

# CHAPTER 1

## The Evolution of Typography

Typography has been described as a merging of art and science. The art of typography is readily visible, but its science lies beneath the surface. In this chapter, we will explore the development of type as it relates to the publishing process. We will discuss type categorization in Chapter 3 and the mechanics of type in Chapter 8.

The science of typography has evolved along with the technology used to publish documents. Whatever forms the written word has taken through the millennia have been driven by our desire to communicate better and more efficiently with one another.

Before the development of the letterform, however, came the initial development of written language. Our Western alphabet followed a path that was millennia in the making.

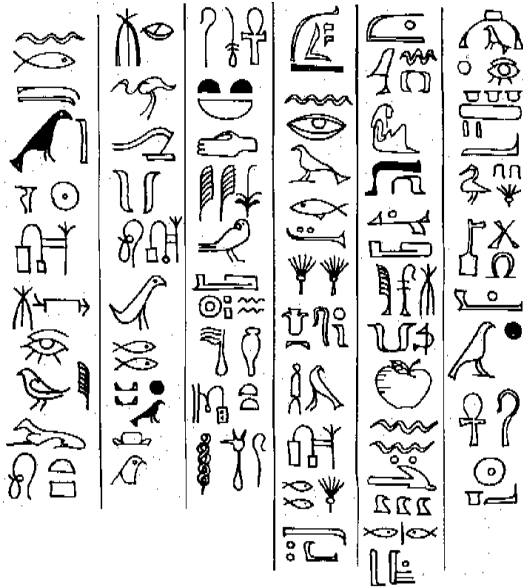
### **The Alphabet Develops**

Presumably the first meaningful human communication was speech. Since speech required that individuals be near one another, other mechanisms were needed to permit accurate communications at a distance, or over time (even with future generations). As we explore the evolution of communication, we note the related finds of archaeological excavations, which have uncovered such items as monumental wall paintings and inscriptions on pottery discussing daily life.

### **Pictographic and Syllabic Forms**

Many of the older forms of picture writing were highly detailed works of art, illustrating a specific event. As it became important to communicate more generically, the symbols were simplified and standardized. Egyptian hieroglyphs and Chinese ideograms are early forms of this picture writing.

There were really two kinds of writing for the Egyptians: word-signs, or logograms, and syllabic signs. We use similar word-signs today, such as “&” for “and,” “\$” for “dollars” and “=” for “equals.” While modern English has a sound for each letter, the ancients had a sound for each syllable, or sometimes for multiple syllables. Consequently there were hundreds of syllabic signs.



Standardized symbols allow us a look at ancient Egyptian culture, through a study of their hieroglyphic writings.

Another pictographic writing system was cuneiform writing. The word “cuneiform” is from a Latin word meaning “wedge-shaped.” Figures were pressed into soft clay tablets with the slanted edge of a stylus, giving them a unique wedge shape. Cuneiform was not a language, but a set of symbols that gained almost universal acceptance in the Middle East. The oldest dated cuneiform tablet, from the Sumerian city of Unik (Erech), is from 3100 BCE. This form of writing was passed from one culture to another and predominated through the fall of the Babylonian empire in the 6th century BCE.\*

Between 1500 and 1000 BCE, the Semites of Syria and other parts of the Middle East created their own system of writing based on the Egyptian syllabic signs. They discarded all of the

**A syllabary is a list of symbols, each of which represents a syllable.**

### Phoenician Syllabic Writing

From the Phoenician city of Byblos, already famous for exporting the writing material papyrus, came a new syllabic writing style, consisting of only 22 signs (all consonants). The reader filled in the vowels, based on structure and context, so *wndr* could be understood to be *wonder* or *wander*. While this seems awkward, we can illustrate that such a structure is not all that difficult. Test yourself:

Y cn prbly rd ths sntnc.

\*The abbreviation BCE (Before the Common Era) and CE (Common Era) are preferred to the more common BC (Before Christ) and AD (Anno Domini — In the Year of Our Lord) in deference to those whose religion is not Christian.

Because the Phoenicians were seafaring traders, they carried their writing form throughout the Mediterranean world, from Yemen to Ethiopia, where this ancient language is still in use today.

Aramaic, which replaced the older Hebrew writing style, was an important branch of the Phoenician writing style. Much of the Bible was written in Aramaic, and this square writing style is still used today. The northern Arabs took over a form of the Aramaic system, and with the rise of Islam, spread it to the far corners of the earth.

