

# Real (Software) Abstractions

*On the Rise of Facebook and the Fall of MySpace*

---

**Robert W. Gehl**

On January 12, 2011, *Bloomberg News* publicly broke the announcement MySpace's CEO Mike Jones made to his employees: the site was either going to be sold or spun off its parent company NewsCorp.<sup>1</sup> The news came as little surprise as web industry reporters had been reporting on the demise of MySpace for at least two years. In 2009, MySpace laid off 30 percent of its employees, cutting four hundred jobs.<sup>2</sup> This was followed by a further cut two years later, reducing its workforce to roughly five hundred.<sup>3</sup> This restructuring of the company was a reflection of the downward slide of the site's traffic and revenues,<sup>4</sup> and Jones's announcement marked a low moment in MySpace's eight-year run. In late June 2011, MySpace was unceremoniously sold for \$35 million to an advertising network.<sup>5</sup> Five years prior to the sale, MySpace was the most popular social networking site in the world, and by some estimates the most visited website in America, beating Yahoo! and Google.<sup>6</sup> By the end of 2010, however, it was clear that Facebook was the dominant social networking service, and MySpace began rebranding itself as a social entertainment site, effectively ceding the social networking market to its rival Facebook.<sup>7</sup> MySpace even went as far as integrating many of its functions into the growing Facebook Connect service, which allows third-party sites to connect to Facebook users and offer customized interfaces based on user preferences.<sup>8</sup>

It is difficult to mourn the creative destruction of MySpace. After all, the site helped pioneer the exploitative business practices of Web 2.0, where, as Web 2.0 advocate Tim O'Reilly puts it, the users "build the business for you" by creating the content of a web page for free.<sup>9</sup> In Web

2.0, users are encouraged to process the constant streams of new digital artifacts such as avatars, status updates, Tweets, “Likes,” and media, while Web 2.0 site owners constantly monitor user labor and store the associated data sets in archives for sale to marketers. MySpace was no exception to this business practice, and its sale to NewsCorp for over \$500 million in 2005 was at the time seen by industry pundits as a savvy purchase in light of the seemingly endless self-commodification of that site’s users.

However, MySpace’s failure and the concomitant rise of Facebook does provide a moment to nuance the critiques of Web 2.0, social media, and ideologies of participation found in the works of Mark Andrejevic, Larry Lessig, and the authors of the articles collected in *First Monday’s* special edition on Web 2.0.<sup>10</sup> As scholars of science and technology studies (particularly in the social construction of technology school) argue, a critique of a failed technology allows us to avoid reifying successful ones as the natural result of technological development.<sup>11</sup> Hence, a critique of MySpace at this stage in its existence is a chance to avoid technological determinism. Furthermore, given the impermanence of websites, a postmortem of MySpace serves to somewhat preserve its memory for the public record.

Thus, this paper contrasts the dominance of Facebook in social networking services (SNS) with the concomitant failure of MySpace. I argue that MySpace failed to associate its users, software, and third parties because it failed to produce an effective real software abstraction. I first develop this idea by synthesizing the software-engineering concept of abstraction and the Marxian concept of the real abstraction. Next, I compare MySpace and Facebook at the levels of aesthetics, code, culture, and appeal to marketers. I argue that instead of creating an architecture of abstraction in which users’ affect and content were easily reduced to marketer-friendly data sets, MySpace allowed its users to create a cacophony of “pimped” profiles that consistently undermined efforts to monetize user-generated content. In contrast, Facebook has proven to be extremely efficient at reducing users to data sets and cybernetic commodities, all within a muted, bland interface that does not detract from marketing efforts. In other words, Facebook has associated social and technological elements into a *real software abstraction*, thus managing its users as immaterial laborers in the affective online marketplace.

## **Two Forms of Abstraction: Software Engineering and Marx’s “Real Abstraction”**

### Software Abstraction

Every profession has a literature that expresses the required practices and cultural norms of the field, and software engineering is no exception. An important foundational document in software engineering is Frederick

Brooks's classic tale of the development of the IBM System/360, *The Mythical Man-Month*.<sup>12</sup> Its publication in 1975 provided an influential explication of the nascent field of software engineering, drawn from the heart of what was the most powerful computer company in the world.

Brooks's argument about the production of software centers on a fundamental conceptual division between the *architecture* of the program and its *implementation*. "By the *architecture* of a system," he writes, "I mean the complete and detailed specification of the user interface. For a computer this is the programming manual. For a compiler it is the language manual. For a control program it is the manuals for the language of languages used to invoke its functions. For the entire system it is the union of the manuals the user must consult to do his entire job."<sup>13</sup>

The architecture is thus the surface of the program, the interface, the layer that the user will work with. As the spatial metaphor "architecture" implies, the architecture defines the space of the program: within it, certain things are possible. What is not possible is not to be contained in any shape in its architecture. For a software project to be successful, the architecture must be clearly specified early and act as the guiding document for all the tasks of realizing it.

Once the architecture is specified, implementation begins. Implementation involves what is popularly thought of as the work of making software: coding. Brooks argues that this is when software is "realized"; it is achieved by coding the interlocking components that will enable the architecture to function as specified. As such, whereas architecture is ideally rigidly specified, implementation is largely open-ended: one might use a variety of coding techniques or languages to achieve the functions described in the architecture. However, what is not allowed in Brooks's prescription is multiplication of functions and features; he uses the Cathedral of Reims as an example, because the centuries-old structure has a "unity" that "stands in glorious contrast" to other cathedrals which contain multiple architectural styles. Reims achieved its integrity "by the self-abnegation of eight generations of builders, each of whom sacrificed some of his ideas so that the whole might be of pure design."<sup>14</sup> Brooks argues that implementers need to similarly subsume their desires for individual expression in order to maintain the integrity of the architecture.

Contemporary software designers have built on Brooks's architecture/implementation hierarchy by refining the organization and planning of software systems. At the heart of contemporary thinking lies the concept of *software abstraction*. As Colburn and Shute<sup>15</sup> explain, software abstraction has its roots in Lockean philosophy. Like the distinction between "mountain" and Mount Everest, abstraction in computing means shifting from the particularities of the machine (the specific configuration of its hardware) to the general software which works on that hardware:

At a basic level, software prescribes the interacting of a certain part of computer memory, namely the program itself, and another part of memory, called the program data, through explicit instructions carried out by a processor. At a different level, software embodies algorithms that prescribe interactions among subroutines, which are cooperating pieces of programs. At a still different level, every software system is an interaction of computational processes. Today's extremely complex software is possible only through abstraction levels that leave machine-oriented concepts behind.<sup>16</sup>

The machine-orientated concepts which are left behind are the material, electronic events that always happen in modern computers: "Whatever the elements of computational processes that are described in textual programs . . . they are never the actual, micron-level electronic events of the executing program; textual programs are always, no matter what their level, abstractions of the electronic events that will ultimately occur."<sup>17</sup> Ultimately, computer programmers use abstraction to hide the material machine behind increasingly complex layers of code, layers which become a stack of abstractions, with concrete lower ones hidden by the more complex layers on top.

