

review articles

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Exploring the technical and ethical issues surrounding Internet advertising and ad blocking.

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Internet Advertising: Technology, Ethics, and a Serious Difference of Opinion

“Every time you block an ad, what you’re really blocking is food from entering a child’s mouth.”²⁵

“In reality, ad blockers are one of the few tools that we as users have if we want to push back against the perverse design logic that has cannibalized the soul of the Web.”²⁶

IN FALL 2015, Apple introduced a “content blocking” extension point into its Safari mobile browser, providing a hook for software that prevents advertisements from being loaded when Web pages

are rendered.²⁷ As it turned out, large numbers of people wanted to do just that.²⁸ Ad blockers had been available for some time, but their potential use in the world’s most popular mobile browser heightened their saliency and brought the debate over their use—a debate sometimes serious and nuanced, but often frivolous—into the mainstream media.²⁹

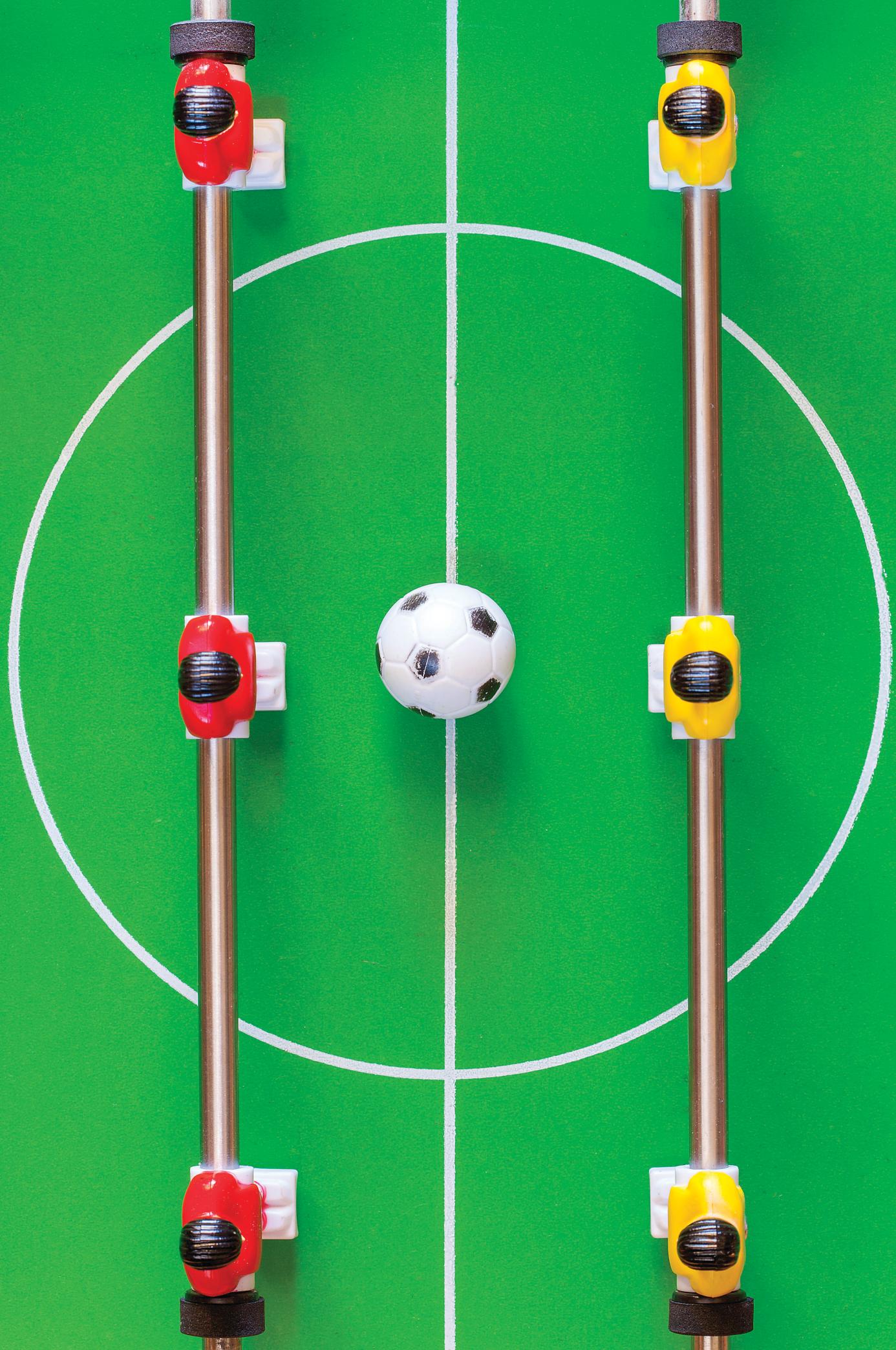
To put the issue into perspective, consider the following provided by PageFair, “a leading provider of counter ad block solutions to Web publishers,” in its 2015³⁰ and 2016³¹ reports on ad blocking:

