The Elements *of* Typographic Style

version 3.0

Robert Bringhurst

¶ THE ELEMENTS *of* TYPOGRAPHIC STYLE

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for my colleagues & friends

in the worlds of letters:

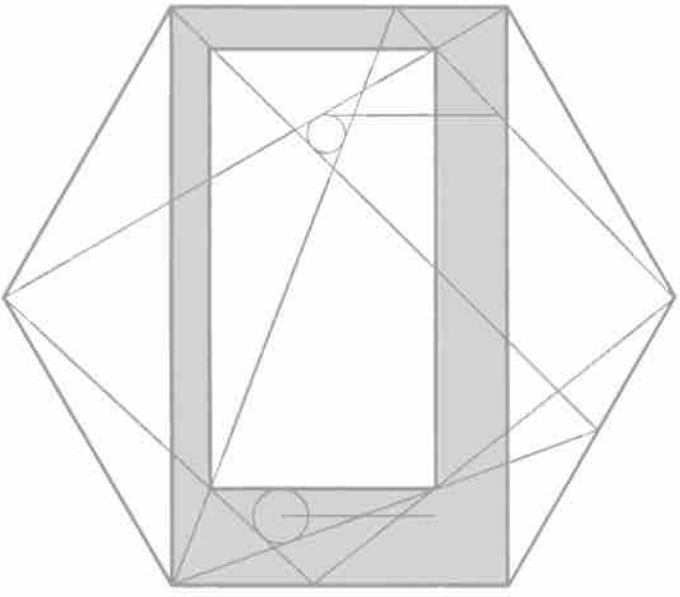
writers & editors,

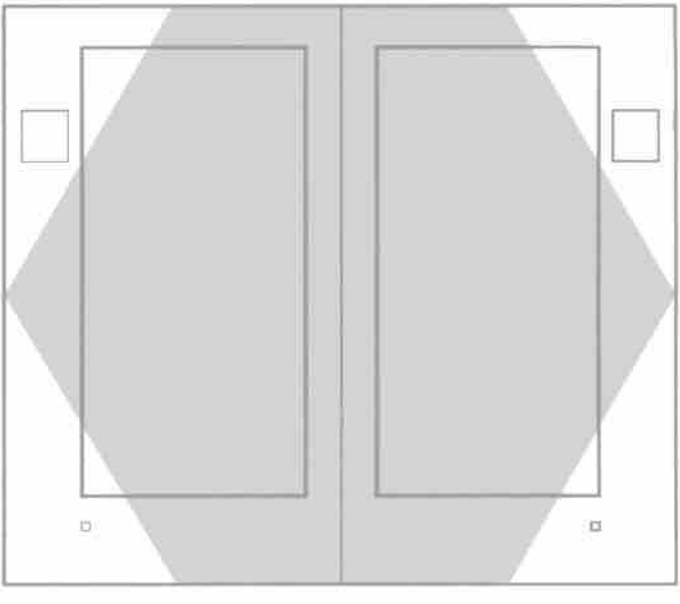
type designers, typographers,

printers & publishers,

shepherding words and books

on their lethal and innocent ways





CONTENTS

— Everything written symbols can say has already passed by. They are like tracks left by animals. That is why the masters of meditation refuse to accept that writings are final. The aim is to reach true being by means of those tracks, those letters, those signs – but reality itself is not a sign, and it leaves no tracks. It doesn't come to us by way of letters or words. We can go toward it, by following those words and letters back to what they came from. But so long as we are preoccupied with symbols, theories and opinions, we will fail to reach the principle.

— But when we give up symbols and opinions, aren't we left in the utter nothingness of being?

— Yes.

KIMURA KYŪHO, *Kenjutsu Fushigi Hen*
[*On the Mysteries of Swordsmanship*],
1768

A true revelation, it seems to me, will only emerge from stubborn concentration on a solitary problem. I am not in league with inventors or adventurers, nor with travelers to exotic destinations. The surest – also the quickest – way to awake the sense of wonder in ourselves is to look intently, undeterred, at a single object. Suddenly, miraculously, it will reveal itself as something we have never seen before.

CESARE PAVESE, *Dialoghi con Leucò*,
1947

FOREWORD

There are many books about typography, and some of them are models of the art they teach. But when I set myself to compile a simple list of working principles, one of the benchmarks I first thought of was William Strunk and E.B. White's small masterpiece, *The Elements of Style.* Brevity, however, is the essence of Strunk & White's manual of literary technique. This book is longer than theirs, and for that there is a cause.

Typography makes at least two kinds of sense, if it makes any sense at all. It makes visual sense and historical sense. The visual side of typography is always on display, and materials for the study of its visual form are many and widespread. The history of letterforms and their usage is visible too, to those with access to manuscripts, inscriptions and old books, but from others it is largely hidden. This book has therefore grown into something more than a short manual of typographic etiquette. It is the fruit of a lot of long walks in the wilderness of letters: in part a pocket field guide to the living wonders that are found there, and in part a meditation on the ecological principles, survival techniques and ethics that apply. The principles of typography as I understand them are not a set of dead conventions but the tribal customs of the magic forest, where ancient voices speak from all directions and new ones move to unremembered forms.

