics of algorithmic management—such as consumer-sourced rating systems and automated "nudges"—were developed by companies of the "sharing" or "gig" economy. These practices have spurred debates over employee classification, as "gig" economy companies classify workers as independent contractors even as they use technology to exert control over their workforces.

And algorithmic management is becoming more common in other work contexts beyond "gig" platforms. Within delivery and logistics, companies from UPS to Amazon to grocery chains are using automated systems to optimize delivery workers' daily routes. Domestic workers and hotel housekeepers are increasingly remotely tracked and managed through software. In retail and service industries, automated scheduling is replacing managers' discretion over employee schedules, while the work of evaluating employees is being transferred to consumer-sourced rating systems.

Adoption of these technologies is generating new challenges for workers' rights in four broad areas:

- **Surveillance and control**: Technology-enabled surveillance can generate new speed and efficiency pressures for workers and may lock workers out from important aspects of decision making, such as being able to use personal discretion.

- **Transparency**: Algorithmic management can create power imbalances that may be difficult to challenge without access to how these systems work as well as the resources and expertise to adequately assess them.

- **Bias and discrimination**: If used to make decisions about workers, tools like consumer-sourced rating systems can introduce biased and discriminatory practices towards workers.

- **Accountability**: Algorithmic management can be used to distance companies from the effects of their business decisions, obscuring specific decisions made about how a system should function.

Introduction: What is Algorithmic Management?

Algorithmic management is a diverse set of technological tools and techniques that structure the conditions of work and remotely manage workforces. Algorithmic management systems' emergence in the workplace is marked by a departure from earlier management structures that more strongly rely on human supervisors to direct workers. Algorithmic management enables the scaling of operations by, for instance, coordinating the activities of large, disaggregated workforces or using data to optimize for desired outcomes like lower labor costs.

Algorithmic management can describe systems of varying degrees of complexity, but they typically include:

- Prolific **data collection** and **surveillance** of workers through technology;

- **Real-time responsiveness** to data that informs management decisions;

- Automated or semi-automated **decision-making**;

- Transfer of performance evaluations to **rating systems** or other metrics; and

- The use of **"nudges" and penalties** to indirectly incentivize worker behaviors.

Many of the characteristics of algorithmic management were developed by companies of the "sharing" or "gig" economy, such as ridehail apps like Uber or multi-service platforms like TaskRabbit, both of which manage large pools of independent contract workers through smartphone apps. Indeed, the phrase algorithmic management was initially coined by academics Lee, Kusbit, Metsky, and Dabbish to describe the ways that Uber and Lyft's software algorithms allow workers to be "assigned, optimized, and evaluated through algorithms and tracked data."[1] The algorithms in ridehailing platforms, for instance, process GPS information from millions of passengers and drivers in order to match those in closest proximity to one another.

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[1] Lee, Min Kyung, Daniel Kusbit, Evan Metsky, and Laura Dabbish. "Working with Machines: The Impact of Algorithmic and Data-Driven Management on Human Workers." In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems*, 1603–1612. CHI '15. New York: ACM, 2015. https://doi.org/10.1145/2702123.2702548.

However, these technologies are not limited to the "gig" economy. They are common across different types of work and have been developed alongside other business uses of computation. For instance, recommendation engines are a driving force behind services such as Netflix, Spotify, and Amazon.[2] Within the labor context, algorithms have long helped structure supply chains, such as in the just-in-time production models of Walmart or Zara.[3] In hiring, algorithms are increasingly used to make hiring decisions and screen pools of job applicants' resumes.[4] As this explainer will explore, different aspects of algorithmic management are also becoming part of the ordinary infrastructure of workplaces from transportation and logistics to retail and service industries and even domestic work. Whether combined with existing practices or used to replace them, features of algorithmic management expand the scope, scale, and purpose of surveillance and data collection.