- Ad blocking was estimated to have cost publishers nearly \$22 billion during 2015.
- As of November 2016, at least 309 million people are blocking advertising on their smartphones.
- 298 million of these people use an ad blocking browser, more than twice the number using blocking browsers in 2015.
- Ad blocking is particularly popular in emerging markets, with the largest number of active monthly users in China, India, and Indonesia. The U.S. is in ninth place.

In its 2016 report, PageFair made the following prediction: *Mobile ad blocking is a serious threat to the future of media and journalism in emerging markets, where people are coming online for the first time via relatively expensive*

» key insights

- Internet advertisers use networks of supply- and demand-side platforms and automated auctions to deliver targeted advertising to readers in a matter of milliseconds.
- Ad blocking is an existential threat to the Internet advertising industry, with costs to advertisers ranging in the tens of billions of dollars.
- The argument that ad blockers violate an implicit contract between the reader and content provider fails on legal grounds.
- A virtue ethics-based analysis clearly supports ad blockers, while also pointing to solutions that may benefit all stakeholders.



or slow mobile connections. Usage in Western economies is likely to grow as more manufacturers and browsers start to include ad blocking as a feature.³¹

Given the amount of money involved in advertising, one might expect a certain amount of invective on the subject of ad blocking. One would be correct. Ad blocking has been referred to as “evil” and as a form of “theft.”³² *Ad Age*, an advertising industry trade magazine, accused ad blockers of being exploitative, extortionate, and anti-democratic, all within the space of a single sentence:

*As abetted by for-profit technology companies, ad blocking is robbery, plain and simple—an extortionist scheme that exploits consumer disaffection and risks distorting the economics of democratic capitalism.*³³

Randall Rothenberg, president and chief executive officer for the Interactive Advertising Bureau accuses ad blocking “profiteers” of “stealing from publishers, subverting freedom of the press, operating a business model predicated on censorship of content, and ultimately forcing consumers to pay more money for less—and less diverse—information.”³⁴

On the other side of the debate, many have pointed to the ads themselves as fostering needless consumption while being tasteless, intrusive, and evil (this word occurs a lot in these discussions), while suggesting that the advertising industry brought ad blocking upon itself.¹

There are purely technical issues as well. The technology that allows Internet advertisers to better target potential consumers slows the loading of Web pages and places a significant burden

on wireless cellular links, a burden that is usually funded by unwilling users. The ad-blocking software provider Shine, an Israeli startup that began life in 2011 as an anti-virus software developer, estimates that advertising consumes between 10% and 50% of user data plans, depending on user location. A typical mobile gaming app with advertising was found to consume 5Mb over a five-minute session, but only 50Kb with ad blocking in place.¹⁷

Shine produces ad-blocking software that can be incorporated into cellular datacenters. In June 2016, the U.K. cellular service provider Three became the first to conduct trials using this software to block ads on cellular data connections.¹² Given that marketers are expected to have spent over \$100 billion on mobile ads in 2016,¹⁰ the response is expected to be extreme.