One question, nevertheless, has been often in my mind. When all right-thinking human beings are struggling to remember that other men and women are free to be different, and free to become more different still, how can one honestly write a rulebook? What reason and authority exist for these commandments, suggestions and instructions? Surely typographers, like others, ought to be at liberty to follow or to blaze the trails they choose.

Typography thrives as a shared concern – and there are no paths at all where there are no shared desires and directions. A typographer determined to forge new routes must move, like other solitary travelers, through uninhabited country and against the grain of the land, crossing common thoroughfares in the silence before dawn. The subject of this book is not typographic solitude, but the old, well-traveled roads at the core of the tradition: paths that each of us is free to follow or not, and to enter and leave when we choose – if only we know the paths are there

and have a sense of where they lead. That freedom is denied us if the tradition is concealed or left for dead. Originality is everywhere, but much originality is blocked if the way back to earlier discoveries is cut or overgrown.

If you use this book as a guide, by all means leave the road when you wish. That is precisely the use of a road: to reach individually chosen points of departure. By all means break the rules, and break them beautifully, deliberately and well. That is one of the ends for which they exist.

Letterforms change constantly yet differ very little, because they are alive. The principles of typographic clarity have also scarcely altered since the second half of the fifteenth century, when the first books were printed in roman type. Indeed, most of the principles of legibility and design explored in this book were known and used by Egyptian scribes writing hieratic script with reed pens on papyrus in 1000 BC. Samples of their work sit now in museums in Cairo, London and New York, still lively, subtle and perfectly legible thirty centuries after they were made.

Writing systems vary, but a good page is not hard to learn to recognize, whether it comes from Táng Dynasty China, the Egyptian New Kingdom or Renaissance Italy. The principles that unite these distant schools of design are based on the structure and scale of the human body – the eye, the hand and the forearm in particular – and on the invisible but no less real, no less demanding and no less sensuous anatomy of the human mind. I don't like to call these principles universals, because they are largely unique to our species. Dogs and ants, for example, read and write by more chemical means. But the underlying principles of typography are, at any rate, stable enough to weather any number of human fashions and fads.

It is true that typographers' tools are presently changing with considerable force and speed, but this is not a manual in the use of any particular typesetting system or medium. I suppose that most readers of this book will set most of their type in digital form, using computers, but I have no preconceptions about which brands of computers, or which versions of which proprietary software, they may use. The essential elements of style have more to do with the goals typographers set for themselves than with the mutable eccentricities of their tools. Typography itself, in other words, is far more device-independent than PostScript, which is the computer language used to render these particular letters, and the design of these pages, into typographic code. If I have

succeeded in my task, this book should be as useful to artists and antiquarians setting foundry metal by hand and pulling proofs on a flat-bed press, as to those who check their work on a screen or laser printer, then ship it to high-resolution digital output devices by optical disk or long-distance telephone line.

Typography is the craft of endowing human language with a durable visual form, and thus with an independent existence. Its heartwood is calligraphy – the dance, on a tiny stage, of the living, speaking hand – and its roots reach into living soil, though its branches may be hung each year with new machines. So long as the root lives, typography remains a source of true delight, true knowledge, true surprise.

As a craft, typography shares a long common boundary and many common concerns with writing and editing on the one side and with graphic design on the other; yet typography itself belongs to neither. This book in its turn is neither a manual of editorial style nor a textbook on design, though it overlaps with both of these concerns. The perspective throughout is first and foremost typographic – and I hope the book will be useful for that very reason to those whose work or interests may be centered in adjacent fields.

This book owes much to the conversation and example, over the years, of several friends and master craftsmen – Kay Amert, Stan Bevington, Crispin Elsted, Glenn Goluska, Peter Koch, Vic Marks, George Payerle and others – and to the practice of two artists and exemplars: the late Adrian Wilson, and Hermann Zapf. Artists and scholars around the world have shared their knowledge freely. James Mosley, his staff and his successors at the St Bride Printing Library, London, have been particularly helpful. I am grateful to them all.

I have many others to thank as well for their contributions to the second and now the third edition of the book. Their names appear in the afterword, page 365.

R. B.

Historical Synopsis

aperture: the opening in letters such as a, c, e, s

RENAISSANCE (15th & 16th centuries): modulated stroke; humanist [oblique] axis; crisp, pen-formed terminals; large *aperture*; italic equal to and independent of roman.

These charts show first and foremost the axis of the stroke, which is the axis of the pen that makes the letter. It is often very different from the axis of the lettershape itself. A pen that points northwest can make an upright letter or a letter that slopes to the northeast.

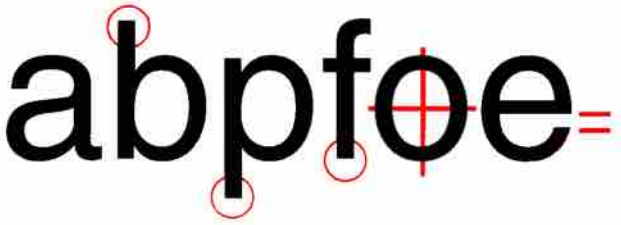
BAROQUE (17th century): modulated stroke; variable axis; modeled serifs and terminals; moderate aperture; italic subsidiary to roman and closely linked with it. A secondary vertical axis often develops in Baroque letters – but the *primary* axis of the penstroke is normally oblique.

