



Journal Publishing House ?

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Late Age of Print by Ted Striphas

From the chapters; Encoding/Decoding-Sort of & A Political Economy of Commodity Codes

Like Cheney, critics both inside and outside the book industry have long complained about its atavistic business practices and lack of coordination. As almost any person in the industry will tell you, there's at least a modicum of truth to these characterizations. Since the early 1970s, however, critics and supporters alike have exaggerated the industry's lack of commercial and organizational savvy. Those who persist in spotlighting the book industry's backwardness or resistance to commercialization overlook the fact that it pioneered the development of highly sophisticated back-office systems, whose aim was to speed distribution and improve inventory tracking and control. Regardless of how some might wish to romanticize books today, they're products. While the book industry might be faulted for the awkward missteps it still occasionally makes with respect to marketing and sales, like the auto parts industry it was among the very first to have agreed on and made use of a universal merchandise-coding system—the International Standard Book Number (ISBN). ISBNs allow each part of the book industry to speak the same language, as it were. In conjunction with the development of computer/database technologies, they've enabled all parts to better coordinate their activities in a manner consistent with Cheney's call for “absolute coordination and integration.”

Far from being a recent invention, publishing firms have engaged in the numerical coding of books at least since the third quarter of the nineteenth century. Most of these early coding systems, however, were unique to individual publishers, who used them mainly to facilitate in-house record keeping rather than industry-wide communications. Consequently coding remained haphazard, idiosyncratic, and was only narrowly applied until the third quarter of the twentieth century. 51

The need for more standardized methods of coding books gained in importance when W. H. Smith & Son, Britain's largest bookselling chain, decided to computerize its new warehouse in 1965.⁵² The publisher's management team had determined that, given the exceedingly specific criteria according to which books were—and continue to be—classified (e.g., author, title, edition, publisher, binding, publication date, language, etc.), keeping track of books by hand was too costly, time-consuming, and prone to error. Even a small mistake or omission could result in an erroneous order, leading to inefficiency, increased costs, and the possibility of lost sales. Transferring inventory data and oversight to Smith & Son's new computers, however, posed its own set of challenges. The relatively limited processing power (by today's standards) of computers in the 1960s made long lists of identifying characteristics untenable, a shortcoming compounded by the fact that the company's computers could only handle numerical data. 53

It thus needed to devise a concise, numerically based coding system to identify each and every edition that passed through its high-tech warehouse.

The costs and logistics associated with the design and implementation of such a system exceeded Smith & Son's capabilities. The company subsequently contacted the British Publishers Association (BPA) in early 1966 to pitch its idea for a numerically based coding system that would serve the British book industry as a whole. Smith & Son's representatives argued that assigning a unique, standardized numerical code to all books published in Britain would facilitate better communication industry wide. If the BPA assumed leadership of the project, moreover, no single company would be forced to shoulder all the risks and up-front costs associated with such a cutting-edge distribution system. The BPA concurred and approached F. Gordon Foster, a professor at the London School of Economics, who conducted a pilot study. In May 1966 Professor Foster concluded that "there is a clear need for the introduction of standard numbering, and ... substantial benefits will accrue to all parties therefrom."⁵⁴ Within a year sixteen hundred British publishers agreed to the new coding system, dubbed the Standard Book Number (SBN).⁵⁵ Thoroughly impressed by its simplicity and effectiveness, the International Standards Organization (ISO) adopted the International Standard Book Number in 1970, which relied on the British SBN scheme in most respects. ⁵⁶

Across the Atlantic the implementation of the British SBN generated significant excitement among publishers, wholesalers, booksellers, and librarians. Given the ever-increasing number and volume of printed books in which they trafficked, many in the United States similarly longed for a precise, universally recognized coding system. The Library of Congress Catalog Card Number had served as the industry's informal inventory standard for some time, but it didn't really meet the needs of the book trade as a whole, much less compel adoption among everyone involved. For these reasons, major trade organizations of the U.S. book industry moved to adopt the British SBN in 1967. That September Publishers Weekly optimistically predicted the SBN's "widespread acceptance" in all branches of the book trade.⁵⁷ However, because its use remained voluntary it took at least a decade—by some estimates as long as fifteen years—before the ISBN achieved truly widespread acceptance in the United States. ⁵⁸

It should be emphasized that the ISBN isn't merely a glorified stock number. Rather, it's a carefully conceived, highly significant, and mathematically exact code that contains detailed information about the identity of each book. It also contains something like a built-in fail-safe mechanism to guard against the transmission of erroneous information. All ISBNs consisted (until December 31, 2006) of ten digits broken down into three clusters, or identifiers, and a final check digit (e.g., 0-674-21277-0).

