Alexa et al., What Are You Doing with My Data?

Maurice E. Stucke* & Ariel Ezrachi**

Abstract

Who wouldn’t want a personal butler? Technological developments have brought us closer to that dream. The rise of digital personal assistants has already changed the way we shop, interact and surf the web. Technological developments and artificial intelligence are likely to further accelerate this trend. Indeed, the leading online platforms are currently investing in this technology. Apple’s Siri, Amazon’s Alexa, Facebook’s M, and Google Assistant can quickly provide us with information, if we so desire, and anticipate and fulfill certain needs and requests. Yet, could they also reduce our welfare? After summarizing several network effects that favor today’s powerful super-platforms, this Essay explores how the leading digital butlers, in progressively increasing their control over our outside options and choices, could harm potentially our wallets, privacy interests, and democracy.

Introduction

Germany’s telecommunications agency, the Federal Network Agency, made the news when it pulled Cayla dolls off the shelves.¹ Why is the blond, blue-eyed doll verboten? “Objects that have concealed cameras or microphones that can send information endanger the private sphere,” said Jochen Homann, the agency’s president.²

So, no Cayla dolls in Germany. And parents elsewhere likewise will spurn giving their child a “Stasi-Barbie.”³ Nonetheless many people, parents included, are bringing home another digital device. It too plays games with their children, and accurately answers their questions. Indeed, parents may confide intimate details with this device, asking for “information about a sensitive health condition or a controversial political figure.”⁴ It collects data on what it observes, what we share with it, and soon our telephone calls with

² Id.
others.\(^5\) Those with access to the data, one of its manufacturers recently told a U.S. court, can reconstruct “[t]he sum of an individual’s private life.”\(^6\) Who is this *Inoffizieller Mitarbeiter*?

Welcome to your digital personal assistant. Demand for these digital butlers—such as Google Assistant, Apple’s Siri, Facebook’s M, and Amazon.com’s Alexa—is booming, with 35.6 million people in the U.S. forecast to use a smart speaker in 2017, up 129 percent from 2016.\(^7\) Alexa-enabled devices, Amazon reported, “were the top-selling products across all categories on Amazon.com” in its 2016 Christmas season: “Customers purchased and gifted a record-setting number of devices from the Amazon Echo family with sales up over by a factor of nine compared to last holiday season.”\(^8\) About 27.5 percent of U.S. smartphone users already rely on their smartphone’s basic digital assistant.\(^9\) Now our assistant can read to our children, order beer and pizza, update us on traffic and news, and stump us with Stars Wars trivia. Our assistants can communicate with other smart devices around our house, operate them, and may, in the future, gather information from sensors on these devices.\(^10\)

The future heralds even faster, smarter, more human-like versions that can transform the way we access information (in suggesting restaurants, news stories, hotels, and shopping sites) and communicate. With the data from our smart-watches, televisions, home appliances, and phones, our digital butler will have unparalleled insights into our behavior and lives. Knowing what entertainment we watch, the stories we read, and the music and food we like, our butler will become pro-active. It will anticipate our needs. Using our personal data, including our calendar, texts, e-mails, and geolocation data, our personal assistant may recognize an unusually busy day, and suggest products and services—from a particular restaurant to a book or news article.

As we shift from a mobile-dominated world to an AI-dominated platform, our digital butler will increasingly control our mundane household tasks, like regulating room temperature, adjusting our water heater, and playing our favorite music. Indeed, as we increasingly rely on our butler it will be harder to turn it off. Moreover, it will be tempting to increasingly rely on the digital butler for other activities, such as the news we receive, the shows we watch, and the things we buy. The more we communicate primarily with our digital butler, the less likely we will independently search the web, read independent

---


\(^6\) Amazon Memo, supra note 4 (quoting Riley v. California, 134 S. Ct. 2473, 2489 (2014)).

\(^7\) Nicas, supra note 5.


\(^9\) Nicas, supra note 5.

\(^10\) Note for example the recent 900-series Roomba vacuum cleaner with inbuilt cameras and sensors which can connect to Amazon’s Alexa devices for voice control. See Chris Dawson, Is your robot vacuum cleaner as innocent as you think?, Tamebay, July 30, 2017 (https://tamebay.com/2017/07/robot-vacuum-cleaner-innocent-think.html).
customer reviews, use multiple price-comparison websites, and rely on other tools. The leading platforms’ plans are clear: they “envision a future where humans do less thinking when it comes to the small decisions that make up daily life.” Therefore, we likely will trust our digital butler. Indeed, Amazon’s CEO remarked the growing number of marriage proposals to Alexa. That increased reliance on the digital assistant (and provider’s online platform) is the Holy Grail for the digital butler providers. The super-platforms’ aim is to increase the time we spend on their platform and to control more aspects of our online interface. As Alphabet CEO Sundar Pichai wrote shareholders in April 2016, “The next big step will be for the very concept of the ‘device’ to fade away. Over time, the computer itself—whatever its form factor—will be an intelligent assistant helping you through your day.”

While this is often portrayed as a utopian environment, reality, as our Essay discusses, may be less promising. Our control over the search interface is fading. Our control over our privacy and personal information is slipping. Part I discusses the current race among the super-platforms (Google, Apple, Facebook, and Amazon) to control as many aspects of the online interface as possible, and reap the associated benefits. The stakes are high, given several data-driven network effects that will likely lead to market dominance for one or two digital assistants. What are the implications of this winner-take-all contest to be the chief digital assistant? Part II considers the toll a dominant digital assistant can have on competition, privacy, and democracy.

I. Network Effects

Currently Microsoft, Samsung, and the four online super-platforms—Google, Apple, Facebook, and Amazon—are jockeying for their digital assistant to become our head butler. With Amazon controlling an estimated seventy percent of the smart-speaker market by early 2017, versus twenty-four percent for Google Home, the stakes are great and go beyond the mere use of the digital assistant. In this competitive race, each super-platform wants its personal assistant to become our key gateway. Let us see why.