This practice is now codified in the most important professionalizing document in software engineering: the *Guide to the Software Engineering Body of Knowledge* (commonly known as the *SWEBOK*), produced by the IEEE Computer Society Professional Practices Committee. Per this guide, the overall architecture—the highest level of abstraction—is the blueprint for the entire project: "a software design (the result) must describe the software architecture—that is, how software is decomposed and organized into components—and the interfaces between those components. It must also describe the components at a level of detail that enable their construction."<sup>18</sup> This highest abstraction hides its internal, heterogeneous details, which are often expressed as modules (themselves conceived of as abstractions). The particular, line-by-line labor of coding is always secondary; it is the process of building modules within the larger architecture. Ideally, code should never get in the way of the architecture, only serve it.

However, the roots of abstraction do not only lie in Lockean philosophy or in the instrumental need to simplify complex engineering tasks; they also lie in the division of labor inherent in large software projects built in informational capitalism. As Liskov and Guttag note, "The basic paradigm for tackling any large problem is clear—we must 'divide and rule.'" Their method to divide and rule is to plan the software project in a way that allows individual coders to work "independently with a minimum of contact," thus alleviating the inefficiencies of organizational communication. The way this is achieved is by "decomposing" the architectural abstraction into modules, small programs that "interact with one another in simple, well-

defined ways. If we achieve this goal, different people will be able to work on different modules independently, without needing much communication among themselves, and yet the modules work together.”<sup>19</sup> For them, the act of constructing a large program and the act of managing labor are one and the same; decomposing abstractions into modules is the same as decomposing a large workforce into individual workers or small teams who answer to the architects of the system.<sup>20</sup> This division and hierarchy must be part of the overall organization of the company producing the software. As software engineer Phillippe Krutchen explains, “The architectural design approaches need to be supported by a matching organization that takes architecture as a key function, and understands its value and how it flows into other areas, such as planning, project management, product management, design or deployment.”<sup>21</sup> For these software engineers, architecture is the infrastructure that determines both how the software functions and how the organization of labor functions. Since software production remains a labor-intensive process (despite the development of compilers and higher-level languages), management of labor is crucial. As Brooks put it, “deliberate, even heroic, management actions are necessary to achieve coherence.”<sup>22</sup>

### Marxian Real Abstraction

While there appears to be a clear division in software abstraction between its loftier philosophical aspects and its down-to-earth management of labor, if we draw on Marxian critiques of abstraction, it becomes clear that these elements are mutually constitutive. Abstraction in software engineering is built on the foundations of abstraction in Western thought since the Enlightenment, and its roots lie in the rationalized management of labor. Harry Braverman’s<sup>23</sup> *Labor and Monopoly Capital*, a work which critiques Taylorism and details the separation of conception into the realm of capitalist management and execution into the hands of deskilled labor, points the way toward a critique of software abstraction, because clearly there are elements of the distinction between larger conceptual ideas (in architecture) and execution (in implementation). However, his emphasis on deskilling does not square with the relative autonomy of implementers as they realize the software architecture; their task is not as regimented as, say, a drill press operator’s. Although his is not a Marxian critique, David Golumbia’s<sup>24</sup> work on “computationalism” and the privileged place of Western rationality in general and the computer in particular points toward a way to dissect software abstraction as a hierarchical, authoritarian practice readily appropriated by neoliberalism.<sup>25</sup>

However, Alfred Sohn-Rethel’s<sup>26</sup> *Intellectual and Manual Labor* provides the clearest analysis of abstraction as both an ideal and material

practice. Starting with Marx's assertion that "it is not the consciousness of men that determines their being, but, on the contrary, their social being that determines their consciousness,"<sup>27</sup> Sohn-Rethel argues that ideal abstractions arise due to concrete actions in social formations. "Abstraction can be likened to the workshop of conceptual thought and its process must be a materialistic one if the assertion that consciousness is determined by social being is to hold true. A derivation of consciousness from social being presupposes a process of abstraction which is part of this being."<sup>28</sup> This leads to Sohn-Rethel declaring the money-commodity to be a real abstraction, a contradictory phenomenon that "exists nowhere other than in the human mind but it does not spring from it. Rather it is purely social in character, arising in the spatio-temporal sphere of human interrelations. It is not people who originate these abstractions but their actions."<sup>29</sup> As commodity exchange gave rise to the universal equivalent of money, it also gave rise to abstract thinking. Since the money-commodity is timeless and socially disconnected to whatever material represents it, it allows its users to imagine other possible ideal formations that are timeless and diffuse as well as divorced from the rhythms of the natural world. The money-commodity thus becomes a second nature, as real as primary nature, and just as capable of shaping human social relations. This analysis leads Sohn-Rethel to the startling three-part thesis: "(a) that commodity exchange is an original source of abstraction; (b) that this abstraction contains the formal elements essential for the cognitive faculty of conceptual thinking; (c) that the real abstraction operating in exchange engenders the ideal abstraction basic to Greek philosophy and to modern science."<sup>30</sup> In other words, real abstraction shapes social life and leads to scientific, ideal abstractions.

Sohn-Rethel's recent interlocutor Alberto Toscano has modified the former's theory to address cognitive capitalism. For him,

society is above all relation: the role of these univocal simple abstractions—such as value, labor, private property—in the formation of the concrete must be carefully gauged so that they do not mutate back into those powerless and separate, not to mention mystifying, intellectual abstractions that had occupied the earlier theory of ideology. But these abstractions are not mental categories that ideally precede the concrete totality; they are real abstractions that are truly caught up in the social whole, the social relation.<sup>31</sup>

Thus, Toscano draws on Sohn-Rethel, Althusser, Žižek, and Roberto Finelli to expand the concept of real abstraction to any ontological phenomenon by which "capital qua substance [becomes] 'Subject.'"<sup>32</sup> This includes familiar points of entry into historical materialist analysis: abstract labor, the commodity, and money. As with any conceptual expansion, debate over the primacy of any one real abstraction is possible. However, regardless of the primacy of one real abstraction (say, the money-commodity)

over another (say, abstract labor power), the effects of any real abstraction include material consequences. In any case, *real abstractions express themselves in social organization and are expressions of social organization*. They are real because they are actions; they are abstractions because they become part of the immaterial constitution of a whole way of life.

Thus, we see that software abstraction is not simply a method to mentally and ideally conceive of a software system; it also functions as a real abstraction, something that is paradoxically both ideal and concrete, expressing itself in concrete effects. Software abstractions, like real abstraction, are an effect of capitalism, a system of which Marx argued, “individuals are ruled by abstraction, whereas earlier they depended upon one another.”<sup>33</sup> The architectural specifications of a software project are, in fact, capital qua substance becoming “Subject.” This subject organizes labor in order to produce software commodities. Coders—intelligent, relatively autonomous human laborers—become objects producing object-oriented software systems for the benefit of their employers.<sup>34</sup> They are ruled by the software abstraction, the architecture. Just as Sohn-Rethel saw Kant’s “pure reason” as an artifact of the mental/material labor split (and as an artifact of class division), so too is the architect/implementer division an artifact of class, with the same power to dominate workers as Taylor’s division of conception and execution—even as it provides implementers with some autonomy to creatively write their code.