Algorithmic systems that collect data on workers have become more affordable and easier to deploy for employers. Importantly, these systems are often implemented as labor- and cost-cutting measures, whether by allowing workers to be classified as less-costly independent contractors: by reducing work hours of employees through automated scheduling: or by transferring worker evaluations onto rating systems. But while they may bring certain benefits to employers, these innovations also generate new challenges for workers because they have the capacity to dramatically alter the power relationships between workers and supervisors, customers and providers, and companies and regulatory agencies. Algorithmic management has altered business models and confounded established economic, legal, and governmental structures. These shifts require new approaches and ways of thinking about the power dynamics that are reshaping workplaces.

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[2] Grossman, Lev. "How Computers Know What We Want — Before We Do," *Time*, May 27, 2010, https://content.time.com/time/magazine/article/0,9171,1992403,00.html.

[3] Rossiter, Ned. *Software, Infrastructure, Labor: A Media Theory of Logistical Nightmares* (Routledge, 2016).

[4] Mann, Gideon and Cathy O'Neil, "Hiring Algorithms Are Not Neutral," *Harvard Business Review*, December 9, 2016, https://hbr.org/2016/12/hiring-algorithms-are-not-neutral.

Evolving Workplace Management

Ridehailing and Delivery Services

Ridehailing companies are some of the most successful and influential developers of algorithmic management. These companies function as automated dispatchers by coordinating pick-up locations and communicating times of arrival to passengers. As labor platforms, they deploy sophisticated apps to set rates and take commissions every time a service is provided by drivers. Uber, Lyft, and other ridehail companies have grown exponentially in the last decade and have become emblematic of the emergent "gig" economy.[5] Importantly, algorithms are one tool that enable companies like Uber to classify their ridehail driver workforces as independent contractors, while at the same time exerting significant control over their workforces. They may do so both through traditional means such as corporate policies as well as through forms of algorithmic management.

Firstly, ridehail platforms exert "continuous, soft surveillance" through data collection of drivers' behaviors, which may be fed into automated performance reports.[6] While drivers have the freedom to log in or log out of work at will, once they're online, their activities on the platform are heavily monitored. For instance, drivers' movements are tracked using GPS location, and other behaviors such as acceleration, working hours, and braking habits are monitored through their phones. In February 2018, for instance, Uber implemented a policy of tracking drivers' working hours and suspending their access to the platform after a 12-hour period of activity (the exact cut-off can vary by city); Lyft has since followed suit.[7]

Data collection is not only used to evaluate drivers but also to influence their behavior. Ridehail platforms use a wide array of practices to incentivize workers to drive certain hours, to travel to "surge" areas where there is higher passenger demand, or to continue

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[5] McAlone, Nathan. "Here's How Uber Got Its Start and Grew to Become the Most Valuable Startup in the World," *Business Insider*, September 13, 2015, https://www.businessinsider.com/history-of-uber-and-its-rise-to-become-the-most-valuable-startup-in-the-world-2015-9.

[6] Rosenblat, Alex, and Luke Stark. "Algorithmic Labor and Information Asymmetries: A Case Study of Uber's Drivers." *International Journal of Communication* 10, no. 0 (July 27, 2016): 27.

[7] Griswold, Alison. "Uber Is Getting Serious about Keeping Drowsy Drivers off the Road." *Quartz*, February 28, 2018, https://qz.com/1204615/uber-is-getting-serious-about-keeping-drowsy-drivers-off-the-road/. Lyft. "Taking Breaks and Time Limits in Driver Mode." *Lyft Help*. Accessed August 23, 2018, http://help.lyft.com/hc/en-us/articles/115012926787-Taking-breaks-and-time-limits-in-driver-mode.