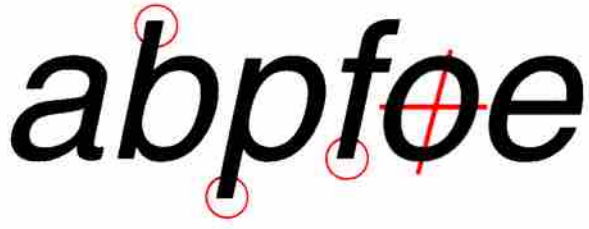
NEOCLASSICAL (18th century): modulated stroke; rationalist [vertical] axis; refined, *adnate* serifs; *lachrymal* terminals; moderate aperture; italic fully subjugated to roman.

adnate: flowing into the stem; *lachrymal*: tear-drop shaped

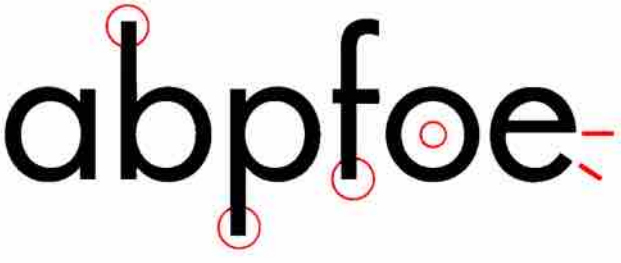
ROMANTIC (18th & 19th centuries): hypermodulated stroke; intensified rationalist axis; abrupt, thin serifs; round terminals; small aperture; fully subjugated italic. In Neoclassical and Romantic letters alike, the *primary* axis is usually vertical and the *secondary* axis oblique.

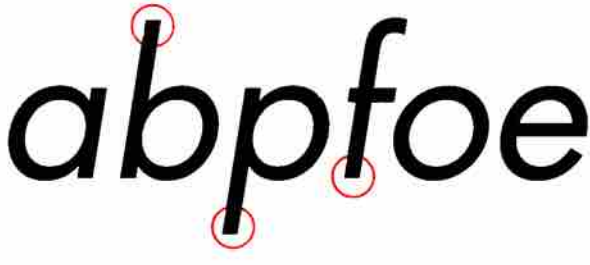
Historical Synopsis



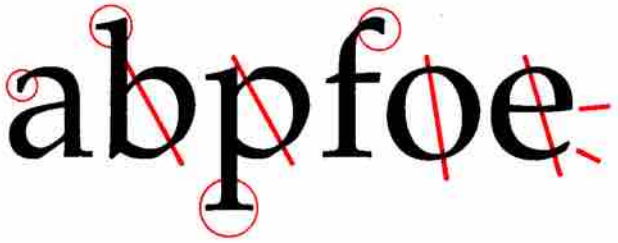


REALIST (19th & early 20th centuries): unmodulated stroke; implied vertical axis; small aperture; serifs absent or abrupt and of equal weight with main strokes; italic absent or replaced by sloped roman.

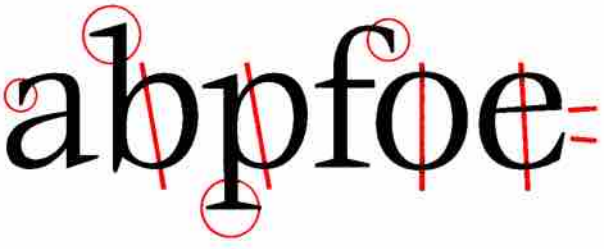




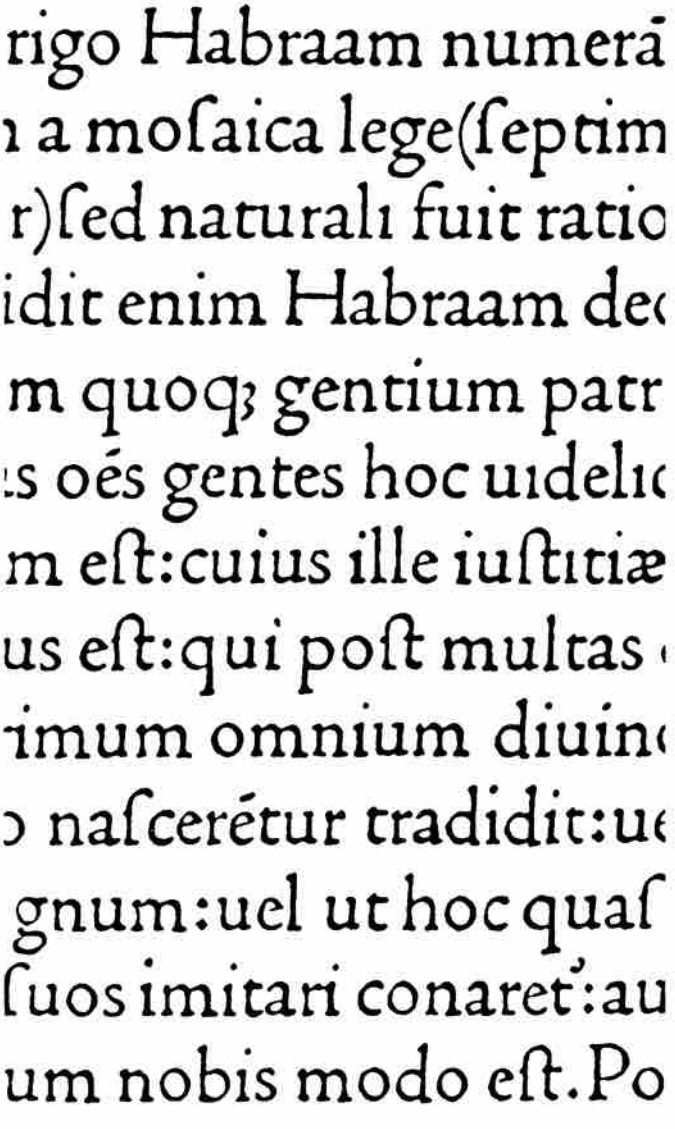
GEOMETRIC MODERNIST (20th century): unmodulated stroke; bowls often circular (no axis); moderate aperture; serifs absent or of equal weight with main strokes; italic absent or replaced by sloped roman. The modeling, however, is often much more subtle than it first appears.



