Knowledge Exchange in the Digital Era

by Jeremy Dormitzer

Introduction

Digital computing has fundamentally changed the way that our society creates, digests, and exchanges knowledge. Although these changes increase access to information, enable global discourse, and connect minds on opposite sides of the world, they also have troubling power and privacy implications. These implications are not widely discussed in popular literature. However, some scholars and activists have long been aware of the dangers of knowledge exchange in the digital age. In his 1979 work "The Postmodern Condition: A Report on Knowledge" (specifically chapter one: "The Field: Knowledge in Computerized Societies"), the French philosopher Jean-François Lyotard predicted a shift in the status of knowledge. He believed that the advent of computers would cause knowledge to become commoditized, a unit of exchange rather than something with inherent value. Furthermore, he detailed the problematic political and economic consequences of this shift. As we will see, many of his predictions have already come to pass.

More recently, software developer and privacy activist Richard Stallman has articulated many similar concerns. Although Stallman primarily talks and writes about software, the concerns of his philosophy closely parallel those of Lyotard's book. Stallman believes that the idea that software can have an owner leads to invasive privacy breaches and a growing power imbalance in which business interests trump those of the greater good of society. Stallman advocates for a simple but powerful solution to this problem: software should not have owners. He offers a compelling case for "free software" (Stallman explains this concept with the phrase, "free as in freedom, not free as in beer"), and in his many essays and talks he demonstrates why free software solves the privacy and power concerns he sees in the modern world.

In this paper, I endeavor to show how Stallman's "free software" philosophy can be used to address Lyotard's concerns about knowledge in the digital era. I begin with an analysis of Lyotard's concerns for the changing state of knowledge, tracing his reasoning from its foundations to its consequences. Next, I perform a similar analysis of Stallman's problem, and explain how free software solves it. I show that Stallman's conception of software plays the same role in his work as does knowledge in Lyotard's. This sets the stage for the body of the paper, in which I extend Stallman's reasoning about software to the field of knowledge in general. I show that, when generalized, Stallman's "free software" philosophy offers hope that Lyotard's concerns could be mitigated. I conclude with an exploration of the implications of "free knowledge".

Lyotard's Prediction

In order to understand Lyotard's predictions about the changing status of knowledge, we must first investigate his conception of knowledge. He begins by narrowing his topic of discussion to scientific knowledge only; this allows him to get specific about how and why knowledge is changing. Having settled on a topic, Lyotard gives a preliminary definition of knowledge: "Scientific knowledge is a kind of discourse" (Lyotard 299). For Lyotard, then, knowledge is not simply a unit, something that one has or does not have; instead, knowledge is a conversation, a shifting shared entity that changes over time as point leads to counterpoint. Lyotard contends that - at the time of writing - "for the last forty years the 'leading' sciences and technologies have had to do with language" (299). Language, in this context, is taken very generally: Lyotard cites not only sciences of linguistics, communication, and translations, but also algebra, data, and computer programming. Language sciences, in other words, are those that deal with manipulating symbols of meaning. This shift towards language sciences is the first sign of the change in the status of knowledge, and lead to the change's symptoms: first, a tendency in other fields of research to draw on language sciences; second, and crucially, an increased use of "information processing machines" (300) to circulate knowledge on a broader scale than was previously possible. Lyotard supposes that this latter change will have "as much of an effect on the circulation of learning as did advancements in human circulation (transportation systems), and later, in the circulation of sounds and visual images (the media)" (300). In this, as we will see, Lyotard has proven to be prescient.

Having understood the type of knowledge that Lyotard writes about, as well as a broad overview of the change in the status of this knowledge that will come about, we can investigate the specific concerns that Lyotard raises about this transition. He writes, "We may thus expect a thorough exteriorisation of knowledge of knowledge with respect to the 'knower'" (300). What does this mean? Lyotard draws an analogy to industry: "The relationships of the suppliers and users of knowledge to the knowledge they supply and use is now tending [. . .] to assume the form already taken by the relationship of commodity producers and consumers to the commodities they produce and consume - that is, the form of value" (300). In the face of new language sciences, knowledge ceases to be a conversation. Instead, it becomes a commodity. Why does this come about? In short, because of computers. Computers understand only data, so all knowledge that passes through a computer must be in the form of data. Lyotard predicts that "anything in the constituted body of knowledge that is not translatable [to data] will be abandoned and that the direction of new research will be dictated by the possibility of its eventual results being translatable into computer language" (300). This necessity means that knowledge must become discrete instead of continuous. One can speak of this piece of knowledge or that piece of knowledge, and each piece has physical limits defined by its file size or data type. Knowledge becomes an object - one that, like all objects, can be

owned, bought, and sold.