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***The Greek word for book, *biblia*, and the English word *Bible* were derived from the city of Byblos.***

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### **Greek Development of the Alphabet**

After about 100 years, the Greeks liberally borrowed Phoenician writing, keeping the forms, the names of the signs, the order of the signs in the alphabet and the direction of the writing (right to left). Later, the Greek form would change considerably, both in the shape of the letters and in other key structures of the writing form. Gradually the Greeks evolved a writing style with a consistent left-to-right format.

The Greeks altered the names of the Phoenician letters only slightly. Alpha, beta, gamma and delta replaced the characters aleph, beth, gimel and daleth. Three signs were dropped, and two changed their original value, namely *.t* and *.s*, which became *th* and *x*. Five new signs were added: *upsilon*, *phi*, *chi*, *psi* and *omega*.

1. Old-style character. Usually used in math formulas. Should not be combined with other forms.
2. Pronounced rh if initial letter; when double, pronounced rrh.
3. Often y except after a, e, ē and i.
4. Greeks added these letters to the Phoenician alphabet.

***The Greek alphabet, which had both consonants and vowels, is the basis of the alphabet we use today.***

We illustrated earlier that reading common words without consonants is not that difficult, but in some instances, common words would not be used — as is the case with names. The Greeks systematically plugged in six signs with weak consonants — sounds that were used only in the Phoenician language and, hence, were of no use to the Greeks as consonants. They were turned into the vowels *a*, *e*, *u*, *E*, *i* and *o*. Once this was done, the remainder of the symbols were no longer needed to represent syllables, but were simply used as consonants. For the first time, an entire alphabet existed, composed of both consonants and vowels.

### The Latin Alphabet Evolves

The alphabet was passed on to the Etruscans, the Copts of Egypt and the Slavonic people of Eastern Europe. Latin writing, like the earlier Greek, consisted of 24 letters, but there were significant differences. The Greek *diagamma* sign of *w* became *f*, and the Greek *eta* (*h*) became *h*. The Greek *gamma* for *g* was used in older Latin for both *c* and *g*, and the *g* was later differentiated from the *c* by the addition of a small horizontal bar (which we see in the English capital *G*).

***Diacritical marks are accents such as the acute accent (á), grave accent (à), umlaut or diaeresis (ü), circumflex (ê), tilde (ñ) and cedilla (ç).***

Further development removed the letters *th*, *z* and *x* in early Latin writing. As you know, the *x* and *z* were later reinserted at the end of the alphabet, along with the letters *v* and *y*. In the Middle Ages, when the letters *j* and *w* were added, the Latin alphabet increased to its present size of 26 distinct letters. Sounds were further differentiated by combining letters, such as the English *sh*, or by adding diacritical marks, such as the French *ç*.

The Greeks, Romans and the people of the Near East used two forms of letter construction — carefully drawn letterform with squarish, separate signs, used on official documents and monuments, and less carefully drawn cursive writing with rounded, often joined symbols on less official documents.

A form of capital letter was introduced in the Middle Ages. Uncials (from the Latin, meaning “inch high”) were squarish in shape, with rounded strokes. These letters were used in Western Europe in handwritten books, in conjunction with small-letter cursive writing.

*The Uncial style was introduced in the Middle Ages.*

Following the Renaissance, two types of letters were distinguished: majuscules (capital letters) and minuscules (small letters), continuing the tradition of medieval cursive writing.

*Pictographic and syllabic forms of writing were used for more than half of recorded history.*

## Document Format Development

Documents through the ages have taken many forms. Early permanent writings were chiseled in stone, and many of those have survived until our day. Huge slabs of stone, however, are not very portable.

Early records were scratched on bark or leather, or other moderately durable material. The Sumerians, Assyrians, Babylonians and others of the Middle East pressed their cuneiform characters into moist clay tablets. If the record was intended to become permanent, the tablet was then baked in an oven. The laws of Solon were carved into wooden tablets and set up in the Acropolis in Greece, just as the Twelve Tables of Roman law were engraved in wood.

As cultures became more dependent upon the written word, it became necessary to create documents that were more portable. The Greeks and Romans used small wax tablets for brief documents of a less-permanent nature. Small boards with narrow frames were overlaid with a thin coating of black wax, into which letters were scratched with a stylus, allowing the lighter-colored wood to show through. The tablets could be bound together with thongs or metal rings; a group of tablets bound together was called a “codex.”