LYRICAL MODERNIST (20th century): rediscovery of Renaissance form; modulated stroke; humanist axis; pen-formed serifs and terminals; large aperture; italic partially liberated from roman.



POSTMODERNIST (late 20th & early 21st century): frequent parody of Neoclassical, Romantic or Baroque form; rationalist or variable axis; sharply modeled serifs and terminals; moderate aperture. (There are many kinds of Postmodernist letter. This is one example.)



Roman type cut in 1469 by Nicolas Jenson, a French typographer working in Venice. The original is approximately 16 pt. The type is shown here as Jenson printed it, but at twice actual size. This is the ancestor of the type (Bruce Rogers's Centaur) shown at the top of page 12.

THE GRAND DESIGN

1.1 FIRST PRINCIPLES

1

1.1.1 *Typography exists to honor content.*

Like oratory, music, dance, calligraphy – like anything that lends its grace to language – typography is an art that can be deliberately misused. It is a craft by which the meanings of a text (or its absence of meaning) can be clarified, honored and shared, or knowingly disguised.

In a world rife with unsolicited messages, typography must often draw attention to itself before it will be read. Yet in order to be read, it must relinquish the attention it has drawn. Typography with anything to say therefore aspires to a kind of statuesque transparency. Its other traditional goal is durability: not immunity to change, but a clear superiority to fashion. Typography at its best is a visual form of language linking timelessness and time.

One of the principles of durable typography is always legibility; another is something more than legibility: some earned or unearned interest that gives its living energy to the page. It takes various forms and goes by various names, including serenity, liveliness, laughter, grace and joy.

These principles apply, in different ways, to the typography of business cards, instruction sheets and postage stamps, as well as to editions of religious scriptures, literary classics and other books that aspire to join their ranks. Within limits, the same principles apply even to stock market reports, airline schedules, milk cartons, classified ads. But laughter, grace and joy, like legibility itself, all feed on meaning, which the writer, the words and the subject, not the typographer, must generally provide.

In 1770, a bill was introduced in the English Parliament with the following provisions:

... all women of whatever age, rank, profession, or degree, whether virgins, maids, or widows, that shall ... impose upon, seduce, and betray into matrimony, any of His Majesty's subjects, by the scents, paints, cosmetic washes, artificial teeth, false hair, Spanish wool, iron stays, hoops, high heeled shoes [*or*] *bolstered hips shall incur*

the penalty of the law in force against witchcraft ... and ... the marriage, upon conviction, shall stand null and void.

The function of typography, as I understand it, is neither to further the power of witches nor to bolster the defences of those, like this unfortunate parliamentarian, who live in terror of being tempted and deceived. The satisfactions of the craft come from elucidating, and perhaps even ennobling, the text, not from deluding the unwary reader by applying scents, paints and iron stays to empty prose. But humble texts, such as classified ads or the telephone directory, may profit as much as anything else from a good typographical bath and a change of clothes. And many a book, like many a warrior or dancer or priest of either sex, may look well with some paint on its face, or indeed with a bone in its nose.

1.1.2 *Letters have a life and dignity of their own.*

Letterforms that honor and elucidate what humans see and say deserve to be honored in their turn. Well-chosen words deserve well-chosen letters; these in their turn deserve to be set with affection, intelligence, knowledge and skill. Typography is a link, and it ought, as a matter of honor, courtesy and pure delight, to be as strong as the others in the chain.

Writing begins with the making of footprints, the leaving of signs. Like speaking, it is a perfectly natural act which humans have carried to complex extremes. The typographer's task has always been to add a somewhat unnatural edge, a protective shell of artificial order, to the power of the writing hand. The tools have altered over the centuries, and the exact degree of unnaturalness desired has varied from place to place and time to time, but the character of the essential transformation between manuscript and type has scarcely changed.