### **Real Software Abstractions in Web 2.0**

Certainly, the progression from the nascent professionalizing document *The Mythical Man-Month* to the highly structured *SWEBOK* is not linear nor has its attendant vision of labor in software production gone unchallenged. An obvious challenge to the proprietary mode of software production used by IBM, Microsoft, and Apple has been the open-source movement, led by programmers such as Richard Stallman and Linus Torvalds. Eric Raymond’s “bazaar” model is perhaps the quintessential riposte to Brooks’s architecture/implementation concept.<sup>35</sup> Raymond explicitly contrasts the authoritarian model of cathedrals and proprietary software with bazaars and open-source software. Whereas an architecture/implementor system hinges on the division of labor I have described—a division of labor Brooks sees as necessary to creating any coherent artifact—the bazaar model hinges on many people contributing freely to a project according to their abilities and in nonpredetermined amounts of time, just as small shopkeepers may set up tables and peddle their wares in a public space. In the most idealized form, the open-source “bazaar” model requires no central arbiter or authority; rather, every contribution is simply judged by one criterion: does it work? This model has been nota-

bly used in the production of GNU/Linux, which is a free, fully fledged, nonproprietary alternative to Windows or Mac OS.

The open-source model of production has greatly influenced Tim O'Reilly's concept of Web 2.0.<sup>36</sup> Web 2.0 arises, O'Reilly argues, out of the larger "architecture of participation" found in open-source software systems such as GNU/Linux and the World Wide Web. These systems are built to be open to inspection and alteration. Their openness allows anyone who has the time and technical ability to contribute to them and shape them to heterogeneous needs. Web 2.0 is marked by user-generated blogs, wikis, and web pages, all of which indicate a fundamental shift from closed, industrial modes of software and content production to a user-led, "produsage" model.<sup>37</sup> Just as the "2.0" in Web 2.0 indicates, on the surface there appears to be a clean break between the old models of media and software production to new ones marked by freedom, personalization, and participation. Once we update our software from version 1.0 to 2.0, there is no going back.

This appears to undermine my argument for the *continuity* of software production models and management of labor by capital by way of the real software abstraction. How do we move from industrial software development to the chaotic, user-led and -created world of Web 2.0? How can anyone argue that the real software abstraction, which clearly functions to manage the labor of coders in firm-based software production, has been carried into social networks where the users are in control? After all, prior to the widespread use of computer networks, the *professional* (that is, not "user-led") practices of software engineering were limited to software firms such as IBM and Microsoft.

The answer lies in the shift from software for personal computers to software built specifically for the web. The advent of Web 2.0 and cloud computing in the 2000s introduced the "Web as Platform,"<sup>38</sup> shifting the emphasis of developers from building iterations of software for computer platforms to the "perpetual beta" model of development for the web. A quick contrast between Microsoft Word and Google Docs illustrates this: while Microsoft builds Word as discrete versions to be released every few years (Word 95, 98, XP, 2007, and so on) and used on a personal computer, Google's software engineers release small changes to Docs on a scale of days, not years, and Google Docs works on nearly any web-enabled device. A user might upgrade a computer to take advantage of the latest version of Word, but there is less need to think in terms of hardware when it comes to web-based software, because web-based software exists independently of any given computer.

However, the most salient change that has come with the shift in platforms lies in the ways in which the labor of software implementation is breaking out of the firm and being "crowdsourced" on the web.<sup>39</sup> In an

ideal Web 2.0 site, the user is conceived of as an *implementer*, a laborer responsible for realizing the architecture conceived of by the site owners and designers. As the authors of the O'Reilly Media tech book *Web 2.0 Architectures* argue

a key trend in Web 2.0 is the inclusion of the user as a core part of any model. Most Web 2.0 examples have breached the purely technical realm and include users as an integral part of their workflow. Online applications are more than mere software; they represent a process of engagement with users. Users provide key functionality and content in most Web 2.0 applications, helping to build a web of participation and collaboration.<sup>40</sup>

The “engagement” of the user could be thought of in terms of “interactivity” or “participation” as Mark Andrejevic<sup>41</sup> has so aptly described. But it also could be thought of as implementation. Web 2.0 sites are essentially empty frames: imagine Twitter, Facebook, or YouTube without any user-generated content. But rather than dwell on what’s missing, the frame itself should be examined. It is, in fact, an *architecture*, waiting for a user to realize it with content.

The ideal Web 2.0 site is thus a real software abstraction capable of directing users, each of whom labors over a small portion of the site, exchanging bits of personal data for access to the service and to other users. *Web 2.0 Architectures*, like Brooks’s classic text and the *SWEBOK* before it, offers an idealized vision of software that has real effects on the organization of labor needed to implement it—the only difference between Web 2.0 and prior iterations of software is the use of users as implementers (in addition, of course, to the waged laborers who work for these firms and create the frames themselves by coding them in Javascript, HTML, PHP, and so on). This idealized Web 2.0 architecture will inform the distinction between MySpace and Facebook and explain—at least in part—how the latter thrived and the former has become a latter-day Pets.com.

### **MySpace’s Concrete Chaos versus Facebook’s Abstractness**

For Marxian critics of Web 2.0, MySpace has functioned as an exemplar of exploitation and panoptic surveillance in social media.<sup>42</sup> As Mark Coté and Jennifer Pybus argue, MySpace is a biopolitical disciplinary system meant to train its users to be immaterial laborers. “The ‘work’ of MySpace, as a corporate entity, is to ‘monetize’ [the affective work of users] in a manner which does not compromise the good will of users.”<sup>43</sup> However, MySpace’s market failure and Facebook’s rise require us to nuance these critiques. In spite of MySpace’s power to create and discipline its users as immaterial laborers and sell their data to marketers, why did MySpace ultimately fail?

A simple aesthetic comparison of the sites reveals a path to an answer. Consider a subculture that may not have too much obvious appeal to marketers and advertisers: Satanists. Facebook's openness allows for users to express a wide range of interests, including Satanism. The Satanist Facebook page features an inverted pentagram as its profile image.<sup>44</sup> The pentagram is white on a black field; it is a clean SVG file, with no pixilation. As such, it fits into the overall aesthetics of Facebook: sans-serif fonts, clean blue banners, rounded edges, black text on a white background. Next to the pentagram is a "Like" button, a binary switch which allows Facebook users to signal their affiliation with Satanism. As of this writing, over 7,000 Facebook users "like" Satanism. Below this "Like" button is an excerpt from Wikipedia, pulled in with Javascript and neatly displayed in its own HTML div tag in the center of the profile. According to the Wikipedia excerpt, "Satanism is a religion that is composed of a diverse number of ideological and philosophical beliefs and social phenomena. Their shared features include symbolic association with, admiration for the character of, and even veneration for Satan or similar rebellious, promethean, and liberating figures."<sup>45</sup> The Wikipedia description, arising as it has out of that encyclopedia's "Neutral Point of View" policy, is clinical and detached, fitting well with the clean interface of Facebook. In terms of code, the use of Javascript to pull in external content such as the Wikipedia excerpt, along with highly standardized HTML and CSS, results in 68 lines of code; again, even at the code level, Facebook is well organized. In all, the Facebook Satanist page, like all Facebook pages, is so aesthetically clean it renders the content in the frames nonthreatening; one imagines the most subversive content being muted within this architecture, reduced to a series of HTML divs, smooth images, clinical text, and well-structured code.