The first cluster, the group identifier, refers to the language, nation, or region in which a given book is published. Here 0 designates the English language. The second cluster identifies the publisher. In this example 674 refers to Harvard University Press; all books produced under its imprimatur will bear that number. The third cluster, or title identifier, designates not only the book's name but also its edition and binding. Here 21277 refers to the paperback edition of Pierre Bourdieu's *Distinction*. The final check digit, which is derived from a mathematical formula called modulus 11, guards against inaccurately recorded and/or transposed digits. It's computed by multiplying each of the ISBN's first nine digits by a corresponding weight, as illustrated in the accompanying chart. These products are then totaled. The check digit is the number required to bring this sum to the next whole-number multiple of eleven.

Because the sum (198) is divisible by 11, nothing more needs to be added. Thus the check digit is 0. The letter X is used in cases where the check digit works out to be 10.⁵⁹ Computers programmed to track ISBNs basically run this algorithm in reverse when verifying an ISBN's validity. It's an elegant and rather ingenious system since it guards not only against inaccurately recorded digits but also against the apparently more common error of transpositions.

The International ISBN Agency clearly recognized this potential. In 1980 the agency contacted its counterpart, EAN International, and asked the governing body to devise an ISBN-based bar-coding system for books. Their efforts resulted in what came to be known as the "Bookland EAN" bar-coding standard, which derives its name from what may appear to be an unusual reason. "Since the book industry produces so many products," a trade source explains, "it has been designated as a country unto itself and has been assigned its own EAN prefix. That prefix is 978 and it signifies Bookland, that wonderful, fictitious country where all books come from."⁷⁰ As capricious as that may sound, EAN International's decision to designate the book industry a country was calculated and practical, allowing it to preserve the integrity of the ISBN structure within the EAN coding scheme.

Having observed Bookland EAN's successful implementation in Europe, in 1985 the Book Industry Systems Advisory Council endorsed the bar-coding system. Less than a year later it started testing it in the United States.⁷¹ Implementing Bookland EAN presented its own set of challenges, however, given the growing entrenchment of the UPC. Indeed, only in the late 1980s did the U.S. book industry finally arrive at a compromise solution on the intractable matter of machine-readable book codes. All books intended for sale in bookstores would be imprinted exclusively with the Bookland EAN bar code. Mass-market and other books intended for sale at nonbook outlets (e.g., supermarkets, pharmacies, warehouse/price clubs) would be the exception. They would be imprinted with both symbols since in most cases the retailers who sold these books could only decode UPC bar codes, if any (fig. 8).⁷²

Nevertheless, even this compromise solution has proven untenable in the long run. Though the International ISBN Agency had designed the ten-digit code for longevity, more books and book-related items bearing ISBNs have been produced in the past two decades than nearly anyone had anticipated. By the turn of the millennium the book industry had to confront the daunting prospect of running out of ISBNs sooner rather than later. After careful study and deliberation, it decided to move to a thirteen-digit code effective January 2007. The new ISBN numbers formally include the 978 Bookland prefix instead of treating it as an add-on, resulting in the ISBN's absorption into the EAN coding scheme. Once all the 978 ISBNs are exhausted, the book industry will begin using the new prefix 979, which should accommodate its item-numbering needs for the foreseeable future. An upsurge in global commerce has led the Uniform Code Council to phase out the UPC in favor of the EAN (renamed the International Article Number), which means the book industry's coding system is now the same one used for national and global product exchange. 73 (Image) FIGURE 8 UPC and EAN product codes for a book intended for sale in nonbook outlets, printed on the outside back and inside front covers, respectively.