Lyotard explains that the commoditization of knowledge will have broad societal, political, and economic consequences. First, as a commodity, knowledge is now a thing that can be produced and exported by a nation-state; indeed, Lyotard writes that "knowledge has become the principal force of production over the last few decades; [. . .] In the postindustrial and postmodern age, science will maintain and no doubt strengthen its preeminence in the arsenal of productive capacities of the nation-states" (300). This shift has a noticeable effect on a nation's workforce. It creates an increasingly important and lucrative "white-collar" job market. Knowledge workers make more money than laborers, and this in turn bolsters the nation's economy, creating a positive feedback loop in which a better economy means more tech companies, and more tech companies means more knowledge workers, which leads to an even better economy. However, in order to kick off this process there need to be knowledge workers and tech companies already working in that nation; this means that developing nations without such resources get left further and further behind.

Second, Lyotard points out that commoditized knowledge becomes a scarce resource over which nations and businesses must compete. He writes, "Knowledge in the form of an informational commodity indispensable to productive power is already, and will continue to be, a major [. . .] stake in the worldwide competition for power" (301). In other words, knowledge resources both enable and are themselves a force of production, and therefore a source of power. Nation-states will need to develop new industrial, economic, and military policies to succeed in this new world.

Third, Lyotard predicts that knowledge's new status will upset the power balance between the public sector and the private sector. Traditionally, the state controlled the "production and distribution of learning" (301). When talking about learning, Lyotard means more than simply going to a university or reading a book; he means control over the transmission of knowledge, from the individual level all the way up to determining the *ethos* of a generation. Before the commoditization of knowledge, the state enjoyed regulatory power over the majority of knowledge discourse. However, as knowledge becomes a product, control over the contents of that product moves to the product's owner - usually, a private business entity. In particular, Lyotard is concerned about the rise of multi-national corporations - businesses so large and so distributed they do not fall under the jurisdiction of any one nation-state. He gives a pertinent example:

> Suppose, for example, that a firm such as IBM is authorised to occupy a belt in the earth's orbital field and launch communications satellites or satellites housing data banks. Who will have access to them? Who will determine which channels or data are forbidden? The State? Or will the State simply be one user among others? New legal issues will be raised, and with them the question: 'who will know?' (301)

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Lyotard demonstrates the full frightening implication of knowledge's new status: the entity that controls the channels of knowledge controls the knowledge itself. That entity therefore has power over everyone who wants or needs that knowledge. The questions that Lyotard asks about the communications satellites concern every vehicle of knowledge: questions of access control, censorship, privacy. Although Lyotard wrote in 1979, these questions have become increasingly relevant. Many of Lyotard's predictions about the status of knowledge and its consequences have come to pass. Richard Stallman, in his many writings and talks, has taken up Lyotard's banner and continues to raise concerns about the breadth and scope of the power of those who control the knowledge. Furthermore, as we will see, Stallman offers hope that that power could be redistributed back to those to whom it rightfully belongs: the people themselves.

Stallman's Problem

Richard Stallman, from about a decade after Lyotard published his grim predictions to the present, writes and gives talks about a problem he sees with modern copyright law. Although he mostly discusses software, his arguments apply to anything covered under copyright law, and as we will see, actually apply to any form of knowledge as defined by Lyotard. His writing is prolific; however, his views on copyright law and freedom are neatly summarized in a speech he gave in 2001 entitled "Copyright and Globalization in the Age of Computer Networks". In that talk, Stallman argues that his views on free software apply to any kind of information that can be stored on a computer; therefore, in order to understand his arguments there we will first need to understand his views on free software. Stallman lays these views out neatly in an earlier essay, "Why Software Should Be Free".

In "Why Software Should Be Free", Stallman explains that the principle concern of free software is that of ownership. He asks, "suppose on individual who has a copy of a program meets another who would like a copy. It is possible to copy the program; who should decide whether this is done? The individuals involved? Or another party, called the 'owner'?" (Stallman 121). Stallman holds that the usual criteria for answering this question is that which maximizes developers' profits. Based on that criteria, the question is answered with the idea that the software does have an owner separate from the user, and this owner gets to decide who uses the software. This is the typical answer, and the answer that most people today accept as true. However, Stallman proposes a different criteria by which to answer the question: "the prosperity and freedom of the public in general" (121). By this criteria, he argues, software should not have owners. This is what he means by the phrase "free software": software without an owner.