The original purpose of type was simply copying. The job of the typographer was to imitate the scribal hand in a form that permitted exact and fast replication. Dozens, then hundreds, then thousands of copies were printed in less time than a scribe would need to finish one. This excuse for setting texts in type has disappeared. In the age of photolithography, digital scanning and offset printing, it is as easy to print directly from handwritten copy as from text that is typographically composed. Yet the typographer's

task is little changed. It is still to give the illusion of superhuman speed and stamina – and of superhuman patience and precision – to the writing hand.

Typography is just that: idealized writing. Writers themselves now rarely have the calligraphic skill of earlier scribes, but they evoke countless versions of ideal script by their varying voices and literary styles. To these blind and often invisible visions, the typographer must respond in visible terms.

The Grand Design

In a badly designed book, the letters mill and stand like starving horses in a field. In a book designed by rote, they sit like stale bread and mutton on the page. In a well-made book, where designer, compositor and printer have all done their jobs, no matter how many thousands of lines and pages they must occupy, the letters are alive. They dance in their seats. Sometimes they rise and dance in the margins and aisles.

Simple as it may sound, the task of creative non-interference with letters is a rewarding and difficult calling. In ideal conditions, it is all that typographers are really asked to do – and it is enough.

1.1.3 *There is a style beyond style.*

Literary style, says Walter Benjamin, "is the power to move freely in the length and breadth of linguistic thinking without slipping into banality." Typographic style, in this large and intelligent sense of the word, does not mean any particular style – my style or your style, or Neoclassical or Baroque style – but the power to move freely through the whole domain of typography, and to function at every step in a way that is graceful and vital instead of banal. It means typography that can walk familiar ground without sliding into platitudes, typography that responds to new conditions with innovative solutions, and typography that does not vex the reader with its own originality in a self-conscious search for praise.

From part 2 of Benjamin's essay on Karl Kraus, in *Illuminationen* (Frankfurt, 1955). There is an English translation in Walter Benjamin, *Reflections*, ed. Peter Demetz (New York, 1978).

Typography is to literature as musical performance is to composition: an essential act of interpretation, full of endless opportunities for insight or obtuseness. Much typography is far removed from literature, for language has many uses, including packaging and propaganda. Like music, it can be used to manipulate behavior and emotions. But this is not where typographers, musicians or other human beings show us their finest side. Typography at its best is a slow performing art, worthy of the

same informed appreciation that we sometimes give to musical performances, and capable of giving similar nourishment and pleasure in return.

The same alphabets and page designs can be used for a biography of Mohandas Gandhi and for a manual on the use and deployment of biological weapons. Writing can be used both for love letters and for hate mail, and love letters themselves can be used for manipulation and extortion as well as to bring delight to body and soul. Evidently there is nothing inherently noble and trustworthy in the written or printed word. Yet generations of men and women have turned to writing and printing to house and share their deepest hopes, perceptions, dreams and fears. It is to them, not to the extortionist – nor to the opportunist or the profiteer – that the typographer must answer.

1.2 TACTICS

1.2.1 *Read the text before designing it.*

The typographer's one essential task is to interpret and communicate the text. Its tone, its tempo, its logical structure, its physical size, all determine the possibilities of its typographic form. The typographer is to the text as the theatrical director to the script, or the musician to the score.

1.2.2 *Discover the outer logic of the typography in the inner logic of the text.*

A novel often purports to be a seamless river of words from beginning to end, or a series of unnamed scenes. Research papers, textbooks, cookbooks and other works of nonfiction rarely look so smooth. They are often layered with chapter heads, section heads, subheads, block quotations, footnotes, endnotes, lists and illustrative examples. Such features may be obscure in the manuscript, even if they are clear in the author's mind. For the sake of the reader, each requires its own typographic identity and form. Every layer and level of the text must be consistent, distinct, yet (usually) harmonious in form.

The first task of the typographer is therefore to read and understand the text; the second task is to analyze and map it. Only then can typographic interpretation begin.

If the text has many layers or sections, it may need not only

heads and subheads but running heads as well, reappearing on every page or two-page spread, to remind readers which intellectual neighborhood they happen to be visiting.

Novels seldom need such signposts, but they often require typographic markers of other kinds. Peter Matthiessen's novel *Far Tortuga* (New York, 1975; designed by Kenneth Miyamoto) uses two sizes of type, three different margins, free-floating block paragraphs and other typographic devices to separate thought, speech and action. Ken Kesey's novel *Sometimes a Great Notion* (New York, 1964) seems to flow like conventional prose, yet it shifts repeatedly in mid-sentence between roman and italic to distinguish what characters say to each other from what they say in silence to themselves.

The Grand Design

In poetry and drama, a larger typographic palette is sometimes required. Some of Douglass Parker's translations from classical Greek and Dennis Tedlock's translations from Zuni use roman, italic, bold, small caps and full caps in various sizes to emulate the dynamic markings of music. Robert Massin's typographic performances of Eugène Ionesco's plays use intersecting lines of type, stretched and melted letters, inkblots, pictograms, and a separate typeface for each person in the play. In the works of other artists such as Guillaume Apollinaire and Guy Davenport, boundaries between author and designer sometimes vanish. Writing merges with typography, and the text becomes its own illustration.