working rather than log off. In this way, the platform is responsive in real time to changes in worker behavior and passenger demand. The most obvious example of this is Uber's "surge pricing" system: At certain times, in certain locations, both riders and drivers receive notification that rides will be provided at higher rates, thus nudging more drivers to be available in a high-demand location. Such a system reveals how algorithms can cause disaggregated work forces, supposedly independent and flexible, to behave in ways that are good for the company as a whole. With Uber in sole control of the surge pricing algorithm, this form of algorithmic management puts individual workers in a position of relative powerlessness. Uber has also experimented with gamification and a variety of "psychological levers" through promotional rates and notifications sent to drivers' phones. For example, a driver trying to log off the platform may receive a notification stating, "You're $10 away from making $330 in net earnings. Are you sure you want to go offline?"[8]

Finally, ridehail platform companies intentionally create information asymmetries between drivers and the platform by withholding information. For example, Uber, Lyft, and others have passenger acceptance policies that do not inform drivers how much they will earn before they accept a trip. If they opt not to accept dispatches or to cancel them, they can be penalized by being put on a "time out," or even deactivated (suspended or fired) from the platform. As a result, the platforms can induce drivers to take on trips that are not economically advantageous without directly mandating them to do so.

While the tools and techniques of algorithmic management are most commonly associated with ridehail apps, other companies are increasingly using similar technologies to manage workers within delivery and logistics. In 2015, Amazon launched its Amazon Flex program, which now operates in more than 50 US cities and relies on a fleet of independent contractors who use their private vehicles to deliver packages through the company's delivery app. Flex drivers work by selecting "blocks" of time during which they pick up and deliver packages using routes indicated on the app. Like ridehail drivers, Flex workers do not receive direct training, but instead receive incentives and penalties to guide behaviors.[9]

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[8] Scheiber, Noam. "How Uber Uses Psychological Tricks to Push Its Drivers' Buttons." *The New York Times*, April 2, 2017, https://www.nytimes.com/interactive/2017/04/02/technology/uber-drivers-psychological-tricks.html.
[9] Menegus, Bryan. "Amazon's Last Mile." *Gizmodo*, November 16, 2017. https://gizmodo.com/amazons-last-mile-1820451224.

As grocery retailers face competitive pressures from e-commerce, they are following in the footsteps of Amazon by investing in technological infrastructure for online ordering and delivery, either by partnering with third-party "gig" economy companies like Instacart or by acquiring them, as Target and Walmart have done with delivery startups Shipt and Parcel, respectively.[10]

In 2016, UPS drivers began receiving driving directives from ORION (On-Road Integrated Optimization and Navigation), an algorithm developed internally by UPS to optimize delivery routes by finding the most time- and cost-effective trip routes for a delivery.[11] The company claims the algorithm has reduced unnecessary delivery truck travel by 100 million miles annually.[12] Routes are updated and changed in real-time as customers' delivery preferences change, even if this may mean travelling back to the same area multiple times in a given day. According to public statements from UPS, drivers are not expected to strictly follow ORION's instructions, but may use their own discretion when necessary.[13] In 2018, UPS has also begun to expand its use of predictive analytics, incorporating vast amounts of data to forecast optimal practices for routing packages. According to a UPS representative, UPS plans to invest in "building algorithms to help determine the best job setup for the day."[14] The *Wall Street Journal* reports that these tools would potentially replace many aspects of human decision making, resulting in employees receiving automated instructions on tasks such as routing packages or the optimal way to place packages inside a UPS truck.[15]

[10] Haddon, Heather. "Kroger to Launch Grocery Delivery Service," *Wall Street Journal*, August 1, 2018, https://www.wsj.com/articles/kroger-to-launch-grocery-delivery-service-1533117720.; Boyle, Matthew. "Target to Buy Shipt for $550 Million in Challenge to Amazon," *Bloomberg*, December 13, 2017, https://www.bloomberg.com/news/articles/2017-12-13/target-to-buy-shipt-for-550-million-in-bet-on-same-day-delivery.; Walmart. "Walmart Announces the Acquisition of Parcel, a Technology-Based, Same-Day and Last-Mile Delivery Company," Accessed August 19, 2018, https://corporate.walmart.com/article/walmart-announces-the-acquisition-of-parcel-a-technology-based-same-day-and-last-mile-delivery-company.