Longer documents were made of papyrus, a parchment-like paper made from the pith, or inner portion of the stalk, of the papyrus plant. The pith was cut into thin strips, pressed together and dried to form a smooth, thin writing surface.

The sheets of papyrus were glued together, side to side, to form a roll (scroll) 5–12 inches wide and 15–40 feet long, with writing on only one side. The roll was called a “volumen”; its papyrus was rolled around a brightly painted, gilded stick with knobs at both ends, called an “umbilicus.” The roll was held in the right hand and unrolled, column by column, onto the roller held in the left hand. When the reader reached the end of the roll or had read enough, the roll was rewound onto the umbilicus. The dry air of Egypt and the desert areas of the Middle East and the cedar oil in which the papyrus was soaked have preserved papyrus rolls that are thousands of years old.

*Scrolls, or volumen were precursors to leaved books.*

Gradually, leaved books replaced scrolls and parchment, made from the skins of sheep and goats, replaced papyrus. Vellum, made from calfskin, was used for special copies of books. Vellum and parchment were made by carefully washing the skins, then covering them with lime to loosen the hair. When the hair was removed, the skin was stretched on a frame, scraped, dusted with sifted chalk and polished with pumice.

Parchment and vellum were used as early as the 5th century BCE. They gradually replaced papyrus, beginning about 100 CE, and virtually displacing papyrus by the middle of the 5th century as the standard material for a book or codex. The sheets were cut to a uni-

form size and bound together on one side with leather thongs.

Far to the east, the Chinese developed the art of papermaking. The Arabs learned the art from them and introduced paper into Europe in the 12th century CE, after which Europeans developed their own papermaking methods. The first European papermill was built in 1270 CE in Fabriano, Italy.

### Producing Books in the Middle Ages

For practically a thousand years after the fall of Rome, all books were written by hand, one character at a time, using pens made from a reed or a quill from the wing of a large bird. The pens were cut with a broad end, or nib, shaped like a chisel. As a result, when the pen was used to draw a vertical stroke, the stroke was broad; horizontal strokes used the narrow edge of the pen. A curved letter had thick and thin strokes, dependent upon the angle at which the quill was held.

The ink used for writing on vellum, and later on paper, was either lampblack ink, which had been developed for use with papyrus, or an ink made from iron filings and oak bark, boiled in vinegar and bound to the vellum with gum arabic. The scribe ruled the page, marked margins and drew nearly invisible guidelines.

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***Paper was first made by the Chinese in individual sheets. A pulp made up of fibers from rags and plants was mixed with water. When a sheet mold was immersed in the pulp, the fibers interlocked. The mold was removed and set aside to dry.***

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***You might think of the scriptorium as a modern print shop or ad agency. Each person had a specific job or responsibility: lay out the book, ink the pages, proofread to ensure an error-free result, color the illustrations and add gold leaf to special pages.***

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Books were rented to students and teachers by book dealers known as “stationers”; when the student left the university for any reason, the book was turned back to the stationers; it was a crime to remove books. As universities grew in size, the stationers would sell their texts instead of renting them, with a change in name to *librarian*. The booksellers were considered professionals, not ordinary tradesmen.

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***The earlier book dealers were librarians as we know the word today; they rented books and allowed students to examine them without removing them from the premises***

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While in France and Italy the book trade was closely tied to the universities, in England, Germany and the Low Countries, there was trade in both scholarly and popular books, including almanacs, books on astrology, cooking and other subjects. After the introduction of paper, the cost of books was greatly reduced.

In addition to text-heavy books, small religious documents called “block books” were printed from engraved blocks of wood, which we would call “woodcuts” today. The process by which they were printed was known as “xylography.” In 1438 Johannes Gutenberg became a partner in a block-printing firm. For 10 years he experimented with wood and metal type.

*Blocks of wood were used to print publications prior to the invention of movable type.*

Most manuscripts produced in this era were the work of monks. In some monasteries, each monk worked at his own desk in a large room called the “scriptorium.” In other monasteries, especially in the early part of the Middle Ages, each monk worked in his own cell.

Around 1200 CE, secular scribes also entered book production, producing texts required for university courses.