One reason the stakes are significant is that digital personal assistants are subject to at least four potentially interrelated network effects, which can also affect the quality of the product itself. Network effects “occur when the value of a product or service for a

11 Danny Yadron, Google Assistant takes on Amazon and Apple to be the ultimate digital butler, Guardian, May 18, 2016 (https://www.theguardian.com/technology/2016/may/18/google-home-assistant-amazon-echo-apple-siri).
15 Nicas, supra note 5.
customer increases when the number of other customers also using it increases.\textsuperscript{16} A telephone is a classic example. As more people use a telephone, the more people you can call, the more use you get from your phone. These classic network effects are familiar in the brick-and-mortar economy. Firms compete to dominate markets characterized by network effects. As one product or standard increases in popularity, it trends toward dominance. “[O]nce dominance is achieved,” a U.S. court observed, “threats come largely from outside the dominated market, because the degree of dominance of such a market tends to become so extreme.”\textsuperscript{17}

One traditional, albeit indirect, network effect is the positive feedback loop in attracting manufacturers and developers.\textsuperscript{18} As more people use a particular digital platform, the greater the demand for products and services that can connect to the digital platform. It follows that the more likely other manufacturers and developers will develop applications for that platform, the more appealing the platform becomes to consumers, manufacturers and software developers.

We already see this network effect for digital personal assistants. To increase sales of Alexa, Amazon in 2015 opened its Alexa Voice Service to third-party hardware makers, “giving them the tools to integrate Alexa into internet-connected devices.”\textsuperscript{19} The aim is to get more “smart” appliances, like lights, fans, switches, thermostats, garage doors, sprinklers, locks, and more, connected to Alexa.\textsuperscript{20} As more people use Alexa, more manufacturers will make smart-products which Alexa can control, and the more appealing Alexa becomes to prospective purchasers and manufacturers. Similarly, GE Appliances, LG Electronics, Whirlpool and other household appliance manufacturers announced in 2017 that their appliances will connect with Google Assistant,\textsuperscript{21} which already has over seventy smart home partners supporting the Google Assistant across Google Home and Android phones.\textsuperscript{22}

\textsuperscript{16} Case Comp. M. 8124, Microsoft/LinkedIn, 6.12.2016, para 341 (http://ec.europa.eu/competition/mergers/cases/decisions/m8124_1349_5.pdf); see also United States v. Microsoft Corp., 253 F.3d 34, 49 (D.C. Cir. 2001).
\textsuperscript{17} Novell, Inc. v. Microsoft Corp., 505 F.3d 302, 308 (4th Cir. 2007).
\textsuperscript{18} Indirect network effects arise when people increasingly use a product or technology (for example, software platforms). The more people that use the platform, “the more there will be invested in developing products compatible with that platform, which, in turn reinforces the popularity of that platform with users.” Case T-201/04, Microsoft Corp. v. Comm’n, 2007 E.C.R. II-3601 (Ct. First Instance), para 1061.
\textsuperscript{19} Amazon.com, Inc., Form 8-K, EX-99.1, CIK 0001018724, 000-22513, July 23, 2015.
\textsuperscript{20} Amazon.com, Inc., Form 8-K, EX-99.1, CIK 0001018724, 000-22513, Feb. 2, 2017 (announcing in early 2017 that “[t]ens of thousands of developers” were using the Alexa Voice Service to integrate Alexa into their products, including “Dish DVRs, Ford and Volkswagen vehicles, GE C Lamp, Huawei Mate 9, LG Smart Instaview fridge, and Whirlpool appliances”).
\textsuperscript{22} Scott Huffman, Vice President, Google Assistant & Rishi Chandra, Vice President, Google Home, Your Google Assistant is getting better across devices, from Google Home to your phone, Google, May 17, 2017 (https://blog.google/products/assistant/your-assistant-getting-better-on-google-home-and-your-phone/).
Likewise, a second feedback loop is to teach the digital butler new skills. Amazon, for example, offers a free Alexa Skills Kit, which “makes it fast and easy for developers to create new voice-driven capabilities for Alexa.”\(^{23}\) As more people use a particular digital butler, it is likely that more companies will develop new skills for that butler (like ordering beer and pizza).\(^ {24}\) With more skills to offer, the leading butler will likely appeal to even more prospective purchasers and developers.\(^ {25}\)

Developing apps, hardware and software for every digital butler is inefficient. Instead manufacturers and developers likely will focus on the top-selling digital butlers. So, if more people primarily use Google’s or Amazon’s butler, its operating platform’s applications and functions will likely attract more developers and smart-appliance manufacturers. As that digital butler learns more skills, its quality will improve relative to rivals, thereby increasing its appeal to prospective customers and developers.

Amazon’s Alexa, by July 2017, acquired over 15,000 skills—up from its 10,000 skills in February, which was triple what it had in September 2016.\(^ {26}\) By mid-2017, Google in contrast had just 378 skills, while Microsoft had only sixty-five skills.\(^ {27}\) As more people purchase Alexa, more companies will develop new skills for Alexa. For example, Alexa can already order you a pizza from Domino’s or a car from Uber, check your credit balance with Capital One, get fitness information from Fitbit, alert you with election updates from NBC News, play Jeopardy!, get stock quotes with Fidelity, hear headlines from The Huffington Post, provide you a seven-minute workout, and test your Star Wars knowledge with a trivia quiz from Disney.\(^ {28}\)

Besides this traditional network effect, a second network effect involves learning-by-doing. We already see this data-driven network effect with search engines.\(^ {29}\) Each person’s utility from using the search engine increases as others use it as well. As more people use the search engine, the more trial-and-error experiments, the more likely the search engine can learn consumers’ preferences, the more relevant the search results will likely be, which in turn will likely attract others to use the search engine, and the positive feedback continues. By learning through servicing us, digital butlers can take a pro-active role—anticipating our needs and wants—rather than following instructions. This requires


\(^{26}\) Sarah Perez, Amazon’s Alexa passes 15,000 skills, up from 10,000 in February, TechCrunch, July 3, 2017 (https://techcrunch.com/2017/07/03/amazons-alexa-passes-15000-skills-up-from-10000-in-february/).

\(^{27}\) Id.


\(^{29}\) Maurice E. Stucke & Allen P. Grunes, Big Data and Competition Policy (2016).
the super-platform to have enough users, data and opportunities to experiment and train the algorithms.