In this article, we explore how advertising networks and ad blockers work. We further consider how ad blockers are subverted, and whether they are ethical. The ethical analysis yields mixed results, but it does, however, suggest a solution that empowers users, allowing them to select the types of ads that they see and how often they see them.

The Technology of Ad Networks and Ad Blockers

Web browsers request a Web page from a server by sending an HTTP GET command to the appropriate Internet host. The host responds with HTML code that the Web browser uses to render the desired page and present it to the user. This much is both simple and ubiquitous, but the details, particularly when advertising is involved, are much more complicated.

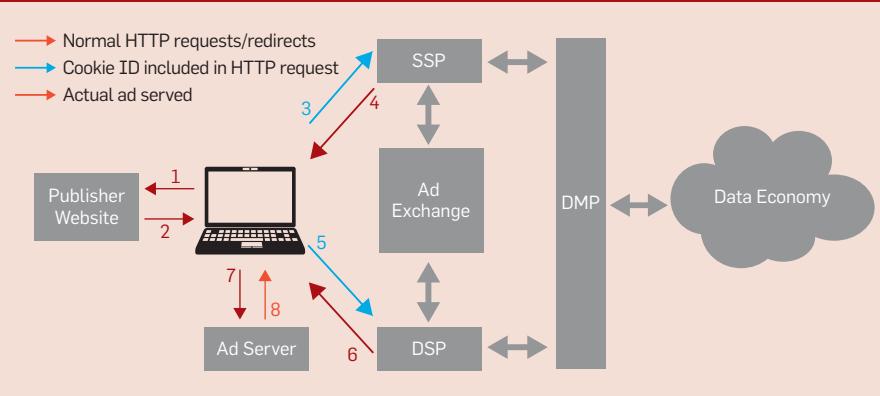
Suppose the Web browser requests a page from a content publisher that supports his or her work through advertising (this is represented in the accompanying figure by link 1). Most publishers do not generate their own advertising content, so they will embed requests for advertising into the HTML files they send to requesting users (link 2). When the requesting host attempts to render the HTML file, it will generate requests for advertisements from an ad exchange. The ad exchange, as shown in the figure, sits at the center of a network consisting of supply side and demand side entities. The supply side entities provide information about the user, while the demand side entities provide advertising in response to requests from publishers.

The HTML code provided by the publisher directs the host to a supply-side platform (SSP—link 3). The request sent to the SSP includes a cookie—a small string of information that was previously stored by the SSP on the user’s computer. The cookie enables the SSP to craft a response that is specifically tailored to the requesting user. In this case, the cookie will include a user ID that the ad exchange can use to coordinate bidding for an advertisement.

The ad exchange forwards the user ID and any other information that it may have about the requesting user to one or more demand-side platforms (DSPs) that place bids on behalf of advertisers for the opportunity to display their ads. Through a process known as cookie syncing, the DSPs are able to match the SSP cookie ID to a user profile, which is often stored and managed by a separate entity called a data management platform (DMP).

As multiple SSPs and DSPs can use the same DMP, the DMP may link a wide range of user IDs to the same person. This enables all interested parties (other than the user) to exchange information on the user and form a more complete picture of that user’s browsing history. First-party websites may also participate in the process, providing yet more user information. For example, if a user supplies an email address to a website to sign up for its newsletter, the email address can be linked at the DMP to the cookie IDs associated with that user. If the user provides a name and address to a website, that information may also

Internet ad delivery is a complex process involving multiple redirections, synchronization of user information, and an auction, all in a few tens of milliseconds.



be linked to the cookie IDs. The DMP may take this a step further by including information inferred from the user's social media activity, purchase history on various sites, search history, and email messages. Finally, the DMP may have access to data gathered offline. Data aggregators are known to collect data from publicly available records, including licensing records (for example, licenses for doctors, lawyers, pilots, or hunters or fishermen licenses), voter registration databases, court records, and DMV records, as well as buying data from commercial sources including brick-and-mortar store purchase histories and transaction information from financial services companies.⁹ Data aggregators also buy and sell information from each other. This whole system of transactions is often referred to as "the data economy." Through this data economy, the DMP is able to build a strikingly detailed simulacrum of an individual consumer, a simulacrum whose accuracy drives the advertisers' return on investment, and whose inaccuracy may drive the consumer to distraction.

