

Getting Hooked on Tech

Are technology companies maximizing profits by making users addicted to their products?

IT IS NOT a good year for Facebook. The company's ubiquitous platform, designed to bring users together, was used by Russian non-state actors to tear America apart by creating fake posts on highly divisive issues and using them to sway opinion in the lead up to the 2016 presidential election.

In hindsight, Facebook was the perfect weapon: used by billions worldwide, and more than half of Americans use it several times each day. That much attention, it turns out, could be weaponized by the Russians.

According to *The New York Times*, "Facebook found \$100,000 of ad purchases that were linked to the fake pages—designed to look like the pages of Americans animated by particular issues—that spread inflammatory messages about immigration, guns and other topics; derided Mrs. Clinton and supported Mr. Trump."

The impact of these efforts was perceived as so dire that Facebook agreed to turn over to Congress more than 3,000 ads used to influence attitudes during the election. At the time, Facebook founder and CEO Mark Zuckerberg said, "It's a new challenge for Internet communities to deal with nation-states attempting to subvert elections. But if that's what we must do, we are committed to rising to the occasion."

That's nice, but only tells one side of the story.

While the fake posts were designed to provoke outrage, some users kept coming back multiple times per day; they were shown even more fake news, and further influenced by false narratives.

If these types of sensational posts are like a drug, then users have been programmed to be unable to get enough of them from social media sites and the smartphones that display them.

How Tech Gets You Addicted

Facebook is just one of several companies that rely on users' continued atten-

tion to make money. Twitter and Google operate on this model, too. All three rely on advertising revenue to make money. The value of that advertising revenue is directly tied to the attention the platform can attract and keep from users.

Tech giants excel at getting attention, offering products with features users can't access anywhere else. It might be the ability to search for any information in the world using Google's search engine, or the ability to communicate and engage with friends and family from anywhere in the world by using Facebook. Users might even want to engage in a real-time conversation with thousands of other people about breaking news by using Twitter.

However, it is not just the content that keeps users coming back for more, but also how the platforms are engineered to exploit human psychology. While the subjective condition of "using tech too much" is not classified as a biological addiction, it can be a behavioral one.

"Tech companies develop their products in order to make them appealing and user-friendly, so you're keen to use them," says Daria Kuss, a psychologist and senior lecturer at Nottingham Trent University. Kuss researches the psychology of Internet use, trying to decode how products and services are designed to keep users returning for more.

"Some ways in which tech compa-

"It's a social validation feedback loop ... exactly the kind of thing a hacker like myself would come up with."

nies engineer their devices is to allow personalization, in terms of content, appearance, and usage—tailoring the products to the respective needs of the users," she says.

Facebook and Google lead the way in this arena. Facebook allows users to customize their personal profile to their liking and indicate their interests by engaging with content. Every reaction a user has to a post teaches Facebook's algorithms his/her preferences; these algorithms then serve more content that even better matches the user's preferences.

The result? The user visits and revisits the site, staying for longer, making them a richer target for advertising.

Google does something similar, trying to guess which search results will best match a user's query, then serving them up with increasing accuracy based on insights that machine learning algorithms extract from its immense pool of the world's search data. Companies pay Google to display their ads next to those increasingly relevant results.

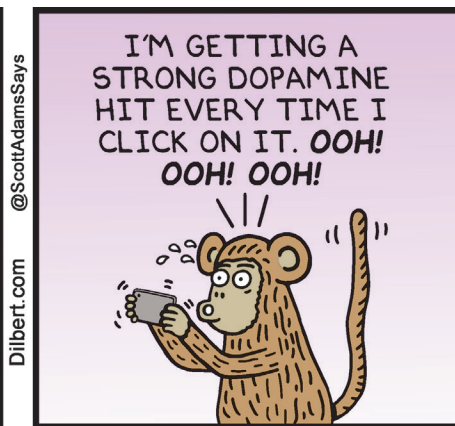
There certainly is nothing wrong with providing more of what users want, but tech giants include their fair share of socially and psychologically engineered tweaks to keep users coming back for more, and it goes beyond making the service more useful.

Sean Parker, a former president of Facebook, has recently become what he calls a "conscientious objector" on social media, speaking out against the negative effects of the platform he helped to create. He told *Axios* that the process behind Facebook and other social media websites is wholly concerned with consuming as much of users' time and attention as possible.