A third network effect involves the scope of personal data collected on us and predicting our unique needs. The super-platforms already expend a lot of effort to better track us, collect our personal data, and profile us. Here the feedback loop adds a dimension: it is no longer the trial-and-error, learning-by-doing from earlier queries by billions of other users, but an additional layer of trial-and-error in predicting individual tastes and preferences from the variety of personal data the super-platform collects about you. For example, the more often you converse with your digital butler, and the more data it collects about you, the more opportunities the butler can anticipate your particular needs, the more times it can successfully offer you services or products and the more likely you’ll use this butler (rather than train another butler bought off-the-shelf). The scope of the data—“what app you are in, previous search history, your current GPS, as well as personal details”—can provide the needed context for your voice inquiry or in anticipating your requests.30

Finally, a fourth network effect involves “spill-over effects.” Here the network effects on the ostensibly “free” (consumer) side can spill over to the “paid” (provider) side, and each side can reinforce the other. As a digital butler attracts many users with heterogeneous requests, it will also attract a greater variety of advertisers and sellers to the digital butler’s platform. Butlers that seamlessly offer a greater variety of products and services (everything from power drills to local pizza) will attract even more users, which attracts more sellers and advertisers to that super-platform.

A dominant platform can also use the inflow of personal data to better target consumers with its own and third-party products and services. Therefore, as more consumers use a particular digital butler, the more sellers will be attracted to that platform, the more fees the super-platform can collect from sellers when they transact with the butler’s users. (Amazon, for example, earns fees from third-party sellers that sell on its platform.31)

The super-platform can also use the personal data to target users with personalized ads in the moments that matter for a purchasing decision across its expanding platform of “free” services (such as sponsored search results, ads in e-mails, and displaying ads in videos) and across media (such as personal computers, smartphones, tablets, and, soon, “smart” household appliances and driverless cars). Currently, some of the super-platforms earn most of their revenues when consumers click on a relevant sponsored ad (which generates revenue on a cost-per-click basis) or see a display ad (which generates revenue on a cost-per-impression basis). Amazon is currently testing ads with its digital butler, and ads

31 Amazon.com, Inc., Form 10-K, For the Fiscal Year Ended December 31, 2016, at 3.
are expected to increase on the digital butlers.\textsuperscript{32} Ultimately, in targeting users with more relevant products, services, and ads, the super-platform increases its revenue and profits.

Also important is how these networks effects can reinforce each other, enabling the super-platform to expand to other ventures, such as driverless cars. Besides collecting more data on its users’ behavior, a driverless car enables the passengers to spend more time on the super-platform, where they can be targeted with products, services, and ads. As more users are drawn to the growing platform, and as the company amasses a greater variety of data to effectively target consumers with relevant ads, products and services, the super-platform can reduce the sellers’ fixed costs of managing multiple ad campaigns and selling across different channels. As more people are attracted to the super-platform’s services (like its digital butler), the more sellers and advertisers will use the super-platform. With the influx of sellers and advertisers, combined with the growing volume and variety of personal data, the super-platform can better target users with relevant products, services, and advertisements. In receiving a targeted ad or product during a critical purchasing decision, the user will more likely buy that item. As a result, the super-platform’s revenues and profits increase. It can afford to expand its range of free services and to ensure that its existing services remain the default on various portals to the Internet. Google, for example, announced in 2017 that its Assistant “will soon be available via an app on iPhones—following a similar move by Amazon—as well as a variety of other devices, including refrigerators, washing machines and toys.”\textsuperscript{33}

Network effects yield efficiencies, no doubt. But, in our online digitalized environment, they also change the competitive dynamics. They can better protect the winner from disruptive strategies and strengthen its gatekeeper power. As the U.K. competition authority observed,

\begin{quote}
[In certain circumstances the combination of exclusive access to a large volume of detailed consumer data on the one hand, and sophisticated algorithms capable of interrogating that data to create highly tailored services on the other, could help to reinforce a firm’s market power or raise entry barriers—for example, if it serves to limit realistic opportunities or reduce incentives for customers to switch to competitors who may not (initially at least) be able to provide similarly “personalised” services.\textsuperscript{34}
\end{quote}

Consequently, one reason that the competition is so fierce among the super-platforms is the recognition that with these network effects, the digital assistant market can tip toward dominance. Network effects helped Microsoft dominate for decades the market for personal computer operating systems.\textsuperscript{35} Network effects currently help Google maintain

\begin{footnotesize}
\begin{itemize}
  \item \textsuperscript{33} Nicas, supra note 5.
  \item \textsuperscript{34} Algorithms and Collusion: Note from the United Kingdom, submitted for the OECD Competition Committee Hearings on 21-23 June 2017, DAF/COMP/WD (2017) 19, at 8 (May 30, 2017) [hereinafter UK Submission to OECD].
  \item \textsuperscript{35} New York v. Microsoft Corp., 224 F. Supp. 2d 76, 89–90 (D.D.C. 2002), aff’d, 373 F.3d 1199 (D.C. Cir. 2004) (noting how trial and appellate court found that network effects helped perpetuate Microsoft’s
\end{itemize}
\end{footnotesize}
its dominance in search, and Facebook maintain its dominance in social networks. Likewise, as one digital assistant gains in popularity, its quality (in terms of skills) and capabilities, given these network effects, can significantly improve over rivals. As a result, the market for digital personal assistants five years from now may be far less contestable. If people do gravitate to one or two digital assistants, it might also be a lot harder for them to switch to other assistants, especially one unfamiliar with their personal habits, with far fewer skills, and which connects to far fewer appliances.

II. The Dark Side of Digital Personal Assistants

Suppose, as a result of these network effects, we are left with one or two leading digital assistants. As we welcome the intelligent, voice-activated digital butler to our homes, we may not recognize its toll on our well-being. As this Part explores, a dominant digital assistant may abuse its gatekeeper position in three ways. First, such a digital assistant can lessen competition, to the detriment of sellers upstream and consumers downstream. Second, it may take a significant toll on privacy and personal peace of mind. Third, it can pose significant risks to democracy and the marketplace of ideas.

A. Economic Concerns

A dominant digital assistant raises several economic concerns. Google and other super–platforms have the goal of increasingly providing direct answers—through voice queries—which makes it quicker, easier, and more natural to find results. Rather than searching online for information, users will talk with Google Assistant, Alexa, or another digital assistant in a natural and conversational way. By controlling the interface between the user and sellers or advertisers, the companies controlling the dominant digital assistants can abuse their significant market power, adversely affecting both users downstream and sellers upstream. The high switching costs between digital butlers (due to the need to train the new butler) could also lock us in.

1. Behavioral Discrimination

Competition officials are familiar with price discrimination. In considering the abundance of information and options available as we shift to a data- and algorithm-driven economy, the ability to better price discriminate may sound counter-intuitive. How could a seller price discriminate when competition is only a click away? Indeed, the conventional belief is that in a structurally competitive market, price discrimination is unlikely and cannot persist. This is “because other sellers of the same product have an incentive to sell the product at a competitive rate to the victims of price discrimination.”

operating system dominance because applications will continue to be written for the already dominant Windows, which in turn ensures that consumers will continue to prefer it over other operating systems).