All this encoding, decoding, recording, and cross-referencing is clearly tedious business. It's precisely the kind of tedium that, decades earlier, Cheney had insisted would be integral to the long-term survival of the book industry in a growing capitalist economy. The successful implementation of the ISBN, bar coding, and other measures bear witness to the book trade's unusually high level of integration, this despite both proponents and critics' persistent criticisms of its organizational savvy. Yet these systems don't exist merely to coordinate the ebb and flow of books between publishers, wholesalers, dealers, and others, important as that function may be. They're part and parcel of the process of commodifying books, no more and no less than advertising, book jackets, and other—more manifestly ideological—forms of marketing. The main difference is that for the most part the purpose, significance, and material infrastructure of these distribution systems remain hidden from the public eye.

Without these deceptively understated transformations in the book industry's back office, the emergence of large-scale retail bookselling following the Second World War—especially since the mid-1960s—would have been impractical. Indeed, quantities of books haven't miraculously appeared on bookstore shelves and elsewhere. They've arrived there because the strategies and techniques for distributing and communicating about printed books finally caught up with the extraordinary number of books being produced. The ISBN and Bookland EAN bar codes imprinted on nearly all books are particularly crucial with respect to coordinating and executing all phases of its order-fulfillment operations with the utmost efficiency. Workers at each of Amazon.com's facilities scan the EANs on all printed books upon receipt from suppliers, thus allowing the company to maintain up-to-the-minute inventory records. A second scan upon shelving each volume records its precise bin number/location in the fulfillment center's main computer.

Because Amazon.com adheres to a random stow shelving system in these facilities, this scan is absolutely crucial for the computer to keep tabs on the quantity and whereabouts of every item in stock. From the time a book enters one of Amazon.com's warehouses to the time it leaves, its EAN will have been scanned and its ISBN recorded and checked as many as fifteen different times. 94

Once a shopper places a book order at Amazon.com's Web site, its main computer system determines the appropriate distribution center to which to assign it. Typically it makes the selection on the basis of geographical proximity to the customer and whether or not a particular warehouse has the requested title(s) in stock. Within the next couple of hours, the chosen distribution center's in-house computer breaks down the order into its component items, matching each requested book to the unique address of the bin containing it. The computer subsequently radios the merchandise picker located nearest to each bin, each of whom carries a hand-held scanning gun that receives the transmission. The gun's LCD readout directs the picker to the designated bin number to retrieve the appropriate number of copies of the title. In the case of best sellers, Amazon.com employs a more rapid "pick to light" system. A small red light located on the shelf below each bin is illuminated when the computer receives a request for the item contained therein. Upon retrieving the volume, the picker turns off the light by pressing a small button located nearby.

In either case pickers must once again scan each specific volume's EAN upon removing it from the shelf. The scanning gun then radios this information back to the warehouse's main computer, indicating that the item has been located and that the computer should update its inventory records accordingly. The scan also registers that the book is now in the system, waiting to be joined with whatever remaining items were included in the order. Thereafter pickers distribute their items randomly into plastic tubs on a nearby conveyor belt, which moves along at a precisely calculated 2.9 feet per second.⁹⁵ The whole system reportedly is configured to "minimize the number of steps the pickers must take to gather all of the items needed,"⁹⁶ thus remedying one of the inefficiencies endemic to its earlier fulfillment operations.

Eventually the tubs containing the books wind their way to a receiving area, at which point they've moved to the induction phase. There, orders are reassembled with the help of a twenty-five-million-dollar sorting machine, which can process up to two thousand discrete orders simultaneously. Employees remove books from the tubs upon their arrival at induction, scan their EANs to confirm their arrival, and feed them onto another conveyor system leading to the sorter. The latter then scans each book's EAN and determines to which of the machine's order chutes to route it; the sorter will then route all remaining items in the order to the same chute. Once the order is complete, a flashing light cues personnel waiting nearby to remove the items and box them up.