On the other hand, MySpace's users have constructed a wild, cacophonous array of pimped pages, using coding hacks to radically alter the layout and settings of their pages. Staying with the Satanism theme, we will examine Satan's own MySpace page.<sup>46</sup> While MySpace's default layout is similar to Facebook's in that it uses blues and whites, Satan's page is red text on a black background. The profile picture features Satan using Jesus Christ as a slingshot; he is aiming directly at the viewer. Although MySpace does have standardized layout and navigation (even for many pimped pages), in my browser, the MySpace navigation bar (an element that in practice should be on every page to standardize navigation throughout the site) is gone, replaced with a gray space at the bottom of the page, indicating a bug in the customized code written to override that standardized element. The various HTML divs on Satan's page vary in width; thus they do not line up neatly along the left side of the screen. Likewise, Satan's friends' avatars come in multiple sizes, and thus the collection of avatar images is uneven. While the Facebook page offers the

viewer the option to “Like” Satanism or not, even though I am not logged into MySpace and I have never “friended” Satan, I see that “Satan is in your extended network.” In MySpace, “like” it or not, I have no choice but to be connected to Satan. As Satan informs me, this member of my extended network is dedicated to “indulgence instead of abstinence” and “kindness to those who deserve it instead of love wasted on ingrates!” This language is a far cry from the clinical discussion of Satanism found in the Wikipedia excerpt on the Facebook page. Finally, at 335 lines of HTML, CSS, and JavaScript, this pimped MySpace page uses nearly five times the code of the Facebook page, rendering it slower in my browser, especially since the code is conflicting with the MySpace navigation bar. In sum, the architecture of MySpace is constantly restructured by users who rely on the pimped codes to radically alter their pages, and as danah boyd has argued, these users often express “dangerous” ideas such as Black and Hispanic racial identities and raw, working-class sexuality in their profiles.<sup>47</sup> This is a far cry from the aesthetically muted Satanist Facebook page.

Ultimately, however, aesthetics is not the key to the questions raised by MySpace’s failure, but the aesthetic analysis points toward further areas to examine. The aesthetics of MySpace arise from the users’ ability to inject customized code to alter the default settings. Beyond simply altering the layout of their profiles, MySpace hackers have also been able to write code that hides friends lists, the “Last login” field, recent status updates, and most important, advertisements.<sup>48</sup> Although the last is a breach of the MySpace terms of service, the sheer number of sites providing the code to do so points to a basic antagonism within the site (and broadly on the Internet in general): many users resist advertising in any way possible. In MySpace, coding hacks make it possible; Facebook offers no such work-around.<sup>49</sup> Again, although the MySpace terms of service strictly prohibit users from hiding advertisements on their profiles, the possibility of ad blocking makes marketers extremely nervous.<sup>50</sup> Without advertisements, their logic goes, these “free” services cannot possibly exist.

In addition, consider the simple fact that Satan has a page, even though the actual existence of Satan is highly doubtful. This points to another architectural failure of MySpace: the rampant use of false profiles. Like Satan, a wide range of fictional characters have profiles in MySpace. However, beyond fictional characters, users often have fake profiles for a variety of purposes. In this way, MySpace duplicated the practices—and many of the problems—of Friendster, an SNS that preceded MySpace and has since failed in the market. Users of Friendster often created fake accounts, *fakesters*, to challenge the boundaries of the Friendster architecture.<sup>51</sup> The fakester phenomena led to problems for Friendster, since that site never intended to allow fake profiles and worked vigorously to delete them. Similarly, the ease with which a user could create a fake MySpace

profile resulted in widespread moral panics about sex predators, defamation, and cyberbullies. For example, the sex predator panic centered not on fake profiles but rather on *Wired* magazine writer Kevin Poulsen's correlation of data on registered sex offenders and MySpace profiles. Poulsen found 744 registered sex offenders on MySpace but speculated that more could easily be using fake profiles on the site to avoid detection.<sup>52</sup> Spurred by this revelation, pundits began to argue that adults were simply lying about their age and other personal details to gain access to children in the site.<sup>53</sup> Similarly, several lawsuits were brought against users who created parody profiles of real people in order to mock them.<sup>54</sup> Finally, the suicide of Megan Meier, a result of her harassment on MySpace by another user with a fake profile, led to proposed legislation against cyberbullying.<sup>55</sup>

These incidents resulted in press coverage that heavily relied on technological determinism to argue that MySpace was the cause of increased sex predation, defamation, and bullying. While this determinist argument is clearly faulty—these phenomena predate MySpace—this coverage added to that site's image as a dangerous space.<sup>56</sup> These highly covered incidents tended to overshadow another prevalent subset of fake profiles: spam profiles, often carrying either advertisements (usually for porn sites) or malware such as trojans or viruses.

In contrast, while Facebook certainly struggles with fake user profiles,<sup>57</sup> its history as a closed network has led to its current user culture of preferring real-world identities to fantasy identities.<sup>58</sup> Rather than being an open service like Friendster and MySpace, Facebook grew slowly by adding more colleges, then workplaces, then high schools, until finally opening up to the general public in 2006. Each of the stages prior to opening up to the public relied on third parties (namely, schools, initially Ivy League ones) to vet the identities of its users. In essence, real-world identity was built into Facebook's architecture. The link between real-world and online identities has proven extremely attractive to advertisers.<sup>59</sup> With Facebook, marketers can reach highly specified demographics, customizing advertisements along myriad, abstract categories: age, gender, sexual orientation, location, work history, and purchase history, with all these data points linked back to the real-world identities of users.

In addition, Facebook's Connect service is built on this heritage of real-world identities; sites such as *CNN*, *foost*, and the *New York Times* use Facebook Connect as their users' de facto online identity card. Facebook Connect's role in vetting online identity is so effective that pundits argue that it is superseding open-source identity efforts such as OpenID as well as potential government-backed ID systems such as that proposed in the *National Strategy for Trusted Identities in Cyberspace*.<sup>60</sup> Thus, Facebook's massive database of real-world identities is connecting well to marketers who desire increasingly granular data on potential customers. Even as

Facebook users click away from Facebook.com, they can remain logged in to the SNS, and thus their uses of other websites can be tracked with the resulting data stored for later analysis. Facebook's public success in creating a web-based identity protocol further increased its overall dominance over its competitor MySpace.