If a DSP determines the user profile fits its target audience, it places a bid for advertising space on the web page being rendered by the host computer. The ad exchange selects an ad from among the bidding DSPs; a Vickrey auction is generally used, where the highest offer is selected and the amount paid is that offered by the second highest bidder. The winning DSP provides a URL for retrieving the ad. In an "impression"-based system, an agency ad server determines whether the ad is actually downloaded, and pays the publisher accordingly, with the cost per thousand impressions (CPM) being the most widely used statistic in Internet advertising.³⁵ All of this happens within tens of milliseconds, though the actual loading of the winning ad into the user's browser may take far longer depending on the bandwidth of the user connection and the size of the ad.

As a result of this process, the publisher of the content often has limited control over the safety, quality, or tastefulness of the ad seen by the content consumer. A publisher may, for example, be able to prevent advertisements from a particular advertiser or class of advertisers, but she may not be able to exercise finer control.

Given the amount of money involved in advertising, one might expect a certain amount of invective on the subject of ad blocking. One would be correct.

Ad blockers can use several methods to disrupt the process described earlier, thus prevent ads from being displayed. Many prominent ad blockers, such as Adblock Plus and its variants, block ads by preventing the browser from sending HTTP requests to certain URLs. The URL blacklist for a given blocker is often a crowd sourced effort, such as EasyList, the default blacklist used in Adblock Plus. EasyList is probably the most widely used blacklist; the number of EasyList downloads was used by PageFair and Adobe to estimate the prevalence of ad blocking in their 2015 joint report.³⁰

While URL blacklisting appears to be the most common method of ad blocking, the Electronic Frontier Foundation's Privacy Badger takes a different approach,³⁶ attempting to learn which domains and sites are tracking a user and blocking the ones that do. It detects behavior such as the use of uniquely identifying cookies, canvas fingerprinting, and the appearance of the same third-party site at multiple domains. As such, it blocks very few domains at first, but the more it is used, the more it learns to block. It should be noted that Privacy Badger aims to prevent tracking, not ads; but since the two are intimately connected, it often serves both purposes.

A third ad blocking method blocks website elements fitting certain patterns; for example, it could look for the "iframe" HTML tag and check to see if it contains text strings like "Sponsored" or links to a URL with the word "ad" in it. This method can block advertising served by the Web site itself as opposed to just third parties, advertising that includes ads embedded in search results and social media feeds.

This content filtering can happen at the client or at an intermediate proxy. Some ad blockers use a root certificate to redirect browser requests to a VPN or proxy that removes ad content using the methods previously mentioned before forwarding the HTML code to the browser. This approach can block ads for mobile apps as well as browsers, but it comes with the risks associated with having third parties interfere with browser traffic, risks that include the classic man-in-the-middle attacks. Apple recently removed several ad-blocking apps from its app store on this basis.³⁷

Publishers will sometimes try to circumvent attempts at ad blocking. Anti-ad blocking usually works by serving a fake ad in some way and verifying that it has been loaded or displayed. If it fails to load, the site stops displaying the primary content or refuses to load it in the first place. For example, a site can contain an iframe ostentatiously marked as “Advertising” and then use JavaScript to see if it was displayed.^a If the iframe is not displayed, the site does not provide the primary content. Similarly, the browser can be directed to load a JavaScript with a name, such as “ads.js,” that can be found in common ad blocker filter rules and check to see if it is run. Aside from trying to explicitly detect ad blockers, ad networks can obfuscate the URLs of their ads, such as by using IP addresses instead of domain names.