Therefore, if price discrimination persists, that suggests either collusion or “significant monopoly power.”

Digital butlers can help facilitate behavioral discrimination, a durable, more pernicious form of price discrimination. Online behavioral discrimination, as we explore in Virtual Competition, will likely differ from the price discrimination in the brick-and-mortar world in several important respects.

First is the shift from third-degree, imperfect price discrimination to near perfect, or first-degree, price discrimination. Online sellers, in tracking us, collecting data about us, and segmenting us into smaller groups can better identify our reservation price. The U.K. competition authority found price discrimination to be more prevalent online. The ride-sharing app, Uber, for example, confirmed in 2017 that it uses customer data to better price discriminate. As Bloomberg reported:

The new fare system is called “route-based pricing,” and it charges customers based on what it predicts they’re willing to pay. It’s a break from the past, when Uber calculated fares using a combination of mileage, time and multipliers based on geographic demand.

Daniel Graf, Uber’s head of product, said the company applies machine-learning techniques to estimate how much groups of customers are willing to shell out for a ride. Uber calculates riders’ propensity for paying a higher price for a particular route at a certain time of day. For instance, someone traveling from a wealthy neighborhood to another tony spot might be asked to pay more than another person heading to a poorer part of town, even if demand, traffic and distance are the same.

The second way behavioral discrimination differs from price discrimination is that sellers can use our personal data to target us with the right emotional pitch to increase overall consumption. Basically, they will get us to buy things we otherwise did not want at the highest price we are willing to pay. For example, an Australian newspaper reported how Facebook, according to an internal advertising document, promoted advertising campaigns that exploited Facebook users’ emotional states, including users as young as fourteen years old:

[T]he selling point of this 2017 document is that Facebook’s algorithms can determine, and allow advertisers to pinpoint, “moments when young people need a confidence boost.” If that phrase isn’t clear enough, Facebook’s document offers a litany of teen emotional states that the company claims it can estimate based on how teens use the service, including “worthless,” “insecure,” “defeated,” “anxious,” “silly,” “useless,” “stupid,” “overwhelmed,” “stressed,” and “a failure.” . . . [T]he documents also reveal a

31 Falls City Indus., Inc. v. Vanco Beverage, Inc., 460 U.S. 428, 443 (1983) (“Persistent, industry-wide price discrimination within a geographic market should certainly alert a court to a substantial possibility of collusion.”).


40 UK Submission to OECD, supra note 34.

particular interest in helping advertisers target moments in which young users are 
interested in “looking good and body confidence” or “working out and losing weight.” Facebook denied offering tools to target people based on their emotional state.43

The third way behavioral discrimination differs from price discrimination is its 
durability. The OECD noted that “[a]s companies collect more user data and algorithms 
have more opportunities to experiment (such as presenting items and suggesting other purchases), pricing becomes more dynamic, differentiated and personalised.”44 As more online retailers switch to dynamic (and personalized) pricing and product offerings, it will be harder for consumers to discover a general market price and to assess their outside options.

Indeed, consumers will likely face two currents. They can swim upstream, against 
the current, by trying to find the best deal by searching online (while their behavior is 
being tracked). Or they can swim downstream by relying on their digital butler.

Friction is the buzzword for online retailers. The digital butler is designed to reduce resistance—whether in renting a movie or buying more batteries. When designing the digital butler’s algorithms, the super-platform will ask what, if any, decisions you need to make. An Amazon executive identified the following questions developers should ask:

How many decisions are between a customer and completing a task?
Are each of these decisions absolutely necessary?
If so, can you make the decision for the customer by pre-selecting an option?
If not, and the customer absolutely needs to make that decision, how can you simplify the decision process?
If there are multiple decisions, could you combine them into one decision?
Can you present the most important decision first to the customer?
How can you preserve the decision once it’s been made so that you don’t have to ask the customer again in the future?45


44 Algorithms and Collusion: Background Note by the Secretariat, submitted for the OECD Competition Committee Hearings on 21-23 June 2017, DAF/COMP/WD (2017) 4, at 14 (16 May 2017) [hereinafter OECD Background Note].

To reduce friction, for example, users of Amazon’s digital butler can sign up for Amazon Prime simply by saying, “Alexa, sign me up for Prime.” Once they are signed up, friction is further reduced for verbally ordering items or streaming music.

The digital butler may help the super-platform refine its profile of us, including our likely reservation price (willingness to pay), use of outside options, shopping habits, general interests, and weaknesses (including moments when our willpower is fatigued). This information can facilitate behavioral discrimination.

Voice activation will further increase the ability to discriminate. The greater the ease in conversing with the butler, the more likely we’ll rely on our digital butler. While a search engine provides pages of links, few look beyond the first page. The butler will not prattle even the first page of options. Instead, it might suggest a few choices. Even when we swim upstream by searching the web, the ads, products, or search results we see may be orchestrated by our butler. Thus, as brick-and-mortar stores close, and we buy more online, behavioral discrimination—while not always possible—can occur more often than we expect. Further, while economists and others debate the welfare effects of price discrimination, the potential harm from behavioral discrimination—including its impact on our privacy—would need to be examined anew.

2. Abuse of Dominant Position

While providing us with a distorted view of available options and market reality, our trusted butler can also exclude rivals. When the butler promotes its affiliated products and services, it may become harder and costlier for retailers unaffiliated with the platform (or its advertising business) to reach us. As the European Commissioner noted,

> When an algorithm makes it harder to find rivals’ products, that could deny those rivals the chance to compete. And the result could be higher prices, and less choice, for consumers. That’s precisely the issue in our case with Google Shopping. We’re concerned that the way Google used its algorithms may have given its own comparison shopping service more prominent treatment than it gives to competitors.

---


47 UK Submission to OECD, supra note 34, at 7:

> Algorithms can be used to set different prices for different customers, including through online tracking and profiling of consumers. The combination of: a) the greater and greater volume of data available to firms about customers, and b) the increasingly sophisticated means of using algorithms to swiftly analyse this data and gather very granular intelligence about customers’ preferences, purchases or price sensitivity, is likely to increase further the opportunities for firms to engage in detailed segmentation and price discrimination.