These factors have all reduced advertiser interest in MySpace, even as Rupert Murdoch's NewsCorp was ramping up advertising sales efforts. In a profile in *Advertising Age*, Gavin O'Malley noted marketers' reluctance to advertise in the "less structured" areas of the site, user profiles, opting instead to concentrate on "structured" areas such as MySpace Videos and MySpace Music.<sup>61</sup> "Less structured" is, of course, a euphemism for user-created profiles, popularly perceived to be a dangerous space. Returning to my Satanism theme, a user-generated McDonald's MySpace page features a user-generated image in the comments area of Ronald McDonald with "Satan" emblazoned across his chest, hardly the image that the corporation wants to cultivate.<sup>62</sup> Moreover, as the site's traffic dwindled, advertisers increasingly began to consider it a relic, especially since advertising executives themselves were abandoning it.<sup>63</sup> A vicious cycle is continuing to drive MySpace traffic—and thus revenue—further down. In 2010, MySpace earned \$347 million in advertising revenue; its projection for 2011 is \$297 million. In comparison, Facebook is already exceeding \$1 billion.<sup>64</sup>

### **MySpace's Abstraction Failure**

Thus, I see in MySpace what software engineer Joel Spolsky calls "abstraction failure,"<sup>65</sup> a law-like reality of computing. In the technical sense that Spolsky is concerned with, this simply means that high-level abstractions, such as the operating system graphical interface, will eventually be pierced by malfunction: icons might not behave as they are expected to, screens go blank without warning or recourse, or (to use an example quite common in Windows 98 and XP in the late 1990s and early 2000s), the "Blue Screen of Death" appears, warning the user that "A fatal error has occurred. To continue, press Enter to return to Windows or Press CTRL+ALT+Delete." In these cases, users are confronted with deeper, vestigial, and most important, concrete layers of the computer: faulty memory chips, failing hard drives, poorly written driver files, endless and unbroken loops in software. Moreover, the problem is always at the level of the physical machine: electrons are out of their intended places. To put it another way, the machine (and hence the material) bubbles up through the layers of abstraction and confronts the user.<sup>66</sup> Concrete, specific problems interrupt the smooth layering of abstractions on top of the machine.

But MySpace is not merely a technical failure; it is a real abstraction

failure. Beyond the annoying technical glitches of software abstraction failure, real abstraction failure involves a failure to discipline labor effectively and thus to capture the surplus value of that labor. At the interface level, MySpace's architects violate the professional practices of software engineers: control your architecture, allow the implementers to realize it, but never allow implementers to add features willy-nilly. Indeed, MySpace failed to discipline its users into producing content that adhered to the designs of the site owners. MySpace users' rampant use of CSS and HTML hacks, embedded video and audio files that run as soon as a user's profile loads in a browser, and the increasing amounts of spyware on the site led *PC World* to declare it to be the worst website of 2006—even at the height of its popularity.<sup>67</sup> The false profiles and subsequent moral panic also contributed to the dangerous aura of the site. Although Web 2.0 has been heralded as more emancipatory and democratic than traditional mass media, the lesson of MySpace is that too much emancipation will frighten advertisers. The faults of MySpace—when viewed from the perspective of new media capitalism—is that it is too particular, too concrete, too heterogeneous to be contained. In sum, the concrete, chaotic, freewheeling desires of users bubbled up through the architectural abstraction to confront MySpace's intended market of advertisers, and the advertisers did not like it, resulting in a “fatal error.”

Facebook, on the other hand, has done a remarkable job of disciplining its users. Its rigid layout and its clean architecture are artifacts of its intent to and continued success at abstracting value from the aggregated labor of its users. Users' affective labor—their “likes” and “social graphs”—become reduced to commensurable data sets, reflecting what Eva Illouz calls “emotional capitalism”: “Never has the private self been so publicly performed and harnessed to the discourses and values of the economic and political spheres”<sup>68</sup> This reduction of inner, subjective life to the cold logic of exchange is built into the system of capitalism. Returning to Sohn-Rethel, as subjective as use-values are (and what is more subjective than emotion?), they must be reduced in the process of exchange; otherwise exchange fails. “The actions of exchange are reduced to strict uniformity, eliminating the differences of people, commodities, locality, and date.”<sup>69</sup> Everything is reduced to the universal equivalent. “This uniformity finds expression in the monetary function of one of the commodities acting as the common denominator to all the others.”<sup>70</sup> Whereas Facebook is capable of monetizing emotion, MySpace has failed to make this reduction.

Of course, Facebook's ability to attract far more users than MySpace is surely a key to its success. Returning to the work of danah boyd, a major cause of this may very well be the moral panics surrounding MySpace: sex predators, raw sexuality, and dangerous expressions of racial identity. How-

ever, expand the architecture/implementer metaphor and another cause is revealed: Facebook was simply easier for users to implement. Whereas MySpace users' pimped pages created inconsistent design and navigation, making it difficult to load a user's page, find basic information about that user, and then make a social connection, Facebook's standardized system is far simpler: click "like"; click here to add a friend; click here to add a picture. We might compare the playwork of implementation in Facebook to the ludic and yet highly constricted possibilities of identity formation made possible by consuming in a clean and bright suburban shopping mall versus the anxiety felt (at least by elite whites) in shopping in malls on the "bad side" of town. In a sense, the implications of boyd's work (i.e., that educated whites fled MySpace for Facebook) meet my own in that mass audiences have chosen a social network that does not inadvertently present them with the Other or ask them to do complicated work. Facebook reduces these concrete complexities into a clean, white template, awaiting user implementation.

### **Facebook's Potential Abstraction Failure**

However, Facebook is not necessarily a flawless machine. The news coverage of Goldman Sachs's and Digital Sky's 2011 \$500 million investment in Facebook—an investment that values the company at \$50 billion—reveals yet another abstraction failure. As Sohn-Rethel notes,

People become aware of the exchange abstraction only when they come face to face with the result which their own actions have engendered "behind their backs" as Marx says. In money the exchange abstraction achieves concentrated representation, but a mere functional one—embodied in a coin. It is not recognizable in its true identity as an abstract form, but disguised as a thing one carries about in one's pocket, hands out to others, or receives from them.<sup>71</sup>

For a brief moment, the news coverage of the vast volume of private investment flowing into Facebook reveals the exchange abstraction resulting from the aggregated actions of a half-billion users, actions performed "behind their backs" or, more properly, behind the glossy interface of Facebook. While Marx cautions us not to confuse the money-commodity with the abstract process of exchange—that is, don't confuse gold with the abstraction it stands in for—for the millions of Facebook users, there should be no confusion, since the wealth flowing through Wall Street banks is abstract enough to most of them. It is a "concentrated representation" peculiar to our historical moment: a speculative bubble, built out of the commodification of the private lives of Facebook members. Thus the news coverage of the sheer amount of money flowing through the site and

into Wall Street financial firms is another form of abstraction failure, one that starkly and undeniably reveals the power of Facebook to appropriate the emotional lives of its users, even as investors are betting that Facebook can hide this fact from its users behind an ideology of participation and connection.

In the final analysis, it is very important to remember that real abstractions require such ideologies to support them, and thus *real abstractions can be dissociated by critique*. Just as the money-commodity is ultimately meaningless without social faith in it, our social connections need not be mediated by a site like Facebook. Users may have flocked to that SNS due to its promise of self-expression and social connection. They may have abandoned MySpace due to its concrete chaos and dangerous race and working-class expressions. And for a brief moment in history, Facebook may succeed in convincing them that it is simply a service and not an advertising spy network. But that top layer of software abstraction can be torn aside, revealing the mechanics of exploitation hidden just beneath. As Alfred Whitehead argues, “You cannot think without abstractions; accordingly, it is of the utmost importance to be vigilant in critically revising your *modes* of abstraction. It is here that philosophy finds its niche as essential to the healthy progress of society. It is the critic of abstractions.”<sup>72</sup>

If Marxian philosophy can succeed in critiquing Facebook’s mode of abstraction, if we can consistently connect the wealth and power produced within social media to the exploitation and appropriation of users’ desires and subjectivities, we can propose alternative architectures of the web. Rather than being driven by a strategy of dividing and conquering labor and hiding the machinery of appropriation behind smooth layers of real software abstractions, new SNS architectures might start with the assumption that they should be built to fulfill the promise of social connection without simply appropriating the free labor of users or reducing their lives to binary choices expressed only within approved templates and design specifications. Facebook members could use these alternative architectures as a model and make demands of that SNS: no more appropriation of our personal lives; no more selling reductive visions of our desires to advertising networks; no more ubiquitous surveillance. Or (perhaps more realistically) these architectures would allow laypeople and technologists to mutually implement an open and free social networking standard—perhaps a sort of Facebook.org, (or better) a distributed SNS system—one that does not simply use “democratization” as a cynical, ideological ploy or inure us to constant surveillance but rather allows users to creatively (and yes, even haphazardly and chaotically) plumb its depths. Such a system could follow in the footsteps of open-source software and subtly alter how we view abstraction—and thus how we view capitalism, “the culture of abstraction par excellence.”<sup>73</sup> Marxian philosophy must

engage with proprietary software built in part by the free labor of users. After all, the point is to change the world.