Why does Stallman believe that software without an owner is better for society? Software ownership implies restrictions on the use of that software: under copyright protection, a user is not allowed to modify or copy the program they

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are using. Stallman compares this model to a road with a toll booth. Drivers on the toll road would have to pay to use it, just as users of software must pay to use it. This payment would fund the development of the road. However, most roads are not toll roads. Stallman writes, "Comparing free roads and toll roads by their usefulness, we find that (all else being equal) roads without toll booths are cheaper to construct, cheaper to run, safer, and more efficient to use. [. . .] The toll road is not as good as the free road" (123). In the same way, software with owners is "more expensive to construct, more expensive to distribute, and less satisfying and more efficient to use" (123). Stallman gives three reasons why this is the case:

1. Fewer people use the program.
2. None of the users can adapt of fix the program.
3. Other developers cannot learn from the program, or base new work on it. (124)

These harmful effects reduce the value of the software. However, they are not the only harm which occurs from software ownership. Stallman argues that the damage to society from software ownership far outweighs the damage to the value of individual programs. This societal damage occurs because of what he calls "psychosocial harm", that is, "the effect that people's decisions have on their subsequent feelings, attitudes, and predispositions" (124). The decisions that software ownership forces people to make ends up changing their worldview for the worse. If everyone makes those types of decisions, it changes everyone's worldview for the worse. Stallman gives many specific examples of decisions that change someone's worldview. He sketches a scenario in which a program user feels a social obligation to help his neighbor by sharing the program with the neighbor. However, copyright law makes this sharing illegal. Stallman argues that this tension does psychosocial damage to the user by forcing them to suppress their natural instinct to help. On the other side of the equation, the developer of the program suffers psychosocial harm due to the discouraging feeling of knowing that not everyone will be permitted to use the software she develops.

Although these examples seem somewhat contrived, reflection reveals that these types of situation appear quite frequently in modern society, and that the negative affects associated with them really do occur. In a 2015 Wired Magazine article entitled "We Can't Let John Deere Destroy the Very Idea of Ownership", reporting on a comment the tractor company submitted to the Copyright Office regarding the ownership status of the software in their tractors, writer Kyle Wiens reveals the harm done by proprietary software: "[farmer] Kerry Adams [. . .] hasn't been able to fix an expensive transplanter because he doesn't have access to the diagnostic software he needs" (Wiens 1). This restriction commits a real social harm against farmers. Another farmer told Wiens, "We are used to operating independently, and that's one of the great things about being a farmer. And in this particular space, they are really taking that away from us" (1). Software ownership has real, profound consequences on the social wellbeing

of software users.

Lyotard's arguments, of course, applied to a much broader field than just software, and in order to be useful to us we must show that Stallman's ideas do as well. In "Copyright and Globalization in the Age of Computer Networks", Stallman broadens his argument for free software into an argument against copyright for all types of information. He asks, "how do the ideas about freedom for software users generalize to other types of things?" (Stallman 135). There are only certain other types of things that free software ideas can apply to. Specifically, Stallman argues that these ideas can be applied to certain types of information: "[A]ny kind of information that can be stored on a computer, conceivably, can be copied and modified. So, the ethical issues of free software, the issues of a user's right to copy and modify software, are the same as such questions for other kinds of published information" (136). The phrase "published information" is very important here. Although there are many types of information that can be copied and modified, ethical arguments about the freedom of that information only apply if the information is published, that is, made publicly available. Stallman's argument, therefore, is one against the system of copyright in general, since that is the system that prevents copying and modification of published information.

To contextualize his arguments about the harmful effects of copyright, Stallman presents a summary of the history of copyright. Copyright, he argues, used to be a socially useful construct. Before digital technology, information has to be either copied by hand or copied on a printing press. It was expensive to own and operate a printing press; therefore, copyright was really a regulation on businesses that could afford printing presses rather than on the general public. It protected authors and publishers from other businesses stealing their work. It was easy to enforce, since any business that copied a book would need to publicly share that copying in order to profit from it. Users of the information, i.e. those that purchased the printed copies, were free to make copies by hand, since hand-copying was no threat to the publishers' businesses. Stallman argues that this early form of copyright was actually beneficial for the public: if information publishers know they can profit from making the information, more information will get made in general, and the public has not lost anything since they did not have a good way to copy the information anyway.

However, computers have changed the equation. Stallman writes, "Computer networks and digital information technology are bringing us back to a world more like the ancient world, where anyone who can read and use the information can also copy it and can make copies about as easily as anyone else could make" (138). Although copyright laws still exist to protect the publishers, the laws no longer protect publishers against other publishers. Now, they protect publishers against the users - against the public.

When applied to a greater field than just software, the troubling effects of information ownership become clearer. If owners need to keep information from being copied or modified by users, then they need to keep an eye on all their users to make sure none of them break the copyright: "To enforce

[copyright] requires surveillance, an intrusion, and harsh punishments" (138). This surveillance can take the form of computer programs that report back to their owners who is using them, or restrictions on the copying of data using various technologies collectively called 'digital rights management', abbreviated to 'DRM'. Furthermore, if publishers retain control over all the information they publish, they can repeal that information at any time. Stallman cites the example of a protest site criticizing a major bank: the site was simply disconnected by its ISP (internet service provider) without ever seeing the inside of a courtroom. It did not own the channels through which its data flowed, and so was powerless to do anything about the situation.

Viewed in this light, the state of modern copyright law seems grim. But Stallman offers a solution.