In 2017, the European Commission fined Google a record amount (€2.42 billion) for abusing its dominant position in search. As the Commission noted, Google’s flagship product is its search engine, “which provides search results to consumers, who pay for the service with their data.” In 2004 Google entered a separate market, namely comparison shopping. One problem for Google was that the comparison shopping market already had several established players. Another problem was that Google’s product (Froogle) was subpar. But Google knew that comparison shopping services relied to a large extent on traffic to be competitive. “More traffic leads to more clicks and generates revenue.” Moreover, the comparison shopping service market has its own network effects: as more customers use that comparison shopping site, the more likely retailers will want to list their products with that comparison shopping service.

So to distort competition, Google used its dominant search engine to redirect traffic. From 2008, Google began pushing its own comparison shopping service, while relegating the rival (and superior) comparison shopping services. Google knew that most people click on the first few results on its search engine. Few people go to the second page, and even fewer go to the third page, of results. Google systematically placed its own comparison shopping service on the first page at or near the top of the search results. Google relegated the rival shopping services—the better ones only appeared on page four of Google’s search results, and others appeared even further down the list.

As a result of its illegal practices, Google effectively increased the traffic to its own comparison shopping service while drying up the traffic to its rivals’ services. As the Commission noted:

Since the beginning of each abuse, Google’s comparison shopping service has increased its traffic 45-fold in the United Kingdom, 35-fold in Germany, 19-fold in France, 29-fold in the Netherlands, 17-fold in Spain and 14-fold in Italy.

Following the demotions applied by Google, traffic to rival comparison shopping services on the other hand dropped significantly. For example, the Commission found specific evidence of sudden drops of traffic to certain rival websites of 85% in the United Kingdom, up to 92% in Germany and 80% in France. These sudden drops could also not be explained by other factors. Some competitors have adapted and managed to recover some traffic but never in full.

It is remarkable how effectively Google stifled competition in the comparison shopping market. Even though Google was intentionally degrading the quality of its search results,

---


50 Id.

51 Id. (noting that “[c]ontemporary evidence from Google shows that the company was aware that Froogle’s market performance was relatively poor (one internal document from 2006 stated ‘Froogle simply doesn’t work’”).

52 Id.

53 Id.
consumers did not switch to other search engines, such as Bing or Yahoo!. Even though competitors were a click away, competition wasn’t. Moreover, users on their personal computers could have scrolled to the fourth page of Google’s search results. But few did. For search results on personal computers, “the ten highest-ranking generic search results on page 1 together generally receive approximately eighty-five percent of all clicks on generic search results (with the top search result receiving about thirty-five percent of all the clicks). The first result on page 2 of Google’s search results receives only about one percent of all clicks. The effects on mobile devices are even more pronounced given the much smaller screen size.”Google effectively increased the friction for consumers to use rival shopping services, while reducing the friction for its own (subpar) product.

Search bias will be likelier and even more effective with a dominant digital butler. For one thing, with the Google Shopping case the issue was whether the search result was on the first, fourth or subsequent pages of Google’s results. With the digital butler, there will not even be one page of results. Instead the butler likely will offer one or two suggestions.

As Google told its investors, its search engine used “to show just ten blue links in [its] results, which you had to click through to find your answers.” Now Google is “increasingly able to provide direct answers—even if you’re speaking your question using Voice Search—that make it quicker, easier and more natural to find what you’re looking for.” Rather than searching online for information, Google is encouraging you to talk with its Google Assistant “in a natural conversational way to help you get things done.”

Google Assistant forms part of the company’s “effort to further entrench itself in users’ daily lives by answering users’ queries directly rather than pointing them to other sources.” So few consumers looked at the second or third page of the search engine’s results while on their PCs. Even fewer do so on their smartphone, given the smaller

54 European Commission, Fact Sheet, Antitrust: Commission fines Google €2.42 billion for abusing dominance as search engine by giving illegal advantage to own comparison shopping service, Brussels, 27 June 2017 (http://europa.eu/rapid/press-release_MEMO-17-1785_en.htm) [hereinafter EC Fact Sheet]; see also UK Submission to OECD, supra note 34, at 5 (noting that “high ranking and prominent visibility in search results (whether organic or non-organic) may be important to a business’s ability to compete effectively; and this is partly due to consumers’ online search behaviours, in particular their propensity to focus their attention, clicks and purchases on links at the top of returned search results and rarely venture beyond the first results page”).
55 EC Press Release, supra note 49.
56 EC Fact Sheet, supra note 54 (“Real-world consumer behaviour, surveys and eye-tracking studies demonstrate that consumers generally click far more on search results at or near the top of the first search results page than on results lower down the first page, or on subsequent pages, where rival comparison shopping services were most often found after demotion.”).
58 Id.
59 Id.
screen. With the digital butler, they will have even less incentive to search independently online. Instead, they likely will rely on their butler’s one or two suggestions.

Another reason why search bias will be likelier and more effective with a dominant digital butler is that it will be harder to detect. In the Google Shopping case, the Commission had a ready counterfactual: namely how the results would have looked if Google’s own comparison shopping service were subject to Google’s generic search algorithm.\footnote{EC Press Release, supra note 49.} Absent Google’s manipulation of the search results, its generic algorithm presumably would have given greater prominence to some of the rival shopping services. For example, a rival service might have been on the first page, and Google’s own shopping service might have been on the fourth page. Thus, the Commission ordered equal treatment, namely “Google has to apply the same processes and methods to position and display rival comparison shopping services in Google’s search results pages as it gives to its own comparison shopping service.”\footnote{EC Fact Sheet, supra note 54.}

With digital butlers, the antitrust agency may lack a ready counterfactual, as there might not be a generic search algorithm. Instead, the butler, using the user’s personal data, personalizes results for that user’s taste. So when you ask Alexa, “What movie do you recommend?,” your results will likely differ from your neighbor’s. Thus, it will be harder for the competition authority to reconstruct what an objective digital assistant would have recommended. As The Economist noted, “If search algorithms become more personalized, as is expected to be the case with digital assistants such as Amazon’s Alexa, it will be even more difficult to detect bias.”\footnote{Not so Froogle: The European Commission levies a huge fine on Google, The Economist, July 1, 2017 (https://www.economist.com/news/business/21724436-its-case-not-perfect-it-asks-right-questions-european-commission-levies-huge).}

A third reason why search bias will be likelier and more effective with a dominant digital assistant is its omnipresence. Even when a disfavored retailer can gain our attention, the digital butler may interject with its own recommendation, suggesting a special deal by a member of its platform’s ecosystem.