## Notes

1. Andy Fixmer and Sarah Rabil, “MySpace Sale, Merger or Spinoff Being Weighed by News Corp., Official Says,” *Bloomberg*, 12 January 2011, [www.bloomberg.com/news/2011-01-12/myspace-sale-merger-or-spinoff-being-weighed-by-news-corp-official-says.html](http://www.bloomberg.com/news/2011-01-12/myspace-sale-merger-or-spinoff-being-weighed-by-news-corp-official-says.html).

2. David Goldman, “MySpace to Cut 30%, or 430 Jobs,” *CNNMoney*, 16 June 2009, [http://money.cnn.com/2009/06/16/technology/myspace\\_layouts/index.htm](http://money.cnn.com/2009/06/16/technology/myspace_layouts/index.htm).

3. Juan Carlos Perez, “MySpace Slashes Nearly Half of Staff,” *PC World* 11 (January 2011), [www.pcworld.com/businesscenter/article/216468/myspace\\_slashes\\_nearly\\_half\\_of\\_staff.html](http://www.pcworld.com/businesscenter/article/216468/myspace_slashes_nearly_half_of_staff.html).

4. Web-traffic site Alexa.com ranked MySpace in the top 10 worldwide as late as 2009, but MySpace has now fallen to 62 as of February 2011. TechTree India found that Facebook passed MySpace for traffic in August 2008. See “Facebook: Largest, Fastest Growing Social Network,” News, TechTree.com India, August 13, 2008, [www.techtree.com/India/News/Facebook\\_Largest\\_Fastest\\_Growing\\_Social\\_Network/551-92134-643.html](http://www.techtree.com/India/News/Facebook_Largest_Fastest_Growing_Social_Network/551-92134-643.html). As another indicator, Google Trends search data as of this writing shows that searches for “myspace” peaked in 2006 and have steadily declined to pre-2006 levels. Finally, according to *Daily Finance*, MySpace’s internal estimates of traffic and users has consistently been lower than the numbers the company has published in its press kit; Jeff Bercovici, “MySpace Users: Fewer Than We Thought?,” *Daily Finance*, March 3, 2010, [www.dailyfinance.com/story/company-news/myspaces-dwindling-traffic-looks-even-worse-from-the-inside/19380431/](http://www.dailyfinance.com/story/company-news/myspaces-dwindling-traffic-looks-even-worse-from-the-inside/19380431/). The numbers in the press kit come from ComScore, a competitor to Alexa in web metrics. This discrepancy casts doubts on precisely how much traffic MySpace received, even in its heyday.

5. Julia Boorstin, “MySpace Finally Sold for Some \$35 Million,” *Christian Science Monitor*, 29 June 2011, [www.csmonitor.com/Business/Latest-News-Wires/2011/0629/MySpace-finally-sold-for-some-35-million](http://www.csmonitor.com/Business/Latest-News-Wires/2011/0629/MySpace-finally-sold-for-some-35-million).

6. Pete Cashmore, “MySpace, America’s Number One,” *Mashable* (blog), 11 July 2006, [mashable.com/2006/07/11/myspace-americas-number-one/](http://mashable.com/2006/07/11/myspace-americas-number-one/).

7. Chris Foresman, “Myspace Concedes to Facebook, Changes Focus,” *Ars Technica* (blog), December 2010, [arstechnica.com/web/news/2010/10/myspace-concedes-to-facebook-changes-focus.ars](http://arstechnica.com/web/news/2010/10/myspace-concedes-to-facebook-changes-focus.ars).

8. J. R. Raphael, “Myspace’s Facebook ‘Mashup’—Why Bother?,” *PC World*, 18 November 2010, [www.pcworld.com/article/211127/myspaces\\_facebook\\_mashup\\_why\\_bother.html#tk.mod\\_rel](http://www.pcworld.com/article/211127/myspaces_facebook_mashup_why_bother.html#tk.mod_rel); Mark Sullivan, “Myspace to Use Facebookers’ Entertainment Likes,” *PC World*, 18 November 2010, [www.pcworld.com/article/211095/myspace\\_to\\_use\\_facebookers\\_entertainment\\_likes.html?tk=hp\\_new](http://www.pcworld.com/article/211095/myspace_to_use_facebookers_entertainment_likes.html?tk=hp_new).

9. See Tim O’Reilly and John Battelle, “Opening Welcome: State of the Internet Industry” (presented at the Web 2.0 Conference, San Francisco, CA, 5 October 2004). For critiques of the use of “free labor” and user-generated content to build and manage websites, services, and games, see Tiziana Terranova, “Free Labor: Producing Culture for the Digital Economy,” *Social Text* 18 (2000): 33–58; Terranova, *Network Culture: Politics for the Information Age* (London; Ann Arbor, MI: Pluto Press, 2004); Trebor Scholz, “Market Ideology and the Myths of Web 2.0,” *First Monday* 13, no. 3 (3 March 2008), [firstmonday.org/htbin/cgiwrap/bin/ojs/](http://firstmonday.org/htbin/cgiwrap/bin/ojs/)

index.php/fm/article/viewArticle/2138/1945; Trebor Scholz and Geert Lovink, *The Art of Free Cooperation*, Pap/DVD (Autonomea/Institute for Distributed Creativity, 2007); Hector Postigo, "Emerging Sources of Labor on the Internet: The Case of America Online Volunteers," *International Review of Social History* 48, no. 11 (2003): 205–23; Postigo, "America Online Volunteers: Lessons from an Early Co-production Community," *International Journal of Cultural Studies* 12, no. 5 (1 September 2009): 451–69; and Olli Sotamaa "Have Fun Working with Our Product!": Critical Perspectives On Computer Game Mod Competitions," in *Proceedings of DiGRA 2005 Conference: Changing Views—World in Play* (Vancouver: University of Vancouver, 2005): 1–10.