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***Modern universities developed from the European universities of the Middle Ages. The word “university,” taken from the Latin *universitas*, implies that a university should deal with a universe of subjects — nearly all fields of learning should be taught.***

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## Typography and Printing Become Automated

In 1448, Gutenberg returned to his hometown of Mainz to set up his own press. He went into partnership with a wealthy financier and his son, and set in movable type, the text for a Turkish calendar and for his masterpiece, the 42-line Bible. A year later he quarreled with his partners and lost control of his printing establishment; he was financially ruined.

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***The Gutenberg Bible, also known as the Mazarin Bible and the 42-Line Bible, was printed in Latin in Mainz, Germany, sometime between 1450 and 1456. The book is the first volume known to have been printed with movable metal type, and is Gutenberg's claim to fame. There were 42 lines of type to a page.***

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In these few short years, Gutenberg changed the world of communications, as we know it, and made a name for himself. Because the type was movable and reusable, it became practical to make multiple copies of type-heavy documents. The written word had finally become the published (from the Latin *publicare*) word, available to the public at large.

Printers initially fashioned their documents as close as possible to the style of the manuscripts of the scribes. They used type that resembled the hand-lettered look, used the same abbreviations and special signs, and even left space for woodcut

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***Movable type was originally invented by the Chinese, around 1040. However, because their language was composed of ideograms instead of alphabetic characters, it was discarded as impractical.***

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illustrations that would be hand-colored, or for hand-drawn illustrations to be inserted. While this was beautiful, it wasn't particularly easy to read, nor was it good for a fast-paced workflow.

For the next 400 years, printers followed much the same process. While there were improvements in the mechanism of printing presses, letters were still set in place one by one, being assembled in a shallow hand-held tray called a "composing stick." After each line of type was spaced to fit snugly in the width allocated, a strip of lead, usually two points wide, was inserted between lines. If no lead was



Pages like this one, the first page of the Bible book of Apocalypse (Revelation), were printed on Gutenberg's and other early presses. Note the hand-inserted illuminated text.



inserted, the type was said to be “set solid.” If more than 6 points were inserted, the inserted lead was called a “slug.” The type was then locked into a frame or *chase*, the type was inked, paper placed on it and an imprint was made. Majuscules were stored in the upper type case and miniscules were stored in the lower case.

*In this illustration, the blue bands show how leading was inserted in handset type.*

In 1886, Ottmar Mergenthaler changed the world of composition again. He developed a key-operated linesetting and typesetting machine that employed reusable brass matrices. His invention cast an entire line of type at a time; because of this, it was called the “Linotype.” This was the *first generation* of automated typesetting systems. Eventually, tape drives from a variety of manufacturers would drive these machines, allowing greater productivity.

*The Linotype, capable of setting an entire line of type at one time, was the first commercially successful typesetting machine.*

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***Although Mergenthaler’s Linotype was the first commercially successful typesetting machine, William Church devised a typesetting machine in 1822. The Kiegl Composer (1839) and the Clay and Rosenberg Type-setter and Distributor (1840) both closely resembled upright pianos.***

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Unfortunately, lead is a very soft metal, and the slugs of lead would wear down quickly. To solve this problem, a means of making more durable plates was invented. The most common methods were electrotyping and stereotyping. In the electrotyping process, type is set and a cast (usually from wax) is made; it is then coated in graphite and placed in an electroplating bath. A copper shell is built up in the shape of the original type. Stereotyping begins by making a mold of the type using a heat-resistant papier-mâché. Molten metal is then poured into the mold to create the cast plate.

This process is used for *letterpress* or relief printing, where the type and any graphics are raised elements and are literally pressed onto the paper. Offset lithography, however, has been the predominant printing process since the early 1980s. The lithographic principle is that grease and water don't mix. The printing plate, made of aluminum, steel, an alloy, or a man-made material, is treated so that grease (ink) will stick to some areas and not to others. The image is offset onto a roller, and transferred to the paper. Since the process does not require a raised surface, the printing plates are made using a photographic process, either directly etched, or imaged from film, much as a black and white print would be.

To create type for this process directly requires that the type be photographically imaged to film. In the early 1950s, Varityper and Photon (the president of which later cofounded Compugraphic Corporation) each introduced a reasonably priced, stand-alone typesetting system. These were *second-generation* typesetters. They used device-dependent glass, plastic and film masters. Light was flashed through the master onto photosensitive material, which was then developed and eventually contact-printed to a printing plate.

