Tiny Salespeople:
Mediated Transactions and the Internet of Things

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Supreme Court Justice Samuel Alito wanted to dramatize how hard GPS surveillance would be for our nation's founders to envision. It would take a "very tiny constable," he noted in concurrence with the majority in *United States v. Jones*, "with incredible fortitude and patience" to stow away on a stage coach and monitor its owner's movements.[1] Here, I focus on the more plausible prospect of a very tiny salesperson. Specifically, I ask what it would mean for consumers if their everyday objects tried to sell them products and services—an uncomfortably realistic consequence of the "Internet of Things."

The Perils of Mediated Transactions

It's still relatively common to travel to a store to buy something. Tomorrow's consumers, however, will be *mediated* consumers. More and more of our transactions are taking place through technology—kiosks, computers, tables, smartphones, even glasses.

That transactions are mediated means a few things. Technology captures and retains many aspects of a consumer's interaction with a firm—by which I mean company or other business. We leave a digital trail of what we purchase, when and where we shop, and what we pay. This information is combined with other details and behavior such as what websites we visit or to whom we're connected on social media.

Contemporary privacy regulation—from fair information practice principles to privacy by design—focuses on this data flow. Regulators might inquire into what notice firms proffer to consumers before collecting data, how long firms store the data, and with whom they share the data.

But mediation has a second effect, one that I (and others) find increasingly interesting. Mediation also means that firms design almost every aspect of the interaction with consumers. This includes not only writing and updating the transaction's legal terms but also designing the physical or virtual environment. Firms draw the maze and write its rules, generally with their own goals in mind. Lawrence Lessig famously observed that "code is law";[2] code is also bargaining power.

Mediation has several upsides. The existence of a record, for instance, makes detecting fraud and reversing its effects easier. Firms often use what they learn about consumer habits to personalize and otherwise improve their services. Scott Peppet argues that augmented reality—adding a layer of mediation to everyday interactions—will also empower consumers to more easily compare prices or terms.[3] "Use your phone's camera to scan the bar code on a potential purchase," he points out, "and Amazon or Consumer Reports will instantly return price comparisons and consumer reviews."

But downsides exist. Firms have an economic incentive to use what they know about consumers to manipulate the marketplace.[4] Firms already use their understanding of human bias to set contract terms in a way that appears seductive but is actually to consumers' disadvantage.[5] Presumably what seduces consumer A might not always resonate with consumer B. Profiling enables firms to dynamically generate terms based on whether the specific consumer falls into a particular category such as "impulsive" or "optimistic."[6]

The situation is similar with price. Today, everything costs $9.99 because firms know that we tend to see the difference from $10 as greater than 1 cent. This price blindness lets firms extract a few cents of rent from consumers.[4] If a firm collects enough data about a consumer, however, it might be able to guess the consumer's specific *reservation price*—the highest amount he or she might be willing to pay for a product or service. This will

let the firm dynamically change its price and capture the surplus. Price comparison is no panacea if the firm blocks the practice (for example, by using unreadable bar codes) or if competitors also independently engage in price profiling.

The ability to design the transaction environment is independently noteworthy. Take Apple, for example. Consumers who purchase digital content on their computer, tablet, or phone presumably care about how long the content takes to download. In Mac OS X, the download progress bar's appearance can create the impression that downloading is occurring faster.[7] Similarly, faced with complaints about cell service coverage for the iPhone, Apple reportedly changed the signal bars in the new interface, doubling the size of the first bar and adding height to the second and third. These changes are nothing compared to the design psychology of, say, slot machines that create "near wins" apparently to trigger the release of dopamine by the gambler's brain.[8]

Getting Pushy

This set of commercial phenomena, more than anything else, is what worries me about the Internet of Things. The Internet of Things refers to the possibility of billions of devices—including everyday appliances such as your refrigerator—one day being networked and interactive. Some security researchers talk in terms of an *attack surface*, meaning the vectors from which an attacker can compromise a given system.[9] Obviously networking a device—such as a car—increases its attack surface by creating a new way to compromise it without physical access.[10]

This is a relatively well-understood problem—one the law addresses, for instance, by requiring adequate security for consumer devices and software. (The US Federal Trade Commission has brought various actions against websites, physical retailers, and one mobile device manufacturer to enforce Section 5 of the FTC Act, calling inadequate security an unfair or deceptive practice.) Somewhat less understood is how interactive, networked devices create new vectors by which to approach—and sometimes exploit—consumers. (At least one study is

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examining the possibility of making ads covertly tailored for implicit persuasion—for instance, by subtly combining faces.[11])

What networking "things" really does is further mediate consumers, and dramatically so. Recall mediation's effects: data collection and opportunities to design interactions. If a company can track not only my browsing habits but also when I open my fridge, it can better zero in on what junk food to advertise to me—and when and how to advertise it.

Moreover, historically, much consumption has occurred on the pull model—consumers actively seek out commercial interactions by traveling to websites or storefronts. Now, networked and interactive devices create the possibility of vastly more "push." If your refrigerator is going to remind you that you're out of cheese, perhaps it can suggest a cheese you might like or where to buy it. These decisions won't always turn on the consumers' best interests but rather the best deal device manufacturers can strike with advertisers. Our things will contain tiny salespeople with

a fortitude and patience born of intense corporate resources and economic incentives.

(B.J. Fogg has long observed that computers have many of the same advantages as people, in that we interact with them as though they were social entities capable of flattery and other techniques, and none of the limitations.[12] Computers have perfect memories, for instance, and can mask their identity. Ian Kerr also observed how social Internet bots might efficiently collect information from users.[13] Meanwhile, the FTC has long acknowledged the special harms that flow from in-person sales and has crafted special rules such as cooling-off periods.)

As with the founders and GPS, I'm not sure today's regulators and courts contemplate the prospect of tiny salespeople. So, we might be doomed always to fight the last battle. We'll focus on the increase in data flow that the Internet of Things will generate while ignoring the new attack surface. That our things will become tiny salespeople is hardly inevitable. The cost-benefit analysis will be subtle and complex. But technologists should at least countenance the possibility that a proliferation of interactive, networked devices will exacerbate the asymmetries of information and design we already see in the marketplace. Recognizing this possibility lets us think through how best to calibrate incentives and balance firm and consumer value. ∎
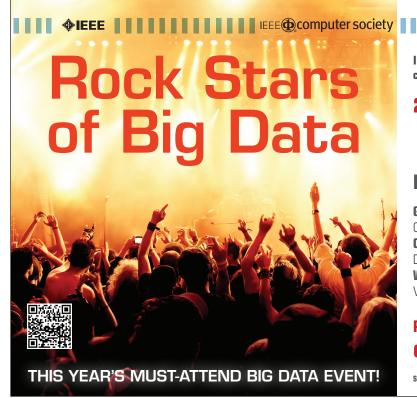
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