10. Mark Andrejevic, *Reality TV: The Work of Being Watched* (Lanham, MD: Rowman and Littlefield Publishers, 2003); Andrejevic, *iSpy: Surveillance and Power in the Interactive Era* (Lawrence: University Press of Kansas, 2007); Larry Lessig, *Free Culture: How Big Media Uses Technology and the Law to Lock Down Culture and Control Creativity* (New York: Penguin, 2004); Lessig, "The Ethics of Web 2.0: YouTube vs. Flickr, Revver, Eyespot, blip.tv, and Even Google," *Lessig Blog*, 20 October 2006, [www.lessig.org/blog/2006/10/the\\_ethics\\_of\\_web\\_20\\_youtube\\_v.html](http://www.lessig.org/blog/2006/10/the_ethics_of_web_20_youtube_v.html). *First Monday* 13, no. 3, a special issue on Web 2.0, has several excellent articles and is available at [www.uic.edu/htbin/cgiwrap/bin/ojs/index.php/fm/issue/view/263/showToc](http://www.uic.edu/htbin/cgiwrap/bin/ojs/index.php/fm/issue/view/263/showToc).

11. Wiebe E. Bijker, Thomas Parke Hughes, and T. J. Pinch, *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology* (Cambridge, MA: MIT Press, 1987); Donald A. MacKenzie and Judy Wajcman, *The Social Shaping of Technology*, vol. 2 (Buckingham, UK: Open University Press, 1999).

12. Frederick P. Brooks, *The Mythical Man-Month: Essays on Software Engineering, Anniversary Edition*, 2nd ed. (Reading, MA: Addison-Wesley Professional, 1995).

13. *Ibid.*, 45.

14. *Ibid.*, 42.

15. Timothy Colburn and Gary Shute, "Abstraction in Computer Science," *Minds and Machines* 17, no. 2 (1 July 2007): 169–184.

16. *Ibid.*, 173.

17. *Ibid.*, 177.

18. IEEE Computer Society, *Guide to the Software Engineering Body of Knowledge (SWEBOOK)* (Los Alamitos, CA: IEEE Computer Society, 2004), 3.1.

19. Barbara Liskov and John Guttag, *Program Development in Java: Abstraction, Specification, and Object-Oriented Design* (Boston: Addison-Wesley, 2000), 2.

20. See also Joe Nandhakumar, "Managing Time in a Software Factory: Temporal and Spatial Organization of IS Development Activities," *Information Society* 18, no. 4 (July 2002): 251–62.

21. Phillippe Krutchen in Jan Bosch, *Design and Use of Software Architectures: Adopting and Evolving a Product-Line Approach* (Reading, MA: Addison-Wesley, 2000), xii.

22. Brooks, *The Mythical Man-Month*, 256.

23. Harry Braverman, *Labor and Monopoly Capital: The Degradation of Work in the Twentieth Century* (New York: Monthly Review Press, 1975).

24. David Golumbia, *The Cultural Logic of Computation* (Cambridge, MA: Harvard University Press, 2009).

25. See also Alberto Toscano, "The Culture of Abstraction," *Theory, Culture and Society* 25, no. 4 (1 July 2008): 57–75.

26. Alfred Sohn-Rethel, *Intellectual and Manual Labour: A Critique of Epistemology* (New York: Macmillan, 1983).
27. Karl Marx, preface to *A Contribution to the Critique of Political Economy* (1859), [www.marxists.org/archive/marx/works/1859/critique-pol-economy/preface.htm](http://www.marxists.org/archive/marx/works/1859/critique-pol-economy/preface.htm).
28. Sohn-Rethel, *Intellectual and Manual Labour*, 19.
29. *Ibid.*, 20.
30. *Ibid.*, 28.
31. Alberto Toscano, "The Open Secret of Real Abstraction," *Rethinking Marxism* 20, no. 2 (2008): 275.
32. *Ibid.*, 275.
33. Karl Marx, *Grundrisse: Foundations of the Critique of Political Economy (Rough Draft)* (New York: Penguin Books in association with New Left Review, 1993), 164.
34. Of course, software need not be developed in such a rigidly hierarchical system. Much nonproprietary open-source software has been produced in more egalitarian and playful ways.
35. E. S. Raymond, *The Cathedral and the Bazaar: Musings on Linux and Open Source by an Accidental Revolutionary* (Sebastopol, CA: O'Reilly Media, 2001).
36. Tim O'Reilly, "What Is Web 2.0: Design Patterns and Business Models for the Next Generation of Software," *O'Reilly Media* (blog), 30 September 2005, [www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html](http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html); O'Reilly, "The Architecture of Participation," *O'Reilly Media* (blog), June 2004, [oreilly.com/pub/a/oreilly/tim/articles/architecture\\_of\\_participation.html](http://oreilly.com/pub/a/oreilly/tim/articles/architecture_of_participation.html).
37. Yochai Benkler, *The Wealth of Networks: How Social Production Transforms Markets and Freedom* (New Haven, CT: Yale University Press, 2006); Axel Bruns, *Blogs, Wikipedia, Second Life, and Beyond: From Production to Produsage* (New York: Peter Lang, 2008).
38. O'Reilly, "Architecture of Participation"; O'Reilly, "What Is Web 2.0."
39. Jeff Howe, *Crowdsourcing* (New York: Random House, 2008).
40. James Governor, Dion Hinchcliffe, and Duane Nickull, *Web 2.0 Architectures* (Sebastopol, CA: O'Reilly Media, 2009), xi.
41. See Andrejevic, *Reality TV; iSpy*. Andrejevic's analysis of "interaction" reveals its reductive form, where "participation" is often limited to making consumer choices.
42. Fred Scharman, "'You Must Be Logged in to Do That!': Myspace and Control," *SevenSixFive*, May 2006, [www.sevensixfive.net/myspace/myspacetwopointoh.html](http://www.sevensixfive.net/myspace/myspacetwopointoh.html); Scholz, "Market Ideology."
43. Mark Coté and Jennifer Pybus, "Learning to Immaterial Labour 2.0: MySpace and Social Networks," *ephemera* 7, no. 1 (2007): 96.
44. [www.facebook.com/pages/Satanist/110943382261091](http://www.facebook.com/pages/Satanist/110943382261091).
45. See s.v. "Satanism," *Wikipedia*, [en.wikipedia.org/wiki/Satanism](http://en.wikipedia.org/wiki/Satanism).
46. [www.myspace.com/pissandshitandsugar](http://www.myspace.com/pissandshitandsugar).
47. danah boyd, "Viewing American Class Divisions through Facebook and MySpace," 24 June 2007, [www.danah.org/papers/essays/ClassDivisions.html](http://www.danah.org/papers/essays/ClassDivisions.html); boyd, "Facebook and MySpace Users Are Clearly Divided along Class Lines," *AlterNet*, 3 September 2009, [www.alternet.org/media/142356/facebook\\_and\\_myspace\\_users\\_are\\_clearly\\_divided\\_along\\_class\\_lines?page=entire](http://www.alternet.org/media/142356/facebook_and_myspace_users_are_clearly_divided_along_class_lines?page=entire).
48. There are countless websites offering code to remove MySpace ads, although most of them note that doing so is a violation of the MySpace terms of service. For examples, see MySpace Layout Support, [www.myspacelayoutsupport](http://www.myspacelayoutsupport)

.com/myspace-tutorials/removing-myspace-ads.php; Yahoo! Answers, answers.yahoo.com/question/index?qid=20070607155227AAUFICT; Katamari Tutorials for MySpace, Facebook, and FriendBurst, abrax.us/Katamari/RemoveLayoutAds.php.