Ad blockers can often adapt, circumventing new anti-ad blocking mechanisms. Facebook recently announced it would prevent ad blocking,³⁸ only to have Adblock Plus announce a few days later that it found a way to defeat Facebook’s prevention technique.³⁹ This is but one example of the evolving arms race between publishers and ad blockers.¹⁶

Though the initial motivation for ad blocking may be annoying ads or tracking, increased computer security is a major side benefit. Online ads are usually pieces of code as opposed to static images or text. The end result of the ad auction process described earlier is that the user’s browser is redirected to a URL of the advertiser’s choosing. The retrieved object may take the form of JavaScript, Flash, or even Java code. Vulnerabilities in these frameworks can be used to execute malicious code on the client machine without the user noticing anything out of the ordinary. Even though browser support for Java and Adobe Flash is being phased out,⁴⁰ vulnerabilities in these frameworks are still being exploited. Java exploits are on the decline, but Flash vulnerabilities are still some of the most common vehicles for malvertising.⁴¹ While ad networks have measures in place to detect malvertising, there are ways to circumvent and avoid detection, at least temporarily, such as serving a legitimate ad until the ad network has approved

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the ad, only serving malvertising every 10th or 20th time, and not serving malvertising to certain IP addresses.⁵ Even large and reputable websites have been known to accidentally serve malvertising, making malvertising a potential problem for every Internet user.

Is Ad Blocking a Breach of Contract?

It would take a long law review article, and one written by another set of authors, to properly address the legality of ad blocking. We do, however, wish to address the oft-cited argument that the provision of free content that contains ads is done under an “implicit contract.”⁴¹ Under this contract, the consumer is provided with free content in return for the user’s agreement to view advertisements. This is not a new argument, as it has been applied by network executives to broadcast television for many years, sometimes in a very extreme form. In 2002, Jamie Kellner, then CEO of Turner Broadcasting, suggested that any systematic practice of using the bathroom during commercials was stealing.⁷

In the U.S., the legal concept underlying this argument is the “implied-in-fact” contract.^b The law is summarized as follows:

*To establish the existence of an implied in fact contract, it is necessary to show: an unambiguous offer, unambiguous acceptance, mutual intent to be bound, and consideration. However, these elements may be established by the conduct of the parties rather than through express written or oral agreements.*⁴²

As an example, suppose you agree to wash your neighbor’s car once a week. You receive payment for each of the first six weeks, but upon washing his car the seventh time, your neighbor refuses to pay because there was no written agreement. Most courts would agree that there was an implied-in-fact contract as evidenced by the conduct of the parties for the first six weeks. Your neighbor has to pay.

Now consider a real example in which it was found that there was no

^b U.S. contract law allows for two other types of contracts: express contract (written) and implied-in-law contracts (also called “quasi contracts,” they are more legal obligations than true contracts). We only address U.S. contract law here; other jurisdictions may be substantially different, and are well beyond our expertise.

^a See, for example, <http://adblockingdetector.johnmorris.me/how-thisplugin-works/>.

implied-in-fact contract. In 1917, the U.S. leased a pier from the Baltimore and Ohio railroad for the purpose of handling supplies destined for the war in Europe. An earlier fire was believed to have been an act of sabotage, so soldiers were deployed to guard the pier and surrounding equipment. The weather was cold, and the troop commander often complained about the tents in which his men were forced to live. A railroad official offered to build temporary barracks. Though there was never any discussion of compensation, the barracks were built. The railroad later sued to recover the cost of the construction, arguing there had been an implied-in-fact contract. In what became the 1923 case of *Baltimore & Ohio R. Co. v. United States*,² the Supreme Court disagreed. The Court stated that an “implied agreement” required “a meeting of minds inferred, as a fact, from conduct of the parties in the light of surrounding circumstances.” The Court found there had been no such meeting of minds, as the railroad company never intimated that it would expect payment from the government.