In this multisided market, the digital butler may subtly push certain products and services and degrade or conceal others, all in the name of personalization. Rather than deter such abuses, market forces, given the data-driven network effects, can actually increase entry barriers.

\section*{B. Privacy Concerns}

Not only will our wallets be affected, but so too will our privacy and peace of mind. A recent criminal case gives us a glimpse.\footnote{Amazon Memo, supra note 4, at 1. Amazon argued that the State must demonstrate: (1) a compelling need for the information sought, including that it is not available from other sources; and (2) a sufficient nexus between the information and the subject of the criminal investigation. Id. at 2.} The Arkansas police in the U.S. were
investigating a murder. While searching the suspect’s residence, the police seized his Echo
device. The police next served Amazon a warrant seeking any audio recordings and
transcripts that were created as a result of interactions with defendant’s Amazon Echo.
Amazon sought to quash the search warrant unless the police could satisfy a higher
burden. As Amazon told the court, the privacy concerns were significant. But Amazon
was concerned primarily with governmental invasions of its users’ privacy and First
Amendment interests. As Amazon cautioned, “the knowledge that government agents are
seeking records concerning customer purchases of expressive material from Amazon
‘would frost keyboards across America.’” Indeed, “rumors of an Orwellian federal
criminal investigation into the reading habits of Amazon’s customers could frighten
countless potential customers into cancelling their online purchases through Amazon,
now and perhaps forever, resulting in a chilling effect on the public’s willingness to
purchase expressive materials.”

Eventually, after the defendant consented, Amazon disclosed the information to
the State. But, as Amazon warned, government surveillance remains a concern. It is
questionable whether the accused can challenge under the Fourth Amendment any
warrantless search or seizure of data Amazon’s personal butler collects from individuals.
Defendants—under a line of Supreme Court cases—would have no reasonable
expectation of privacy in data they share with Amazon and other third parties.

Another concern is covert government surveillance. One example, according to
the recent WikiLeaks, is the Central Intelligence Agency’s “Weeping Angel” program. The
CIA hacked smart televisions, transforming them into covert microphones. The CIA
could also remotely hack and control popular smartphones, which could be instructed to
send the CIA “the user’s geolocation, audio and text communications as well as covertly
activate the phone’s camera and microphone.” Presumably, other governments would
have the incentive and ability to hack our digital butler to monitor and gather evidence.

---

65 Id. at 14 (quoting the Grand Jury Subpoena to Amazon.com dated August 7, 2006, 246 F.R.D. 570, 573
(W.D. Wis. 2007)).
66 Id. (quoting Grand Jury Subpoena, 246 F.R.D. at 573).
67 Andrew Blake, Amazon gives up Alexa data sought in murder probe, Wash. Times, Mar. 9, 2017, 2017
WLNR 7410625.
68 United States v. Miller, 425 U.S. 435, 443 (1976) (government, consistent with the Fourth Amendment,
can obtain “information revealed to a third-party and conveyed by him to government authorities, even if
the information is revealed on the assumption that it will be used only for a limited purpose and the
confidence placed in the third-party will not be betrayed”). The scope of Miller may be revisited in a pending
Supreme Court case, Carpenter v. United States, No. 16-402.
69 WikiLeaks, Vault 7: CIA Hacking Tools Revealed, March 7, 2017 (https://wikileaks.org/ciav7p1/)
(“After infestation, Weeping Angel places the target TV in a ‘Fake-Off’ mode, so that the owner falsely
believes the TV is off when it is on. In ‘Fake-Off’ mode the TV operates as a bug, recording conversations
in the room and sending them over the Internet to a covert CIA server.”).
70 Id.
No doubt these privacy concerns would also exist in an unconcentrated digital assistant market. But at least in those markets personal data would be dispersed across many firms, and competitive pressure may serve to curtail the providers’ incentive to degrade privacy. In contrast, in a monopolized market, personal data is concentrated in one or few firms and consumers have limited outside options which may offer better privacy protection. This increases the government’s incentive to circumvent the firm’s privacy protections and tap into the digital assistant’s capabilities.\(^{71}\)

Also, with fewer firms controlling personal data, the risk that the government will “capture” the firms, using its many levers, increases.\(^{72}\) As personal data is spread out across many firms, there are more firms that the government would have to bribe (or coerce) to access the data. As the number of bribes increase, the value of each decreases. Consequently, the likelihood that the bribe will be less than the value to the digital assistant producer for securing the data will increase.

Moreover, a dominant firm is likely to lobby the government on many more fronts.\(^{73}\) This can increase the likelihood of secretly cooperating with the government in accessing the data if doing so yields greater benefits on the other fronts.

But a third privacy concern, which Amazon did not address in its court filing, is the private collection and use of this data. A 2017 case against the television manufacturer VIZIO gives us a glimpse.\(^{74}\) Since February 2014, VIZIO televisions, the U.S. Federal Trade Commission alleged, continuously tracked what consumers were watching. Over ten million VIZIO televisions transmitted information about what the viewer was watching “on a second-by-second basis.”\(^{75}\) Why the intrusive tracking? VIZIO profited from selling the consumers’ television viewing history to third parties. One purpose for the viewing data was to analyze advertising effectiveness. With the VIZIO TV data, third parties could analyze a household’s behavior across devices, such as, for example, “(a) whether a consumer has visited a particular website following a television advertisement related to that website, or (b) whether a consumer has viewed a particular television program following exposure to an online advertisement for that program.”\(^{76}\) Another purpose for the viewing data was to better target the household members on their other digital devices.


\(^{74}\) Complaint filed in FTC v. VIZIO, Inc., Case No. 2:17-cv-00758 (D.N.J. filed Feb. 6, 2017).

\(^{75}\) Id.

\(^{76}\) Id.
VIZIO eventually settled the case. The outstanding legal issue was whether VIZIO’s disclosure was “unfair” or “deceptive” under section 5 of the Federal Trade Commission Act. As the FTC alleged, consumers were never directly informed that their new VIZIO televisions were tracking their viewing and selling this data to better target them with personal ads. The acting FTC Chair concurred in the enforcement action only because VIZIO deceptively omitted information about its data collection and sharing program. But she did not agree with the complaint, alleging that VIZIO’s collection and sharing of the data without consumers’ consent was “unfair.”