49. Of course, users of web browsers such as Firefox and Chrome have written extensions to block advertisements, most notably Adblock Plus. However, the existence of code specific to MySpace points to user desire to control advertising at the point of production rather than consumption, which is a substantially different form of resistance to marketing. Rather than block advertisements while they use the web, those who attempt to block advertisements on their own profiles are attempting to prevent their profiles from being commodified.

50. Tanzina Vega and Verne Kopytoff, "Web Advertisers Fear Effects of Do-Not-Track System," *New York Times*, 5 December 2010, www.nytimes.com/2010/12/06/business/media/06privacy.html.

51. See danah boyd, "Friendster and Publicly Articulated Social Networking" (paper presented at the Conference on Human Factors and Computing Systems, Vienna, 24–29 April 2004), 1281–82; danah m. boyd and Nicole B. Ellison, "Social Network Sites: Definition, History, and Scholarship," *Journal of Computer-Mediated Communication* 13, no. 1 (2007): 210–30, [http://jcmc.indiana.edu/vol13/issue1/boyd\\_ellison.html](http://jcmc.indiana.edu/vol13/issue1/boyd_ellison.html).

52. Kevin Poulsen, "MySpace Predator Caught by Code," *Wired*, 16 October 2006, www.wired.com/science/discoveries/news/2006/10/71948.

53. Lloyd de Vries, "MySpace Tightens Age Restrictions," *CBS News*, 21 June 2006, www.cbsnews.com/stories/2006/06/21/tech/main1736549.shtml.

54. C. J. Mattus, "Legal Update: Is It Really My Space?: Public Schools and Student Speech on the Internet after *Layshock v. Hermitage School District* and *Snyder v. Blue Mountain School District*," *Boston University Journal of Science and Technology Law* 16 (2010): 318; B. Kay, "Extending Tort Liability to Creators of Fake Profiles on Social Networking Websites," *Chicago-Kent Journal of Intellectual Property* 1 (2010): 1–24.

55. B. M. Szoka and A. D. Thierer, "Cyberbullying Legislation: Why Education Is Preferable to Regulation," *Progress and Freedom Foundation Progress on Point Paper* 16, no. 12 (June 2009): 1–26; K. Turbert, "Faceless Bullies: Legislative and Judicial Responses to Cyberbullying," *Seton Hall Legislative Journal* 33 (2009): 651; J. L. Whitaker and B. J. Bushman, "Online Dangers: Keeping Children and Adolescents Safe," *Washington and Lee Review* 66 (2009): 1053; Nancy Willard, "Cyberbullying Legislation and School Policies: Where Are the Boundaries of the 'Schoolhouse Gate' in the New Virtual World?," Center for Safe and Responsible Use of the Internet, March 2007, <http://csriu.org/cyberbully/docs/cblegislation.pdf>.

56. danah boyd and Henry Jenkins, "MySpace and Deleting Online Predators Act (DOPA)," *MIT Tech Talk*, 26 May 2006, www.danah.org/papers/MySpaceDOPA.html; Alice E. Marwick, "To Catch a Predator? The MySpace Moral Panic," *First Monday* 13, no. 6 (2 June 2008), [firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/2152/1966](http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/2152/1966).

57. There appear to be no academic studies of fake profiles in Facebook yet. However, there are many reports on the Facebook Site Governance page by users claiming to have had their identities stolen: see [www.facebook.com/topic.php?uid=69178204322&topic=19372](http://www.facebook.com/topic.php?uid=69178204322&topic=19372). In addition, it is easy to set up a fake profile in Facebook, but it is difficult to friend such a profile due to the culture of the site.

58. Sid Yadav, "Facebook—The Complete Biography," *Mashable* (blog), 25 August 2006, [mashable.com/2006/08/25/facebook-profile/](http://mashable.com/2006/08/25/facebook-profile/); Sarah Phillips, "A Brief

History of Facebook,” *Guardian*, 25 July 2007, [www.guardian.co.uk/technology/2007/jul/25/media.newmedia](http://www.guardian.co.uk/technology/2007/jul/25/media.newmedia); FaberNovel Consulting, *Social Network Websites: Best Practices from Leading Services*, 28 November 2007, [www.slideshare.net/faberNovel/social-network-websites-best-practices-from-leading-services](http://www.slideshare.net/faberNovel/social-network-websites-best-practices-from-leading-services).

59. Mark Cuban, “An Open Facebook API vs. Google OpenSocial,” *Blog Maverick*, 4 November 2007, [blogmaverick.com/2007/11/04/an-open-facebook-api-vs-google-opensocial](http://blogmaverick.com/2007/11/04/an-open-facebook-api-vs-google-opensocial).

60. Optimize IT, “Facebook Wants to Issue Your Internet Driver’s License,” Facebook, 16 January 2011, [www.facebook.com/note.php?note\\_id=500459938286](http://www.facebook.com/note.php?note_id=500459938286); Alex Howard, “2011 Trends: National Strategy for Trusted Identities in Cyberspace Highlights Key Online Privacy, Security Challenges,” *Gov20.govfresh* (blog), 7 January 2011, <http://gov20.govfresh.com/2011-trends-national-strategy-for-trusted-identities-in-cyberspace-highlights-key-online-privacy-security-challenges>.

61. Gavin O’Mallory, “MySpace Blossoms into Major Web Portal,” *Advertising Age* 77, no. 29 (17 July 2006): 4–26.

62. Available at [www.myspace.com/imolovinoit](http://www.myspace.com/imolovinoit) (accessed 18 March 2011).

63. Brian Morrissey, “MySpace Is Still Here,” *Brandweek* (blog), 30 August 2010, [www.brandweek.com/bw/content\\_display/esearch/e3i84260d4301c885f95e2bd7d033dc1541?pn=1](http://www.brandweek.com/bw/content_display/esearch/e3i84260d4301c885f95e2bd7d033dc1541?pn=1).

64. Mike Shields, “Facebook Trumps MySpace on Ads,” *Brandweek* (blog), 13 August 2010, [www.brandweek.com/bw/content\\_display/esearch/e3i38fc3a9296f214d3cfcafd70a5a89722](http://www.brandweek.com/bw/content_display/esearch/e3i38fc3a9296f214d3cfcafd70a5a89722).

65. Joel Spolsky, “The Law of Leaky Abstractions,” *Joel on Software* (blog), 11 November 2002, [www.joelonsoftware.com/articles/LeakyAbstractions.html](http://www.joelonsoftware.com/articles/LeakyAbstractions.html).

66. Scott Rosenberg, *Dreaming in Code: Two Dozen Programmers, Three Years, 4,732 Bugs, and One Quest for Transcendent Software* (New York: Crown, 2007), 281.

67. Dan Tynan, “The 25 Worst Web Sites,” *PC World*, 15 September 2006, [www.pcworld.com/article/127116/the\\_25\\_worst\\_web\\_sites.html](http://www.pcworld.com/article/127116/the_25_worst_web_sites.html).

68. Eva Illouz, *Cold Intimacies: The Making of Emotional Capitalism* (Cambridge, UK: Polity, 2007), 4.

69. Sohn-Rethel, *Intellectual and Manual Labour*, 30.

70. *Ibid.*, 30.

71. *Ibid.*, 33.

72. Alfred North Whitehead, *Science and the Modern World* (New York: Free Press, 1997), 59.

73. Toscano, “The Culture of Abstraction,” 67.