It follows that there are several reasons the alleged quid pro quo of viewing ads in return for free Internet content fails to rise to the level of an implied-in-fact contract. First, as with the *Baltimore & Ohio* case, there was no unambiguous offer. The Internet content consumer is rarely told precisely what is going to be loaded into his or her Web browser, and what is expected in return. Content consumers suffer the embedding of ads and, on occasion, trackers and other forms of spyware into their Web browsers without receiving any notice from the content provider whatsoever. In fact, as we have seen, the content provider may not know what is being injected into the consumer’s browser.

Second, the alleged agreement fails to satisfy the unambiguous acceptance element. Unlike the lawn-mowing example, there is no prior conduct that indicates a general understanding that an agreement is in place. The popularity of ad blockers^{20,30,31} indicates that most consumers do not want to see the ads, and clearly have not agreed to do so. A Reuters survey provides further evidence, indicating that even those who do not employ ad blockers are ignoring or avoiding the ads:

*More generally, a third or more (39% in the U.K. and 30% in the U.S.) say they ignore ads. Around three in 10 (31%/29%) say they actively avoid sites where ads interfere with the content.*²⁰

Are Ad Blockers Unethical?

In *After Virtue*, Alasdair MacIntyre describes the breakdown in ethical argument that occurs when the foundations for ethical systems are cut away, leaving proponents of differing perspectives to argue past each other without any basis for decisive engagement.¹⁴ Ad blocking provides a canonical example, as we have one group arguing for individual rights (the right to receive payment for one’s effort in providing content), while the other group argues for the general welfare (an Internet devoid of continual distraction caused by tasteless advertising). It is not clear how the two arguments can be reconciled, or how one can clearly overcome the other. We suggest a solution lies in a technologically mediated meeting of minds, but before we consider the solution, we offer a more detailed account of the ethical arguments.

The utilitarian approach, first propounded by Jeremy Bentham and John Stuart Mill in the late 18th and early 19th centuries, is based on the familiar precept that “it is the greatest happiness of the greatest number that is the measure of right and wrong.”³ In what follows, we will consider *act utilitarianism*, which focuses on the consequences of individual actions. We will also substitute “well-being” for “happiness” to counter some of the more obvious criticisms of utilitarianism.

Does the use of ad blockers create the greatest well-being for the greatest number? Those affected by the decision to block ads include the following:

- ▶ Ad blocking users,
- ▶ Ad viewing users,
- ▶ Content generators,
- ▶ Content publishers, and
- ▶ Advertisers

Should users choose to employ ad blockers, the following will arguably result:

- ▶ The ad blocking users will see fewer advertisements.
- ▶ The content generators will receive less revenue per reading user.
- ▶ The content publishers will receive less revenue per reading user.

- ▶ Advertisers will seek other venues for their advertising dollars.
- ▶ Some content generators will stop generating content.
- ▶ Some content publishers will stop publishing content.
- ▶ Some content publishers will publish content of lower quality.
- ▶ There will be less free content available to all users on the Internet, and the content that remains freely available will, in some cases, be of reduced quality.

It is important to provide some context for the suggestion that the quality of online content will be diminished by a general acceptance of ad blocking. Newspaper journalism was in decline well before the advent of ad blocking, or even the advent of the Internet, primarily because of the failure of its core business model.¹⁵ The business model was that of a quasi-monopoly: competition was limited, so that a local paper could charge higher prices for advertising, and then use the revenue to maintain reporters across the world. In essence, the local Wal-Mart paid for the Baghdad bureau through its advertising dollars. The limit on competition was due to a fact of technology: printing presses were very expensive to operate and maintain, so all but the largest municipalities could only sustain one or two (print) newspapers at any given point in time.²² In a pre-Internet world, the papers acted as an intermediary between advertisers and consumers, charging both for the opportunity to communicate. In a multi-newspaper market, the equilibrium was often unstable; a notable scoop could send more advertising dollars to the scooping paper, allowing the scooper to grow (literally) fatter and more attractive to the buyers.