See for example Aristophanes, *Four Comedies* (Ann Arbor, Michigan, 1969), Dennis Tedlock, *Finding the Center* (New York, 1972); Eugène Ionesco, *La Cantatrice chauve* (Paris, 1964), and *Délire à deux* (Paris, 1966). There are samples of Massin's work in *Typographia* n.s 11 (1965).

The typographer must analyze and reveal the inner order of the text, as a musician must reveal the inner order of the music he performs. But the reader, like the listener, should in retrospect be able to close her eyes and see what lies inside the words she has been reading. The typographic performance must reveal, not replace, the inner composition. Typographers, like other artists and craftsmen – musicians, composers and authors as well – must as a rule do their work and disappear.

1.2.3 *Make the visible relationship between the text and other elements (photographs, captions, tables, diagrams, notes) a reflection of their real relationship.*

If the text is tied to other elements, where do they belong? If there are notes, do they go at the side of the page, the foot of the page, the end of the chapter, the end of the book? If there are photographs or other illustrations, should they be embedded in

the text or should they form a special section of their own? And if the photographs have captions or credits or labels, should these sit close beside the photographs or should they be separately housed?

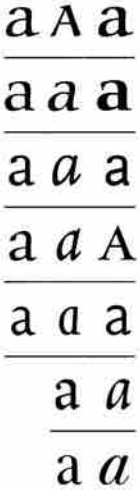
If there is more than one text – as in countless publications issued in Canada, Switzerland, Belgium and other multilingual countries – how will the separate but equal texts be arrayed? Will they run side by side to emphasize their equality (and perhaps to share in a single set of illustrations), or will they be printed back-to-back, to emphasize their distinctness?

Tactics

No matter what their relation to the text, photos or maps must sometimes be grouped apart from it because they require a separate paper or different inks. If this is the case, what typographic cross-references will be required?

These and similar questions, which confront the working typographer on a daily basis, must be answered case by case. The typographic page is a map of the mind; it is frequently also a map of the social order from which it comes. And for better or for worse, minds and social orders change.

1.2.4 *Choose a typeface or a group of faces that will honor and elucidate the character of the text.*



This is the beginning, middle and end of the practice of typography: choose and use the type with sensitivity and intelligence. Aspects of this principle are explored throughout this book and considered in detail in chapters 6, 7 and 11.

Letterforms have tone, timbre, character, just as words and sentences do. The moment a text and a typeface are chosen, two streams of thought, two rhythmical systems, two sets of habits, or if you like, two personalities, intersect. They need not live together contentedly forever, but they must not as a rule collide.

The root metaphor of typesetting is that the alphabet (or in Chinese, the entire lexicon) is a system of interchangeable parts. The word *form* can be surgically revised, instead of rewritten, to become the word *farm* or *firm* or *fort* or *fork* or *from*, or with a little more trouble, to become the word *pineapple*. The old compositor's typecase is a partitioned wooden tray holding hundreds of such interchangeable bits of information. These subsemantic particles, these bits – called *sorts* by letterpress printers – are letters cast on standardized bodies of metal, waiting to be assembled into meaningful combinations, then dispersed and reassembled in a

different form. The compositor's typecase is one of the primary ancestors of the computer – and it is no surprise that while typesetting was one of the last crafts to be mechanized, it was one of the first to be computerized.

But the bits of information handled by typographers differ in one essential respect from the computer programmer's bits. Whether the type is set in hard metal by hand, or in softer metal by machine, or in digital form with a computer, every comma, every parenthesis, every *e*, and in context, even every empty space, has style as well as bald symbolic value. Letters are microscopic works of art as well as useful symbols. They mean what they are as well as what they say.

Typography is the art and craft of handling these doubly meaningful bits of information. A good typographer handles them in intelligent, coherent, sensitive ways. When the type is poorly chosen, what the words say linguistically and what the letters imply visually are disharmonious, dishonest, out of tune.

1.2.5 *Shape the page and frame the textblock so that it honors and reveals every element, every relationship between elements, and every logical nuance of the text.*

Selecting the shape of the page and placing the type upon it is much like framing and hanging a painting. A cubist painting in an eighteenth-century gilded frame, or a seventeenth-century still-life in a slim chrome box, will look no sillier than a nineteenth-century text from England set in types that come from seventeenth-century France, asymmetrically positioned on a German Modernist page.

If the text is long or the space is short, or if the elements are many, multiple columns may be required. If illustrations and text march side by side, does one take precedence over the other? And does the order or degree of prominence change? Does the text suggest perpetual symmetry, perpetual asymmetry, or something in between?

Again, does the text suggest the continuous unruffled flow of justified prose, or the continued flirtation with order and chaos evoked by flush-left ragged-right composition? (The running heads and sidenotes on the recto (righthand) pages of this book are set flush left, ragged right. On the verso (lefthand) pages, they are ragged left. Leftward-reading alphabets, like Arabic and Hebrew, are perfectly at home in ragged-left text, but with

rightward-reading alphabets like Latin, Greek or Thai, ragged-left setting emphasizes the end, not the beginning, of the line. This makes it a poor choice for extended composition.)