The VIZIO case raises several issues. First, can companies collect this personal information? Based on the Commissioners’ construction of the FTC, super-platforms can use their digital assistants to track consumers, collect their data, develop personal profiles, and target them with behavioral ads. They can even sell that data to third parties. All that seems to be required is that they disclose the collection and use of data to consumers.

Second, who must consent? The FTC complaint focuses on consumers that purchased VIZIO televisions. However, there are many (or several) data collection mediums: personal butlers, like televisions, will sweep in data from children, other household members, relatives, friends, and others in the house. Does the super-platform have to inform them of the tracking? Must they provide consent too? Or is this just going to devolve to reasonable expectation?

Third, what constitutes consent? If Amazon or Google states broadly in its privacy statement that the data it collects across its products and services is used for advertising purposes, is this disclosure sufficient to infer consent?77 At the policy level, consent is meaningless when the dominant provider grants service only on condition that it gains access to one’s private data. After all, absent viable alternatives, the user has little choice, but to confirm her agreement. Furthermore, this market reality that empowers the provider enables it to downgrade privacy protection or engage in excessive use and harvesting of personal data. Indeed, Facebook, the German competition agency (the Bundeskartellamt) found in its preliminary assessment, abused its dominant position “by making the use of its social network conditional on its being allowed to limitlessly amass every kind of data generated by using third-party websites and merge it with the user’s Facebook account.”78

At the practical level, the notice-and-consent regime is meaningless if consent does not reflect true awareness on the user’s part. Think about the number of times you consent to terms and conditions presented by newly downloaded apps on your phone. How often do you read the terms and conditions? Even if one reads the terms, for leading apps (such as Facebook or Google Maps), one has even less leverage to decline.

---


A fourth issue is control over the data. U.S. law does not provide adults a way to review the personal information the digital assistant collected about them; a way to revoke their consent and refuse the further use or collection of personal information; or to delete their personal information.

These privacy concerns will increase when your digital butler is connected not only to your TV set, but your computers, smart appliances, security camera, smartphone, smart cars, and the super-platform’s other services (such as search engine, e-mail, maps, etc.). For example, iRobot CEO Colin Angle recognized the value of the mapping data its smart vacuum cleaner collects. “There’s an entire ecosystem of things and services that the smart home can deliver once you have a rich map of the home that the user has allowed to be shared,” he said.\footnote{Jan Wolfe, Roomba vacuum maker iRobot betting big on the “smart” home, Reuters, July 24, 2017 (http://www.reuters.com/article/us-irobot-strategy-idUSKBN1A91A5).} iRobot’s vacuum cleaner Roomba is already compatible with Amazon’s Alexa. According to Angle, the Roomba could share with Apple, Amazon and/or Google its maps of its customers’ homes with customer consent. As Guy Hoffman, a robotics professor, told the press, “Companies like Amazon, Google and Apple could also use the data to recommend home goods for customers to buy.”\footnote{Id.} So every millimeter of your entire home can be known, and every open space can reflect a marketing opportunity.

As for turning off your digital butler, ask yourself this: Could you live without a smartphone or internet access today? If you could have your dream house (but no Internet access) or your current home, which would you realistically choose? If you were born before the 1970s, you could remember life without the Internet. But smartphones, as the Supreme Court recognized, “are now such a pervasive and insistent part of daily life.”\footnote{Riley v. California, 134 S. Ct. 2473, 2484 (2014).}

With the rise of smart appliances, it will be even harder to turn off your digital butler. There will be few facts, if any, that will not eventually be divulged to another. The fact that our smartphones currently collect and store so much data (including things that we may not ever use, such as our movements or search history) and that our digital butler aims to collect even more data about us, reflects that what we give up in exchange (our personal data) is valuable.

C. Marketplace of Ideas

In 2017, Google announced that it is incorporating artificial intelligence into its Gmail service, used by over a billion people, “for features such as suggesting responses to messages.”\footnote{Google Assistant coming to iPhones; will take on Siri, WION, May 18, 2017 (https://www.wionews.com/science-tech/google-assistant-coming-to-iphones-will-take-on-siri-15719);} Similarly, Facebook is using AI, as part of its personal assistant technology, to...
provide suggestions to users based on their private conversations. Among other things, AI-powered assistants may suggest books, articles or propose a post we may wish to share.

The super-platforms—in directing our views of the world—can influence the marketplace of ideas and our elections. As we primarily ask our digital butler, “What are the latest headlines?,” it becomes our primary news gatekeeper. As we increasingly rely on our digital butler for entertainment, its power to manipulate political and social discourse increases as well.

The OECD recently identified several risks that algorithms could pose to our marketplace of ideas. One risk is bias. In filtering the information we receive based on our preferences, the digital butler reduces the viewpoints we receive, thereby leading to “echo chambers” and “filter bubbles.”

A second risk is censorship, whereby a powerful digital butler is “programmed to control or block the content that certain users are able to access.” The digital butler can enforce governmental censorship of information with particular religious, political and sexual orientations. For example, Apple in 2017 removed from its app store in China several popular apps that enabled users to evade government censorship. Additionally, the super-platform can self-censor as to what is appropriate content. Facebook is currently grappling with this issue. In 2017, it asked users for input on several questions, including:

- How aggressively should social media companies monitor and remove controversial posts and images from their platforms?
- Who gets to decide what’s controversial, especially in a global community with a multitude of cultural norms?
- Who gets to define what’s false news—and what’s simply controversial political speech?

Ultimately the answers to these questions will come not from users, but the powerful super-platform. It will ultimately decide what news its digital butler will provide and to

---

83 Karissa Bell, Gmail can use Google’s AI to write replies for you, Mashable, May 17, 2017 (http://mashable.com/2017/05/17/gmail-smart-replies/#wbmaFUiXI0qK).

84 Kurt Wagner, Facebook is using AI in private messages to suggest an Uber or remind you to pay a friend, Recode, April 6, 2017 (https://www.recode.net/2017/4/6/15203526/facebook-messenger-m-artificial-intelligence-ai-bots).

85 OECD Background Note, supra note 44; see also Algorithms and Collusion: Note by the European Commission, submitted for the OECD Competition Committee Hearings on 21-23 June 2017, DAF/COMP/WD (2017) 12, at 2 (14 June 2017) (noting that when it comes to recommending newspaper articles, personalization can limit the range of views that consumers are exposed to, which is the so-called “filter bubble” or “echo chamber” phenomenon).