[11] UPS. "ORION: The Algorithm Proving That Left Isn't Right." Accessed August 23, 2018, https://compass.ups.com/ups-fleet-telematics-system/.

[12] Shields, Nicholas. "UPS Is Turning to Predictive Analytics." *Business Insider*, July 20, 2018, https://www.businessinsider.com/ups-using-predictive-analytics-algorithm-2018-7.

[13] Rosenbush, Steven, and Laura Stevens. "At UPS, the Algorithm Is the Driver." *Wall Street Journal*, February 17, 2015, https://www.wsj.com/articles/at-ups-the-algorithm-is-the-driver-1424136536.

[14] Woyke, Elizabeth. "How UPS Delivers Faster Using $8 Headphones and Code That Decides When Dirty Trucks Get Cleaned," *MIT Technology Review*, February 16, 2018, https://www.technologyreview.com/s/610183/how-ups-delivers-faster-using-8-headphones-and-code-that-decides-when-dirty-trucks-get/.

[15] Rosenbush, Steve. "UPS Expands Role of Predictive Analytics," *Wall Street Journal (Blog),* July 18, 2018, https://blogs.wsj.com/cio/2018/07/18/the-morning-download-ups-expands-role-of-predictive-analytics/.

Domestic Work

Technology is increasingly mediating informal services such as domestic work through gig economy platforms like Handy and TaskRabbit as well as Amazon Home Services.[16] Like ridehail companies, these platforms mediate services "on-demand" through an app that connects consumers with independent contractors. Traditionally, a domestic housecleaner may find clients through word-of-mouth connections, by publicly listing her services, or being employed by a cleaning company.[17] These platforms, by contrast, directly match workers with clients, thus taking on much of the coordination work of booking appointments, calculating rates, and standardizing services.

Because of the nature of domestic work, which takes place inside private homes and involves more subjective measures of service quality, the forms of surveillance used to track such workers are limited. While platforms like Handy, a housecleaning app, use location tracking to monitor that a worker has arrived at a client's home, the app largely relies on self-reporting from clients to confirm if and how a service has been rendered. This creates challenges for workers, as clients may easily lie on app submission forms about important details such as the number of rooms that need cleaning. The discrepancies between information collected by the system and the actual circumstances encountered by workers on the ground can create complications for workers.[18]

Importantly, consumer-sourced rating systems can place additional pressures on domestic workers to comply with clients' demands, in ways that can incentivize them to forego workplace safety interests, such as declining to report sexual harassment out of fear of receiving a poor rating from a client.[19] Many on-demand platforms terminate the accounts of workers whose ratings fall below a certain threshold, while on housecleaning service platforms like Handy, workers' pay rates are tied in part to a workers' average rating.[20]

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[16] Soper, Spencer and Josh Eidelson. "Amazon Takes Fresh Stab at $16 Billion Housekeeping Industry," *Bloomberg*, March 28, 2018, https://www.bloomberg.com/news/articles/2018-03-28/amazon-takes-fresh-stab-at-16-billion-housekeeping-industry.

[17] Ehrenreich, Barbara. "Maid to Order." In *Global Woman: Nannies, Maids, and Sex Workers in the New Economy*. New York: Holt Paperbacks, 2004: 94.

[18] Ticona, Julia, Alexandra Mateescu and Alex Rosenblat. "Beyond Disruption: How Tech Shapes Labor Across Domestic Work and Ridehailing." *Data & Society*, June 2018; pp. 36-7. https://datasociety.net/wp-content/uploads/2018/06/Data_Society_Beyond_Disruption_FINAL.pdf.

[19] Ticona, Julia and Alexandra Mateescu, "How Domestic Workers Wager Safety In The Platform Economy," *Fast Company*, March 29, 2018, https://www.fastcompany.com/40541050/how-domestic-workers-wager-safety-in-the-platform-economy.

[20] Handy. "Payment Tiers." *Handy Professional Help Center*. http://prohelp.handy.com/hc/en-us/articles/217290407-Payment-tiers.