Shaping the page goes hand in hand with choosing the type, and both are permanent typographical preoccupations. The subject of page shapes and proportions is addressed in greater detail in chapter 8.

Tactics

1.2.6 *Give full typographic attention even to incidental details.*

Some of what a typographer must set, like some of what any musician must play, is simply passage work. Even an edition of Plato or Shakespeare will contain a certain amount of routine text: page numbers, scene numbers, textual notes, the copyright claim, the publisher's name and address, and the hyperbole on the jacket, not to mention the passage work or background writing that is implicit in the text itself. But just as a good musician can make a heart-wrenching ballad from a few banal words and a trivial tune, so the typographer can make poignant and lovely typography from bibliographical paraphernalia and textual chaff. The ability to do so rests on respect for the text as a whole, and on respect for the letters themselves.

Perhaps the principle should read: Give full typographic attention *especially* to incidental details.

1.3 SUMMARY

There are always exceptions, always excuses for stunts and surprises. But perhaps we can agree that, as a rule, typography should perform these services for the reader:

- *invite the reader into the text;*
- *reveal the tenor and meaning of the text;*
- *clarify the structure and the order of the text;*
- *link the text with other existing elements;*
- *induce a state of energetic repose, which is the ideal condition for reading.*

While serving the reader in this way, typography, like a musical performance or a theatrical production, should serve two other ends. It should honor the text for its own sake – always assuming that the text is worth a typographer's trouble – and it should honor and contribute to its own tradition: that of typography itself.

2

2.1 HORIZONTAL MOTION

An ancient metaphor: thought is a thread, and the raconteur is a spinner of yarns – but the true storyteller, the poet, is a weaver. The scribes made this old and audible abstraction into a new and visible fact. After long practice, their work took on such an even, flexible texture that they called the written page a *textus,* which means cloth.

The typesetting device, whether it happens to be a computer or a composing stick, functions like a loom. And the typographer, like the scribe, normally aims to weave the text as evenly as possible. Good letterforms are designed to give a lively, even texture, but careless spacing of letters, lines and words can tear this fabric apart.

Another ancient metaphor: the density of texture in a written or typeset page is called its *color.* This has nothing to do with red or green ink; it refers only to the darkness or blackness of the letterforms in mass. Once the demands of legibility and logical order are satisfied, *evenness of color* is the typographer's normal aim. And color depends on four things: the design of the type, the spacing between the letters, the spacing between the words, and the spacing between the lines. None is independent of the others.

2.1.1 *Define the word space to suit the size and natural letterfit of the font.*

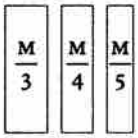
Type is normally measured in picas and points (explained in detail on pages 328–329), but horizontal spacing is measured in *ems,* and the em is a sliding measure. One em is a distance equal to the type size. In 6 point type, an em is 6 points; in 12 pt type it is 12 points, and in 60 pt type it is 60 points. Thus a one-em space is *proportionately* the same in any size.

12 pt em 18 pt em 24 pt em 36 pt em

Typesetting machines generally divide the em into units. Ems of 18, 36 or 54 units, for example, are commonly found in the older machines. In newer devices, the em is generally a thousand units. Typographers are more likely to divide the em into simple fractions: half an em, a third of an em, and so on, knowing that the unit value of these fractions will vary from one machine to the next. Half an em is called an *en*.

Horizontal Motion

If text is set ragged right, the *word space* (the space between words) can be fixed and unchanging. If the text is *justified* (set flush left and right, like the text in this book), that space must usually be elastic. In either case, the size of the ideal word space varies from one circumstance to another, depending on factors such as letterfit, type color, and size. A loosely fitted or bold face will need a larger interval between the words. At larger sizes, when letterfit is tightened, the spacing of words can be tightened as well. For a normal text face in a normal text size, a typical value for the word space is a quarter of an em, which can be written M/4. (A quarter of an em is typically about the same as, or slightly more than, the set-width of the letter t.)



Language has some effect on the word space as well. In highly inflected languages, such as Latin, most word boundaries are marked by grammatical tags, and a smaller space is therefore sufficient. In English and other uninflected languages, good word spacing makes the difference between a line that has to be deciphered and a line that can be efficiently read.

If the text is justified, a reasonable *minimum* word space is a fifth of an em (M/5), and M/4 is a good average to aim for. A reasonable maximum in justified text is M/2. If it can be held to M/3, so much the better. But for loosely fitted faces, or text set in a small size, M/3 is often a better average to aim for, and a better minimum is M/4. In a line of widely letterspaced capitals, a word space of M/2 or more may be required.

For example, the word space native to the font used here is 227 units wide, or 227 thousandths of an em. The typesetting software is instructed to allow, in the main text, a minimum word space of 85%. That is 193 units: just under a fifth of an em. The maximum word space is set to 150%, which is 340 units: just over a third of an em.

2.1.2 *Choose a comfortable measure.*

Anything from 45 to 75 characters is widely regarded as a satisfactory length of line for a single-column page set in a serifed text face in a text size. The 66-character line (counting both letters and spaces) is widely regarded as ideal. For multiple-column work, a better average is 40 to 50 characters.