86 OECD Background Note, supra note 44.


whom. We have already seen Google’s digital butler censor a Burger King video. According to the New York Times, the video stated:

“You’re watching a 15-second Burger King ad, which is unfortunately not enough time to explain all the fresh ingredients in the Whopper sandwich,” the actor in the commercial said. “But I got an idea. O.K. Google, what is the Whopper burger?” Prompted by the phrase “O.K. Google,” the Google Home device beside the TV in the video lit up, searched the phrase on Wikipedia and stated the ingredients.

But within hours of the ad’s release—and humorous edits to the Whopper Wikipedia page by mischievous users—tests from The Verge and BuzzFeed showed that the commercial had stopped activating the device.

Burger King, which did not work with Google on the ad, said Google appeared to make changes by Wednesday afternoon that stopped the commercial from waking the devices, in what amounted to an unusual form of corporate warfare in the living room. Google, which previously said it had not been consulted on the campaign, did not respond to requests for comment.

Censoring a fast-food restaurant’s annoying ad may not cause much alarm. But Google can also censor its maps, YouTube videos, Google News, AdWords, and search engine results. Other super-platforms benefit from similar powers. This self-censorship, given the super-platform’s power, is hard to detect.

A third risk is manipulation, whereby the digital butler’s algorithms select information according to particular business or political interests (of the super-platform), instead of its relevance or quality. We have seen this already in the Google Shopping case.

But a super-platform like Facebook, as Jonathan Zittrain warned, can also manipulate elections. He warned of the super-platform’s potential ability to predict political views, identify party affiliation, and engage in targeted campaigning to mobilize distinct groups of voters to take action. Robert Epstein likewise illustrated how Google, in manipulating the rankings of its search results, could shift the voting preferences of undecided voters by “20 percent or more—up to 80 percent in some demographic groups—with virtually no one knowing they are being manipulated.”

---


91 OECD Background Note, supra note 44.


93 Robert Epstein, How Google Could Rig the 2016 Election: Google has the ability to drive millions of votes to a candidate with no one the wiser, Politico, Aug. 19, 2015 (http://www.politico.com/magazine/story/2015/08/how-google-could-rig-the-2016-election-121548).
We have already seen instances in which super-platforms promoted certain corporate agendas. Google, for example, used its homepage to protest against the Stop Online Piracy Act, asking users to petition Congress.

As the European Commissioner concluded,

The way that algorithms are used to make decisions automatically could even undermine our democracy. These days, social media is a vital source of news. One recent study found that nearly two thirds of US adults get their news this way. So the scope for social media algorithms to create an alternative reality, by showing people one story after another that just isn’t true, is a concern for us all.\(^{94}\)

**Conclusion**

Mattel is now selling a baby digital virtual assistant, Aristotle. The assistant, among other things, will help purchase diapers, read bedtime stories, soothe infants back to sleep, and teach toddlers foreign words. Aristotle, according to one press report, tells the parents and infants in its soothing voice, “My purpose in life is to help comfort, entertain, teach, and learn from you.”\(^{95}\) Thus, for babies born in 2017, a digital assistant may become their lifelong companion, who will know more about each person than parents, siblings, or individuals themselves.

Often, we find it hard to quantify long-term costs and balance these against short-term gain. Digital butlers may be helpful, but we should be mindful about the power they may have on data gathering and distribution and the subsequent implications for privacy, competition and our welfare. We should not forget who is the real master of these helpers. We don’t pay the digital butler’s salary. Google, Apple, Facebook, and Amazon, are likely covering the digital butler’s cost. They control the data and algorithm, access the information, and can engage in behavioral discrimination. In doing so, its gatekeeper power increases in controlling the information we receive. But the larger concern is social and political, namely its ability to affect the marketplace of ideas, elections and our democracy. These privacy, economic and political concerns will increase when a powerful digital personal assistant is connected not only to our TV set, but our computers, smart appliances, security camera, smartphone, and smart cars.

It is easy to see the immediate benefits from these butlers. However, understanding the long-term risks, while harder to see, is key. The problems we identify spread across antitrust, consumer protection, and privacy law and so do the possible solutions. Any antitrust solution will depend on which digital assistants become dominant, their abuses, and the state of antitrust, consumer protection law and privacy law, and enforcement.

The good news, as a former head of the DOJ’s Antitrust Division observed, is that antitrust is evolving:


At bottom, these diverse voices agree on the basic proposition that it is unfair to allow companies to grab unearned monopoly power over markets that they can wield at the expense of consumers, workers, and would-be competitors. By and large, I think this increased public interest in antitrust and competition is a good thing. It is good for the public—because antitrust enforcement promotes the interests of the public over the power of the few—and it is also good for antitrust - because it keeps enforcers focused on the ultimate goal of antitrust, economic fairness.96

That evolution, however, is not problem free. One wonders whether antitrust’s current price-centric economics can evolve to address the challenges posed by digital butlers. Are the dated economics at the foundation of antitrust law irremediably broken, or is the problem simply that the authorities have not applied the economics in the right way? In addition, proposed changes may run counter to the business interests of leading market players, and as such be subjected to ongoing challenges.97

Antitrust law is ultimately informed, but not limited, by the prevailing economic theories. We have been forewarned about the antitrust agencies and courts’ need to “ramble through the wilds of economic theory.”98 As the Supreme Court recognized, the courts “are of limited utility in examining difficult economic problems.”99 Forty years later, some courts, in part for this reason, “remain skeptical about the efficiencies defense in general and about its scope in particular” in merger cases.100 Ultimately, as the Supreme Court warned, the courts “must be alert to the danger of subverting congressional intent by permitting a too-broad economic investigation.”101

So, the antitrust agencies cannot blame dated, faulty, or incomplete economics for their inactivity. We don’t need an economist to tell us why a monopoly should not steal its competitors’ products or detour traffic away from their stores. Nor may we need an economist when a dominant digital butler effectively does the same thing. Courts are already instructed “in any case in which it is possible, without doing violence to the congressional objective embodied in [the antitrust statute], to simplify the test of illegality … in the interest of sound and practical judicial administration.”102

No one likes a Stasi-Barbie, especially one that profits at your expense. We should ask our elected officials and enforcers how they will prevent the abuses by these digital butlers. But before we bring one home, we might also ask ourselves: do I know exactly how it will use my data, how objective its recommendations will be, and if and when its interests will diverge from my interests?

99 Id. at 609.
102 Id.