The typefaces were provided in a variety of forms: as spinning disks, filmstrips, glass-matrix grids or disks comprised of sectors. In the early days, four typefaces (usually a plain, italic, bold and bold italic of the same family) could be accessed at any time. Some of the typesetting machines would allow type to be set only at specified sizes, and others, such as the Varityper system, used a zoom lens, allowing all point sizes within a given range to be set. Eventually some second-generation systems were expanded to allow simultaneous access to more typefaces.

These early typesetters would show the operator one or two lines of type, using a system-generated OCR-like character. In addition, there was a notation of how much space was left on each line, given in units that varied on a manufacturer-by-manufacturer basis. A common value was 18 units per em.

*Ugly OCR characters like this are easily generated on the low-resolution monitors used in the '70s and early '80s. You had no idea what the type would look like, but at least you could ensure that everything was spelled properly before committing a line to type.*

In the 1970s, *third-generation* typesetters used electronically stored font data generated from a cathode-ray tube or laser character generator and "drawn" onto the photosensitive material. Through the early '80s, these machines were the workhorses of the printing and publishing industry. They were often configured into multi-station workgroups.

When third-generation typesetters were introduced, a passive preview was available for some models, and multiple lines of text (still OCR-like characters) could be retained on the screen. To preview your screen, it was necessary to switch from typesetting mode to preview mode, then switch back again to resume typing.

Neither second- nor third-generation typesetters could incorporate graphics more complex than horizontal or vertical rules, and even that capability was a result of their having the ruling routines stored as font data. As powerful as the computers were, it was still necessary to prepare artwork manually and combine it with the type in the final film.

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***WYSIWYG — What You See Is What You Get — is still an unrealized dream, because a monitor does not exactly replicate a printed document. What You See Is More Or Less What You Get — WYSIMOLWYG — is nearer the truth.***

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Imagesetters — the *fourth generation* — also use electronically stored font data, but they have the added ability to combine line art and halftones with the type (a completely composed page). Some use dedicated front-end terminals, and others used Windows, Unix, DOS or Macintosh computers to enter the data. With the fourth generation came active preview — WYSIWYG capability.

Other than Intertype and Linotype linecaster matrices, fonts have never been interchangeable from system to system, although some second-generation and third-generation fonts would run on different models.

Every time a typesetter changed equipment, an entire type library had to be purchased anew. Even when equipment was purchased from the same manufacturer, a new library was often required. Since manufacturers of the typesetting equipment were also the type foundries, an upgrade meant substantial profits for them. Regardless of the upgrade path, every time one upgraded to a new generation of equipment, it meant also purchasing a new font library.

Because of the huge investments in equipment and in fonts (an average font cost \$42 — that's \$168 for a family of four fonts; ITC fonts carried an additional \$30 licensing fee per font), printers, typesetting companies and some in-plant facilities owned typesetting equipment. Designers and others in the publishing business specified and ordered type.

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***ITC, the International Typeface Corporation, (later acquired by Agfa/Monotype) licenses typeface designs that meet specific criteria, including families of type in which various weights meet ITC specifications.***

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## **The Microcomputer Impacts the Industry**

In the 1950s and 1960s, computers were monster number crunchers, fed and cherished by the all-knowing custodians of Data Processing. In the 1970s, minicomputers were introduced. These machines were adapted for work in the office and in the typesetting communities. They were interactive, text-based machines. Soon after, the microcomputer evolved and was adapted for publishing.

In the late 1970s, two system standards were emerging: Apple-DOS and CP/M. IBM had yet to get involved with personal computers. August 1981 brought the IBM PC and MS-DOS into the ring. Hewlett-Packard introduced the LaserJet, bringing about a new quality level for printing and some interesting possibilities for both office and printing environments. In 1984 Apple introduced the Macintosh, which was regarded by many in the professional typesetting world as a bad joke — how could this small computer, which output ugly 300-dpi type possibly be regarded seriously, compared to their big, networked, systems?

A phenomenon was occurring in the publishing industry. With the introduction of these computers, it became possible to use off-the-shelf hardware with custom software to set type and incorporate images. Fonts were being offered by companies like Bitstream for use on multiple systems.