Similar technologies are being implemented in the hotel industry to manage housekeepers through software tools that claim to optimize the order in which hotel rooms are cleaned. Housekeeping staff may carry tablets or other devices that keep a continually updated queue of room assignments, while also tracking housekeepers' work speed. [21] For example, a company called Hotelogix allows managers to "assign rooms to your housekeeping staff based on blocks/floors or sort them based on their status to manage division of work."[22] However, these systems can create practical challenges for housekeepers. Software-generated routes for room assignment order that may be optimal from the standpoint of speed and efficiency may be physically burdensome on housekeeping staff who must transport heavy cleaning equipment across longer distances. Moreover, housekeepers may receive blame for automated decisions, as in one investigation that found that hotel guests often complained to management that housekeepers were skipping over their rooms. As a result, workers are absorbing the consequences of automated decisions that are beyond their control.[23]

Retail and Service Industries

In retail and service industries, workforce management has been affected by the emergence of automated scheduling software, produced by companies like Kronos, Onshift, and Dayforce. These systems are marketed to retailers as a means to reduce labor costs through "accurate labor forecasting" that aims to predict labor demand and schedule workers accordingly.[24] They are also proposed as a remedy to the biases of human decision making done by store managers.[25] Importantly, these systems differ from manual scheduling practices because they base scheduling decisions on a wide range of historical data, such as weather and seasonal patterns, customer foot traffic,

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[21] Reyes, Juliana Feliciano. "Hotel Housekeeping on Demand: Marriott Cleaners Say This App Makes Their Job Harder," *The Philadelphia Inquirer*, July 2, 2018, http://www2.philly.com/philly/news/hotel-housekeepers-schedules-app-marriott-union-hotsos-20180702.html.
[22] Hotelogix. "Web Based Housekeeping Management System for Hotels" *Hotelogix*, accessed August 23, 2018, https://www.hotelogix.com/housekeeping.php.
[23] Reyes, Juliana Feliciano. "Hotel Housekeeping on Demand: Marriott Cleaners Say This App Makes Their Job Harder," *The Philadelphia Inquirer*, July 2, 2018, http://www2.philly.com/philly/news/hotel-housekeepers-schedules-app-marriott-union-hotsos-20180702.html.
[24] Kronos. "Employee Scheduling," *Kronos Inc*, accessed August 23, 2018, https://www.kronos.com/products/employee-scheduling.
[25] Williams, Joan C, Saravanan Kesavan, and Lisa McCorkell, "Research: When Retail Workers Have Stable Schedules, Sales and Productivity Go Up," *Harvard Business Review*, March 29, 2018, https://hbr.org/2018/03/research-when-retail-workers-have-stable-schedules-sales-and-productivity-go-up.

and past sales data.[26] Levy and Barocas have coined the phrase "refractive surveillance" to describe these practices, in which data collected about one party's behaviors, such as shoppers' foot traffic, is then used to make management decisions about a workforce.[27] While discussions around workplace privacy rights have largely focused on the direct surveillance of workers, these technologies are raising new questions about how surveillance of consumers can indirectly impact workers in harmful ways.

Practices like "just-in-time" and "on-call" scheduling are not new phenomena but are a continuation of trends since the 1970s towards the casualization of the retail workforce.[28] Today, unstable scheduling has become a major concern for labor advocates in the retail sector. A 2018 survey of the Los Angeles retail sector found that workers experience significant fluctuations in work hours from one week to the next, with 44 percent experiencing their schedules fluctuating more than 10 hours between weeks.[29] The introduction of automated scheduling contributes to this trend by making it possible for employers to adjust schedules on short notice based on real-time data and to allocate shifts in smaller increments in response to granular fluctuations in store conditions, such as changes in foot traffic.