The unraveling of this relationship began with the television era and the movement of affluent readers from the inner city to the suburbs. National and retail advertisers moved their dollars to television, and newspapers came to depend more on classified ads.⁶ With the advent of the Internet in general and Craig’s List in particular (founded in 1995), classified advertising revenue also began to leave the newspapers’ balance sheets. By 2010 the newspaper industry was in deep decline, with many major players facing bankruptcy (for example, the Tribune Company in

2008), and others left to cope with dramatically reduced staffs.

The consequences of a general use of ad blockers may thus be characterized as a *further* reduction in the quality of free online content through the departure of some Internet content generators and publishers to other ways of making a living. For large numbers of consumers these are apparently acceptable outcomes given what they avoid: the problems associated with spyware and the relentless distraction of advertising. There is also evidence that Internet readers do not greatly value what they are reading; given the choice between paying for the content and losing it, most prefer the latter. The aforementioned Reuters survey found that only 10% of online users appeared to be willing to pay for once-free news content.

After a sharp upturn in 2012–2013—when a large number of paywalls were introduced—our data shows very little change in the absolute number of people paying for digital news over the past year. In most countries the number paying for any news is hovering around 10% of online users and in some cases less than that.²⁰

If Internet readers and users of ad blockers are rational actors who are making decisions based on their individual well-being, and as the readers outnumber the writers and advertisers, one may conclude that the use of ad blockers provides the greatest well-being for the greatest number. From a utilitarian perspective, ad blocking is ethical; the content providers should look for a better business model.

The counterargument is ready at hand: this analysis clearly does not take into account all stakeholders; the content generators and publishers, for example, would almost certainly not be pleased with the consequences of this utilitarian calculus. This is an example of a key criticism of utilitarianism; namely, that in emphasizing aggregate well-being, some individuals may be left in far worse condition than before.

A deontic analysis avoids this particular problem. Immanuel Kant suggested in his *Groundwork of the Metaphysic of Morals* that there is a single primary moral obligation, which he referred to as the “categorical imperative” (CI). Kant offered several formulations of CI, including one that sounds very much like the golden rule: “act so that

you use humanity, as much in your own person as in the person of every other, always at the same time as end and never merely as means.”¹³ Ad blocking readers arguably do not satisfy this formulation—they treat the content generators as means rather than an end in themselves, taking their work product without respecting their efforts to make a living. It appears that Kant is on the side of the advertisers, while Bentham favors the general reader.

Contractualism, an ethical theory related to Kant’s deontological approach,¹⁸ more clearly takes into account all interested parties, while pointing to a potential solution. In *What We Owe Each Other*, T.M. Scanlon²¹ offers the following ethical rule for action (emphasis added):

An act is wrong if its performance under the circumstances would be disallowed by any set of principles for the general regulation of behavior that no one could reasonably reject as a basis for informed, unforced, general agreement.

In establishing rules for behavior, Scanlon suggests that we must consider the perspectives of all stakeholders, and define a basis for informed general agreement. This would require communication between all stakeholders, something that is sorely lacking in the context of online advertising. We will return to this point when we consider possible solutions.

The third and final approach to be considered shifts the balance of the argument in favor of the general reader, but on a far firmer basis than the arguments of Bentham et al. Aretaic, or *virtue ethics*, emphasizes virtues of mind and character.^{8,11} Virtue ethics originated with Aristotle’s *Nicomachean Ethics* and his notion that the ultimate aim (*telos*) of an individual is to live a virtuous life. A virtuous life is a life lived according to reason, where decisions are based on a set of values held dear by the individual. Virtue ethics thus involve the questions of “what is desirable, good or morally worthwhile in life?” “What values should we pursue for ourselves and others?”⁸