There was still a barrier to a seamless interface between creating documents and imaging them. Each output device required its own driver, so pages might not be correctly interpreted if they were not designed with that output device as the designated printer. What was needed was a universal interface between the front end (the screen representation of the page) and the back end (the printed page).

In 1985, events occurred that would drastically change the accepted approach to publishing and document production. Adobe Systems, of Mountain View, California, introduced the PostScript page-description language, licensing its use to any who wished to buy into the program.

In a major coup, they entered into an agreement with Linotype Corporation, arguably the de facto standard for type in the United States, to digitize their very substantial library as PostScript fonts. Because PostScript was used as the device driver for both the proofing device (the laser printer) and for the imaging device, the output was consistent. Even though the laser-printer resolution was only 300 spots per inch (spi) and the imaging device had a resolution of 1270 spi, the page geometry was the same. (Spots per inch are often referred to as “dots per inch.”)

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***Because of PostScript, what you proofed to your low-resolution laser printer actually showed you how the final, high-resolution document would look. This was as significant as the introduction of the Linotype.***

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At approximately the same time, Aldus Corporation released PageMaker (its president, Paul Brainerd, coined the term “desktop publishing”). Apple released the LaserWriter, which used the PostScript language, and Linotype followed shortly with the L-100 imagesetter. The package of off-the-shelf hardware and software for publishing was complete.

*Technology has been a contributing force to the development of publishing. Notice how rapidly the changes have come in the second half of the 20th century.*

The result of these events was a paradigm shift in the cycle of document production. It became affordable for designers and corporations to perform all the typesetting and most of the composition functions of page production themselves, taking their files to a graphic arts service provider (called a “service bureau” in those early days) for imaging to film or photographic paper.

This was a devastating blow to the typesetting portion of the graphic-arts industry, forcing the closure of many shops and a downsizing of many more. Some attempted to shift gears with their clients and became service bureaus, adding high-end scanning and related equipment-dependent services that were beyond the financial means of their clients, or services that were more technical than most clients desired to perform. A few succeeded.

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***Approximately every 18 months, the capability of computers in publishing doubles. In other words, if you spend \$1,000 today for publishing technology, that same investment will purchase twice the capability in a year-and-a-half.***

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As a result, the bulk of typographic expertise and finesse is no longer available, and the quality of typography has deteriorated. (We’ll discuss the art of typography in depth in Section 2.)

As time has gone by, we have seen little change in composition technology, except advances in speed and capability. Changes affecting the printing of documents are another issue entirely. Instead of printing to individual sheets of film, fully imposed flats are imaged. Even beyond that, direct-to-plate or direct-to-press imaging is common in many parts of the printing industry, allowing on-demand printing and variable-data printing.

### **Publishing Beyond Paper**

No discussion of the evolution of publishing would be complete without considering the effects of documents that will never be printed in the traditional sense — they are designed to exist as electronic documents. Those documents appear as Web pages and multimedia documents; some exist as e-books, designed to read on the computer screen.

As early as the 1960s, the Internet began to take shape as the U.S. Department of Defense began investigating means of linking a number of computer installations so they could communicate even in the event of a nuclear war. Through its Advanced Research Projects Agency, the DOD initiated ARPANet, linking a number of military and university computers. In these early stages, operating protocols were established that allowed relatively fast and error-free transmission of data from computer to computer.

As ARPANet grew through the 1970s, other networks came into existence, including UUCP (Unix to Unix Copy) and USENET (the Users' Network). In 1981, with just over 200 computers connected to ARPANet, the military divided it into two organizations, ARPANet and a purely military network. ARPANet was absorbed by the National Science Foundation's NSFNET in the 1980. Eventually, the collection of networks became known as the "Internet."

The Internet grew slowly during these early years because users had to master complex sets of programming commands that required memorization or reference to special manuals. In 1991, British computer scientist Tim Berners-Lee developed what became known as the World Wide Web, using HyperText Markup Language (HTML) to link information.

In 1993, browsers were developed, and this further simplified the use of the Internet. In addition, tools that allowed point-and-click development of Web pages, coupled with more powerful computers, have brought about the tremendous growth of the Internet. Compare the 200 computers connected to ARPANet in 1981 to the tens of millions of users who access the Internet daily in 2001, with the anticipation of exponential growth.

With the growth of the Internet came the spread of shareware and freely distributed files, including fonts. Some of these are very well done and others are not, lacking sophisticated hinting and kerning pairs. In general, we recommend using only fonts from experienced professional and reputable foundries.