Unstable work schedules have been shown to have a variety of negative impacts on workers, including increased work-family conflict, income uncertainty, and higher work stress.[30] Research has shown that "non-standard" work schedules can have negative consequences for parents, who have difficulties adequately caring for their children.[31] A 2014 *New York Times* investigation into Starbucks' use of Kronos's scheduling software detailed the difficulties faced by its barista workforce.[32] Following public criticism, Starbucks vowed to provide its employees with more consistent schedules and provide

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[26] Greenhouse, Steven. "A Part-Time Life, as Hours Shrink and Shift for American Workers," *The New York Times*, October 27, 2012. https://www.nytimes.com/2012/10/28/business/a-part-time-life-as-hours-shrink-and-shift-for-american-workers.html.
[27] Levy, Karen and Solon Barocas, "Refractive Surveillance: Monitoring Customers to Manage Workers," *International Journal of Communication* 12, no. 0 (March 1, 2018): 23.
[28] Carre, Francoise, and Chris Tilly. *Where Bad Jobs Are Better: Retail Jobs Across Countries and Companies*, 1 edition (New York: Russell Sage Foundation, 2017).
[29] Los Angeles Alliance for a New Economy, "Hour Crisis: Unstable Schedules in the Los Angeles Retail Sector." *LAANE*, 2018: 33. https://laane.org/wp-content/uploads/2018/03/Hour-Crisis-Unstable-Schedules-in-the-Los-Angeles-Retail-Sector.pdf.
[30] Golden, Lonnie. "Irregular Work Scheduling and Its Consequences," *Economic Policy Institute*, April 9, 2015, https://www.epi.org/publication/irregular-work-scheduling-and-its-consequences/.
[31] Morsy, Leila and Richard Rothstein. "Issue Brief: Parents' Non-standard Work Schedules Make Adequate Childrearing Difficult." *Economy Policy Institute*, August 6, 2015: 2. https://www.epi.org/files/pdf/88777.pdf.
[32] Kantor, Jodi. "Working Anything but 9 to 5," *The New York Times*, August 13, 2014, https://www.nytimes.com/interactive/2014/08/13/us/starbucks-workers-scheduling-hours.html.

more advance notice to employees.[33] Additionally, the use of scheduling software has complicated questions of corporate liability. In 2014, McDonald's came under the scrutiny of the National Labor Relations Board over whether the company had enough control over its franchisees to be considered a "joint employer." Requiring the use of scheduling software was cited as one way that the company exerts indirect control over working conditions within franchises, raising complaints from workers that these systems were opaque and arbitrary.[34]

In response to the instabilities produced by automating the scheduling process, some employers have also experimented with combining automated scheduling with human discretion by allowing workers and managers to provide input and modify preferences in order to better accommodate employees' needs.[35]

In addition to scheduling software, other technologies reliant on data collection are being used to evaluate and manage frontline workers in the service industry. Consumer-sourced ratings systems have become common in many chain restaurants, where tablets are installed at tables to allow customers to both order food and to rate service using a star-based rating system.[36] Companies like Ziosk, for example, produce tablets for restaurant chains including Olive Garden, Applebee's, Uno, and others throughout the US.[37] In 2014, for instance, the Chili's restaurant chain installed more than 45,000 tablets across 823 of its stores.[38] At the end of a meal, customers are prompted to fill out a satisfaction survey, which then informs workers' performance evaluations. However, these systems have been criticized for serving as vehicles for consumers' biases. Firstly, there is ambiguity over what is being evaluated; a server, for instance, may be penalized for factors beyond her control, such as quality of food. Secondly, ratings systems may

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[33] Scheiber, Noam. "Starbucks Falls Short After Pledging Better Labor Practices," *The New York Times*, December 21, 2017, https://www.nytimes.com/2015/09/24/business/starbucks-falls-short-after-pledging-better-labor-practices.html.