Virtue ethics has enjoyed a recent resurgence, both in philosophy departments and in schools of technology. With regard to the latter, value-based design practices have been developed based on various lists of fundamental

human values. For example, in *Ethical IT Innovation*, Sarah Spiekermann points to both Aristotle and Maslow while concluding that technical design must be based on an understanding that knowledge, freedom, and autonomy are preconditions for human growth, self-esteem, friendship and self-actualization.²⁴

At best, the design of advertising technology shows little concern for knowledge, freedom, and autonomy of consumers. At worst, advertising technology actively works to subvert these values. This subversion can be seen through the lens of the “attention economy,” a term coined by Herbert Simon to capture the finite nature of the individuals’ attention in the face of a seemingly infinite amount of information.²³ The attention economy is reflected in advertisers’ insertion of themselves into virtually all personal interactions in everyday life, ranging from highway billboards to doctors’ offices to the bottoms of the trays at airport security. Writing for the “Practical Ethics” blog of Oxford University, James Williams argues the resulting distractions are more than an annoyance, they “keep us from living the lives we want to live.”

In the short term, distractions can keep us from doing the things we want to do. In the longer term, however, they can accumulate and keep us from living the lives we want to live, or, even worse, undermine our capacities for reflection and self-regulation, making it harder, in the words of Harry Frankfurt, to “want what we want to want.” Thus there are deep ethical implications lurking here for freedom, well-being, and even the integrity of the self.¹⁹

From a virtue ethics standpoint, it follows that the design of Internet advertising technology is itself unethical in that it works against the human project of self-creation. Ad blockers are thus not only ethical, but are literally a matter of self-defense. Quoting the Practical Ethics blog once again:

In reality, ad blockers are one of the few tools that we as users have if we want to push back against the perverse design logic that has cannibalized the soul of the Web.⁶

Solutions and Conclusion

The advertising delivery systems described in this article are the antithesis of value-based design. The values that Spiekermann and others point to as a foundation for virtue-based

design—knowledge, freedom, and autonomy—are precisely the values that online advertising systems most systematically undermine.

Internet advertisers exchange information about users without their knowledge or control, using that information to manipulate users into behavior they might not otherwise have exhibited. This summary may seem harsh, and some may argue that advertisers would happily engage in more ethical behavior if better channels of communication were provided to interested consumers. A solution beneficial to all may lie in a virtue-based redesign. Such a redesign would embed T.M. Scanlon's suggestion that there be an "informed, unforced, general agreement" among all parties. The agreement would be based on a system that provides revenue for content generators and connects advertisers to interested consumers while reducing the deleterious impact of the current system of advertising on the reading public. The key step lies in empowering the reading/consuming public—letting them choose whether they will download ads, and if so, what type of ads. Should a reader choose not to download ads, he or she should be given the opportunity to pay for ad-free content.

The supporting technology for such a system already exists in the current ad networks. Recall the current scheme of directed Internet advertising relies on the use of cookies stored on user machines. These cookies are sent to service-side and demand-side platforms to obtain directed advertising for insertion into content initially requested by a user. Suppose the cookies are replaced by information explicitly provided by the user that indicates buying habits and interest in specific consumer goods. The data management platform (DMP) would request, coordinate, and update this user-supplied information as necessary. Rather than inferring potential sales from browsing habits, advertising networks could make advertising bidding decisions based on the clearly expressed desires of potential consumers. Such a system would increase the agency of the browsing user, while potentially increasing return on investment for advertisers.

Such a solution will require careful design and far more communication between stakeholders than currently takes place, but it offers the potential for clearly informing readers of their options, options upon which they can exercise rational choice in pursuit of their own individual goals. We hope that advertisers see this as an opportunity.

We have argued that ad blocking is not a violation of an existing contract (at least in U.S. law). This does not mean that ad blocking is beyond the reach of earnest lobbyists and subsequent legislation. One might expect, however, that such legislation would not be very popular with the general public. We hope the agreement suggested here takes form before the battle between advertisers and ad blockers escalates any further.

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