The packed boxes are subsequently invoiced and sealed by another machine and sent, via conveyor belt, to a loading dock, from which they are shipped. 97 Together with Amazon.com's complex order-fulfillment apparatus, the ISBN and Bookland EAN coding schemes have helped the company move toward a "spectacularly capital-efficient" just-in-time operation.98 Any given volume reportedly remains in one of Amazon.com's warehouses for an average of just eighteen days, in contrast to the typical 161 days the same volume would spend on the shelf of a more traditional retail bookstore.99 This arrangement provides for incredibly fast-paced turnover in its inventory of printed books—as high as 150 times per year in the case of some products. By comparison, most booksellers generally turn theirs over less than four times in a given year.100 Amazon.com's systems also have enabled the company to minimize the percentage of unsold books it returns to publishers. Estimates vary, but typically this figure fluctuates between 30 and 40 percent industry-wide. Amazon.com, on the other hand, has one of the lowest return rates among all retail booksellers in the United States, purportedly around 4 percent, which the company attributes both to its streamlined warehouse operations and the fact that it acquires many titles (those that say "usually ships in 2–3 days" on its Web site) only after a shopper has ordered them.101

Still, there's a potentially more pernicious side to Amazon.com's use of the ISBN and Bookland EAN coding schemes. Not only do they allow the company to coordinate complex operations inside its order-fulfillment centers but they empower management to monitor worker productivity to an astonishing degree. Its implementation of these everyday—often unnoticed—commodity codes has resulted in a workplace increasingly suspicious of and hostile to living labor. 102

In 2001 Amazon.com "upgraded" employee bar-code scanners with new software, allowing management to track the number of times employees shelved or retrieved items erroneously. (In the case of shelving, the device records an error when a scan of a book's EAN doesn't match that of the bin into which it is placed; in the case of retrieval, it records an error when the item scanned doesn't match up with the item requested.) The new software also enables management to monitor and compare each worker's level of productivity on the basis of the number of scans made during a given period of time. To its credit, the company offers remedial programs to retrain underperforming employees, though repeated errors or a consistently low level of productivity will result in an employee's dismissal.

These bar code-based tracking capabilities have resulted in both a practical and psychological speedup in Amazon.com's warehouses, given the ever-present threat that management will know if a worker has slowed down. Indeed, the company boasts that its new monitoring systems have doubled the average productivity of temporary workers,103 and it seems reasonable to assume that they've also increased that of its permanent staff as well.

Amazon.com's management also predicts that other "incremental improvements" in the coming years will double productivity in its distribution centers.¹⁰⁴ One recent "improvement" is the addition of a "flowmeister," who, despite the cheeky-sounding name, acts as a master overseer, monitoring and maintaining the rhythm of operations within each fulfillment center. For this reason the New York Times likened this person to an orchestra conductor.¹⁰⁵ Using a computer linked to the fulfillment center's critical systems—picking, induction, and packaging—the flowmeister measures and compares productivity in each area and anticipates where backlogs are likely to occur. Employees are then reassigned to areas where the tempo has slowed, thus theoretically ensuring that worker productivity never dips below prescribed levels. The result is not only a more intensive but also a denser workday. To use Marx's terminology, the flowmeister concentrates "a greater mass of labour into a given period."¹⁰⁶ In this regard, the image of the flowmeister as conductor could just as easily have been plucked from the pages of *Das Kapital*, or even Jacques Attali's *Noise*, as it could from a mainstream news source such as the New York Times. As Attali observes, "The orchestra leader appears as the image of the legitimate and rational organizer of a production whose size necessitates a coordinator.... He is thus the representation of economic power, presumed capable of setting in motion, without conflict, harmoniously, the program of history traced by the composer"—or capitalist.¹⁰⁷ Amazon.com's efforts at systematizing operations have occurred against the backdrop of its having successfully staved off unionization. In November 2000 the Washington Alliance of Technology Workers initiated a campaign to organize the company's four hundred Seattle-based customer-service employees. Three rather serious concerns had prompted the unionizing effort: low wages; poor working conditions (e.g., unreasonable mandatory overtime); and the substantial devaluation of company stock options, resulting in undercompensation. Despite—or perhaps because of—this agitation, Amazon.com closed its Seattle customer-service facility in January 2001. This action coincided with the shutdown of its McDonough, Georgia, distribution center, resulting in the elimination of an additional 450 jobs. Indeed, in early 2001 Amazon.com seemed to be hemorrhaging employees, dismissing a total of 15 percent of its workforce—about 1,300 jobs companywide—in an intense effort to "streamline" operations and achieve profitability.¹⁰⁸ Though the company has since rebounded, the layoffs surely resulted in an increased pace for those Amazon.com employees trying to keep up at its remaining warehouse and customer-service facilities.