[34] Scheiber, Noam and Stephanie Strom, "Labor Board Ruling Eases Way for Fast-Food Unions' Efforts," *The New York Times*, December 21, 2017, https://www.nytimes.com/2015/08/28/business/labor-board-says-franchise-workers-can-bargain-with-parent-company.html.; Elejalde-Ruiz, Alexia. "Why Should McDonald's Be a Joint Employer? NLRB Starts to Provide Answers," *Chicago Tribune*, March 10, 2016, http://www.chicagotribune.com/business/ct-mcdonalds-labor-case-0311-biz-20160310-story.html.

[35] Bernstein, Ethan, Saravanan Kesavan, and Bradley Staats, "How to Manage Scheduling Software Fairly," *Harvard Business Review*, September 2, 2014, https://hbr.org/2014/09/how-to-manage-scheduling-software-fairly.

[36] O'Donovan, Caroline. "An Invisible Rating System At Your Favorite Chain Restaurant Is Costing Your Server," *BuzzFeed News*, accessed August 23, 2018, https://www.buzzfeednews.com/article/carolineodonovan/ziosk-presto-tabletop-tablet-restaurant-rating-servers.

[37] Ziosk. "Locations," *Ziosk*., accessed August 23, 2018, https://www.ziosk.com/locations/.

[38] Garber, Megan. "The Menu of the Future Will Make You Order More Nachos," *The Atlantic*, June 16, 2014, https://www.theatlantic.com/technology/archive/2014/06/chilis-is-installing-tablet-ordering-at-all-its-restaurants/372836/.

potentially reproduce the biases of consumers, who may use poor ratings as a means to discriminate against workers on the basis of sex, race, or other categories. These judgments may have other consequences. For example, one investigation found that restaurant managers were using poor customer ratings as a metric for taking away shifts or to fire individual workers.[39]

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[39] O'Donovan, Caroline. "An Invisible Rating System At Your Favorite Chain Restaurant Is Costing Your Server," *BuzzFeed News*, accessed August 23, 2018, https://www.buzzfeednews.com/article/carolineodonovan/ziosk-presto-tabletop-tablet-restaurant-rating-servers.

Key Issues

As the examples above demonstrate, the benefits of complex technical systems that promise to find efficiencies and reduce risks can come with drawbacks, as algorithmic management both generates new challenges and exacerbates older problems for workers. Broadly, technology can serve to shift existing power dynamics and destabilize employment relationships in terms of (1) surveillance and control, (2) transparency, (3) bias and discrimination, and (4) accountability.

Surveillance and control. Algorithmic systems can use a variety of methods to structure and control worker behavior, even when the platforms hosting those systems are billed as "flexible" or voluntary. Granular data about workers' behaviors can also be interpreted as objective measures of performance when in fact they may only be proxies or imperfect measures. For example, time-related assessments often do not take into account conditions on the ground and other factors beyond workers' control. As a result, technology-enabled surveillance can generate new speed and efficiency pressures for workers. Moreover, while technology can be used to optimize work in beneficial ways, it can also lock workers out of important aspects of decision making, such as being able to use personal discretion.

Transparency. Algorithmic management can create power imbalances that may be difficult to challenge without access to how these systems work, as well as the resources and expertise to adequately assess them.[40] As a result, workers are often left to collect information in piecemeal ways. For example, ridehail drivers are routinely unable to see how their pay rates are calculated. As a result, they crowdsource evidence of pay discrepancies and new pricing policies by comparing screenshots on online forums.[41] Similarly, workers assigned shifts through automated scheduling software may not have insight into what data is being used to make decisions about their schedules, or why they might be assigned fewer or more erratic hours than their colleagues.

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[40] Caplan, Robyn, Joan Donovan, Lauren Hanson, and Jeanna Matthews. "Algorithmic Accountability: A Primer," *Data & Society*, April 18, 2018. https://datasociety.net/wp-content/uploads/2018/04/Data_Society_Algorithmic_Accountability_Primer_FINAL-4.pdf.
[41] Griswold, Alison. "Uber Drivers Are Using This Trick to Make Sure the Company Doesn't Underpay Them," *Quartz*, April 13, 2017, https://qz.com/956139/uber-drivers-are-comparing-fares-with-riders-to-check-their-pay-from-the-company/.