## Fonts Used for Publishing

Although there are other font formats in limited use, Adobe Systems' Type 1 PostScript format and TrueType, developed by Apple Computer and Microsoft, are the leading formats for type. OpenType, jointly supported by Adobe and Microsoft, allows both TrueType and Type 1 fonts to work together seamlessly.

*PostScript fonts (the left two icons) are comprised of a screen font and a printer font. TrueType fonts (with three "A"s) have the screen and printer data combined into one unit. OpenType fonts (right) are a super set of TrueType fonts that give the ability to access a broad range of glyphs.*

The fonts using these technologies are unique, in that they work with any PostScript imaging device. All characters and symbols are stored as outlines, so they may be condensed, expanded, elongated and skewed. Their basic shapes may be altered using special programs. They may even be disassembled and retained as artwork, using standard illustration programs.

No matter where the fonts are stored, they must eventually be sent to the printer. As a practical matter, fonts are stored in three different locations:

- **ROM-based** fonts are stored in the printer's read-only memory. They cannot be erased.
- **Printer disk-based** fonts are stored on the printer's hard drive or on a drive attached to the printer.
- **Downloadable** fonts are stored in the computer and are automatically sent to the printer as needed. These fonts are replaced as new fonts are sent to the printer.

The fonts must also be stored where the computer can reference them. On Windows-based computers, TrueType fonts and PostScript screen fonts are stored in the Windows\Fonts folder; PostScript printer fonts are stored in the PS Fonts folder. On the Macintosh, fonts are stored in the Fonts folder within the System folder.

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**Font-management programs come and go. Master Juggler and FontMinder are gone; new programs such as Diamondsoft's Font Reserve are becoming available. Adobe has announced that they have no plans to support Macintosh OSX with Adobe Type Manager.**

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As font libraries grew, it became awkward to have hundreds of fonts available at all times. Font-management programs such as Master Juggler and Suitcase on the Macintosh and Ares FontMinder for Windows were used to turn fonts "on" and "off." More recently, ATM Deluxe (Adobe Type Manager) is also used for font management on both platforms. When a font manager is used, the fonts may be stored in any location on the computer.

PostScript, TrueType and Open Type fonts also use a hinting technology that allows them to be used in either high-resolution or low-resolution devices. Because low-resolution devices have a much coarser grid, letterforms are often distorted. *Hinting* is a set of mathematical instructions added to a font to tell the imaging device how to distort the font at given sizes in order to best preserve the actual shape of the letterform. This subject is discussed in considerable depth in Chapter 8: *The Mechanics of Type*. The evolution of type styles will be discussed in Chapter 3.

## Summary

The development of written forms of expression includes a number of disciplines, from the origins of language itself to the bits and bytes of computer technology. As we have become more complex as a people, our means of communication have improved, and, rather than becoming more elitist, as might be expected, they have reached out to embrace a wider group. We saw this with the evolution of the alphabet, the development of the printing press and the democratization of typesetting through the introduction of off-the-shelf hardware and software.

## Endnote

Not surprisingly, the early DTP programs ran on the PC (before Windows) and under different languages than PostScript (since they were released before either the Macintosh or the PostScript language). Some of these products ran on a microcomputer, but were really high-end typesetting software, using phototypesetters as their output device, instead of laser or other personal printers.

Several products “almost made it to market,” and of those that did, most failed the acid test of producing quality commensurate with their price tags. Some were caught up in buyouts and mergers. Few of the early programs are still in existence.

**After PostScript**, the primary programs released were:

**FrameMaker**, Frame Corporation — *used for technical documents. Later acquired by Adobe Systems*

**PageMaker**, Aldus Corporation — *PC (with run-time Windows), Macintosh. Later acquired by Adobe Systems*

**QuarkXPress**, Quark, Inc. — *Macintosh, later also Windows*

**Ventura Publisher**, Xerox Corporation — *PC under GEM, later under Windows. Now owned by Corel*

**InDesign**, Adobe Systems — *Macintosh, Windows*

While there are a number of low-end programs in today’s market and a few high-end programs, those that have been successful in keeping market share in the professional publishing arena are PageMaker, FrameMaker and QuarkXPress. InDesign, introduced by Adobe in 2000 shows promise. All professional publishing programs use the PostScript language today.