This means these companies "need to sort of give you a little dopamine hit every once in a while, because someone liked or commented on a photo or a post or whatever," Parker said. "And that's going to get you to contribute more content, and that's going to get you more likes and comments."

"It's a social validation feedback loop ... exactly the kind of thing that a hacker like myself would come up with, because you're exploiting a vulnerability in human psychology."

This also happens on smartphones,



where notifications train user to look because they have received a text message, social media update, or news alert.

Kuss details how this type of functionality manifests in games that you are unable to put down. "Many games use rewards that are delivered based on intermittent reinforcement schedules, i.e., rewards are provided only some of the times the gamer is performing the action, making it more likely for them to continue engaging in the behavior."

Except this is no game; it's a battle for your waking life—and one that can have negative effects on your health.

Hazardous to Your Health?

Caglar Yildirim, a professor of human-computer interaction at the State University of New York at Oswego, believes smartphone addiction is a real problem. In his research, Yildirim uses a questionnaire that scores people on the severity of their smartphone dependence. If you score between 100 and 200, you may actually experience severe anxiety when parted from your device.

"This might negatively affect your social life and relationships with friends and family," says Yildirim. "There are studies that show those who score high on the test tend to avoid face-to-face interactions, have high levels of social anxiety, and maybe even depression. It might affect your ability to work or study, because you want to be connected to your smartphone all the time."

One of the biggest dangers presented by addictive tech is distracted driving. According to the *Pew Research Center*: "In a 2010 Pew Research Center survey, nearly half (47%) of adults who use text messaging (equivalent to 27% of all U.S. adults) said they had sent or received messages while driving."

CNN reports nearly half of U.S. adults say they have sent a text while driving; distracted driving kills nine people and injures more than 1,000 every single day.

When addictive tech starts to override rational precautions like paying attention while driving, the consequences could be injury or death.

The mental toll of addictive services like Facebook can't be discounted, either. Another former Facebook employee, former VP of user growth Chamath Palihapitiya, said he does not allow his children use that social media service because he fears they will become addicted to "short-term, dopamine-driven feedback loops."

Kuss and a colleague analyzed previous studies on social media addiction in 2011; they concluded social media addiction actually "may be a potential mental health problem for some users."

To date, social media addiction is not formally classified as a mental health disorder. Just how much damage has already been done is impossible to tell, but the fact remains that many users check these services, almost unconsciously, many times a day—and this can have extremely negative consequences to time and health.

So what can users do to reduce their dependence on services and devices intentionally designed to be addictive?

"Personally, I would recommend, counterintuitively, to make time for technology use," says Kuss. "This takes the immediate pressure off to use technology." She recommends an hour in the morning and an hour at night, then setting the smartphone aside.

"I would also recommend putting the technology away when having dinners with the family and spending time

in face-to-face interactions with others."

Perhaps the most important step, however, is truly understanding there is a problem, she says.

"Overall, we need to create an increased awareness of our technology use. Our phones allow us to check the time we spend on specific applications and I recommend having a look at this—it's quite enlightening. The time we spend using these apps is often longer than we think." **G**

Further Reading

Cakebread, C.

If you haven't checked Facebook lately, you're in the minority, *Business Insider*, Oct. 2, 2017, <http://read.bi/2AT5WC4>

Shane, S., and Isaac, M.

Facebook to Turn Over Russian-Linked Ads to Congress, *The New York Times*, Sept. 21, 2017, <http://nyti.ms/2yS3wCb>

Sean Parker unloads on Facebook "exploiting" human psychology, *Axios*, Nov. 9, 2017 <http://bit.ly/2kg5Pdx>

LaMotte, S.

Smartphone addiction could be changing your brain, *CNN*, Dec. 1, 2017 <http://cnn.it/2kHY13J>

Texting while driving may be common, but it's illegal in most states, *Pew Research Center*, Nov. 15, 2013 <http://pewrsr.ch/2kFnNFZ>

Online Social Networking and Addiction—A Review of the Psychological Literature, International Gaming Research Unit, Nottingham Trent University, Aug. 29, 2011 <http://bit.ly/2J6TKBo>

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