Bias and discrimination. The increasing use of rating and review systems within work contexts raises the potential of disparate impact in employment outcomes. Rosenblat, Levy, Barocas, and Hwang use Uber as a case study for describing how customer ratings can function as a vehicle for bias, concluding that these systems can serve as a "backdoor to employment discrimination."[42] Specifically, Rosenblat and Stark's fieldwork on Uber drivers found that drivers experienced ratings as a source of anxiety as a result of having little insight into how particular ratings corresponded to specific behaviors. Because bias is introduced by consumers rather than tech companies themselves, ratings systems potentially create an environment in which "companies may perpetuate bias without being liable for it."[43]

Accountability. Algorithmic management is capable of producing a powerful rhetorical effect; companies are able to claim that business practices implemented by computational systems are meaningfully different from management decisions made by humans. This claim can give companies a technological cachet, but it can also help to bolster claims that workers are not employees *as such* but rather networked users of a service, accessing the output of an algorithmic system.[44] The consequences of this are far-reaching and may lead to the misclassification of workers to avoid traditional employer-employee accountability or mask discrimination by hiding it on the other side of an opaque algorithm.[45] Additionally, the rhetoric of algorithmic management can distance companies from the effects of their business decisions, obscuring specific decisions made about how a system should function.

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[42] Rosenblat, Alex, Karen Levy, Solon Barocas, and Tim Hwang. "Discriminating Tastes: Customer Ratings as Vehicles for Bias," *Data & Society*, October 2016: 1. https://datasociety.net/pubs/ia/Discriminating_Tastes_Customer_Ratings_as_Vehicles_for_Bias.pdf.
[43] Rosenblat, Alex, Karen Levy, Solon Barocas, and Tim Hwang. "Discriminating Tastes: Customer Ratings as Vehicles for Bias," *Data & Society*, October 2016: 8. https://datasociety.net/pubs/ia/Discriminating_Tastes_Customer_Ratings_as_Vehicles_for_Bias.pdf.
[44] Lobel, Orly. "The law of the platform." *Minn. L. Rev.* 101 (2016): 87.
[45] Rosenblat, Alex, Karen Levy, Solon Barocas, and Tim Hwang. "Discriminating Tastes: Customer Ratings as Vehicles for Bias." *Data & Society*, October 2016. https://datasociety.net/pubs/ia/Discriminating_Tastes_Customer_Ratings_as_Vehicles_for_Bias.pdf.

Questions to Consider

The implications of algorithmic systems on employment and workers warrant closer examination. The growing adoption of these systems spurs questions about the effects on workers subject to algorithmic management, the fairness and accountability of algorithms, and the ability of our current regulatory and legal structures to address these changes. Below are some of the questions that should be considered in future research and debate on this topic:

- How do workers find new ways to assert their rights when they are confronted by a system that is often touted as infallible, impartial, and inevitable? What kinds of transparency on the part of technology companies and employers are needed?

- How will algorithmic management tools be shaped by different workplace contexts, norms, and workers' identities and/or senses of autonomy?

- In what ways may algorithmic management displace harms or place new burdens onto workers in ways that may be hard to see or measure? (For example, algorithmic management has prompted new forms of networking across a disaggregated workforce, such as online forums, as workers crowdsource information about the technologies they use in their everyday work. But this has also created new unpaid work as workers struggle to decipher and keep up with opaque processes and policies.)

- As algorithmic management tools become more common in traditional employment contexts, how will the role and authority of human managers change? How will power dynamics shift as decision-making becomes increasingly centralized and mediated by third parties?

- How will the opacity and rapid experimentation that technologically-mediated decision making enables make it more difficult for academics, labor advocates, and other actors to conduct research and collect data about these systems' effects on workers?

- How is the prolific data collection needed for algorithmic management systems to function changing the way different actors are thinking about workplace privacy issues? As data collected about consumers is used to manage workers, are our current conceptions of worker privacy inadequate?