If the type is well set and printed, lines of 85 or 90 characters will pose no problem in discontinuous texts, such as bibliogra-

phies, or, with generous leading, in footnotes. But even with generous leading, a line that averages more than 75 or 80 characters is likely to be too long for continuous reading.

A reasonable working minimum for justified text in English is the 40-character line. Shorter lines may compose perfectly well with sufficient luck and patience, but in the long run, justified lines averaging less than 38 or 40 characters will lead to white acne or pig bristles: a rash of erratic and splotchy word spaces or an epidemic of hyphenation. When the line is short, the text should be set ragged right. In large doses, even ragged-right composition may look anorexic if the line falls below 30 characters, but in small and isolated patches – ragged marginal notes, for example – the minimum line (if the language is English) can be as little as 12 or 15 characters.

When the counters of the letterforms themselves, not just the spaces between words, are elastic, justification can be carried to greater extremes See pp 190–192

These line lengths are in every case averages, and they include empty spaces and punctuation as well as letters. The simplest way of computing them is with a copyfitting table like the one on page 29. Measure the length of the basic lowercase alphabet – abcdefghijklmnopqrstuvwxyz – in any face and size you are considering, and the table will tell you the average number of characters to expect on a given line. In most text faces, the 10 pt roman alphabet will run between 120 and 140 points in length, but a 10 pt italic alphabet might be 100 points long or even less, while a 10 pt bold might run to 160. The 12 pt alphabet is, of course, about 1.2 times the length of the 10 pt alphabet – but not exactly so unless it is generated from the same master design and the letterfit is unchanged.

On a conventional book page, the measure, or length of line, is usually around 30 times the size of the type, but lines as little as 20 or as much as 40 times the type size fall within the expectable range. If, for example, the type size is 10 pt, the measure might be around $30 \times 10 = 300$ pt, which is $300/12 = 25$ picas. A typical lowercase alphabet length for a 10 pt text font is 128 pt, and the copyfitting table tells us that such a font set to a 25-pica measure will yield roughly 65 characters per line.

2.1.3 *Set ragged if ragged setting suits the text and the page.*

In justified text, there is always a trade-off between evenness of spacing and frequency of hyphenation. The best available compromise will depend on the nature of the text as well as on the specifics of the design. Good compositors like to avoid consecu-

tive hyphenated line-ends, but frequent hyphens are better than sloppy spacing, and ragged setting is better yet.

Narrow measures – which make good justification extremely difficult – are commonly used when the text is set in multiple columns. Setting ragged right under these conditions will lighten the page and decrease its stiffness, as well as preventing an outbreak of hyphenation.

Horizontal Motion

Many unserifed faces look best when set ragged no matter what the length of the measure. And monospaced fonts, which are common on typewriters, always look better set ragged, in standard typewriter style. A typewriter (or a computer-driven printer of similar quality) that justifies its lines in imitation of typesetting is a presumptuous, uneducated machine, mimicking the outward form instead of the inner truth of typography.

❧ When setting ragged text with a computer, take a moment to refine your software's understanding of what constitutes an honest rag. Software is often predisposed to invoke a minimum as well as a maximum line. If permitted to do so, it will hyphenate words and adjust the word spaces regardless of whether it is ragging or justifying the text. Ragged setting with these parameters tends to produce an orderly ripple down the righthand side, making the text look like a neatly pinched piecrust. If that is what you want, fine; but it may not be. Unless the measure is excruciatingly narrow, you may prefer the greater variations of a hard rag. This means fixed word spaces, no minimum line, no letterspacing, and no hyphenation beyond what is inherent in the text. In a hard rag, hyphenated linebreaks may occur in words like *self-consciousness,* which are hyphenated anyway, but they cannot occur without manual intervention in words like *hyphenation* or *pseudosophisticated,* which aren't.

2.1.4 *Use a single word space between sentences.*

In the nineteenth century, which was a dark and inflationary age in typography and type design, many compositors were encouraged to stuff extra space between sentences. Generations of twentieth-century typists were then taught to do the same, by hitting the spacebar twice after every period. Your typing as well as your typesetting will benefit from unlearning this quaint Victorian habit. As a general rule, no more than a single space is required

AVERAGE CHARACTER COUNT PER LINE

	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
80	40	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160
85	38	45	53	60	68	76	83	91	98	106	113	121	129	136	144	151
90	36	43	50	57	64	72	79	86	93	100	107	115	122	129	136	143
95	34	41	48	55	62	69	75	82	89	96	103	110	117	123	130	137
100	33	40	46	53	59	66	73	79	86	92	99	106	112	119	125	132
105	32	38	44	51	57	63	70	76	82	89	95	101	108	114	120	127
110	30	37	43	49	55	61	67	73	79	85	92	98	104	110	116	122
115	29	35	41	47	53	59	64	70	76	82	88	94	100	105	111	117
120	28	34	39	45	50	56	62	67	73	78	84	90	95	101	106	112
125	27	32	38	43	48	54	59	65	70	75	81	86	91	97	102	108
130	26	31	36	41	47	52	57	62	67	73	78	83	88	93	98	104
135	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
140	24	29	34	39	44	48	53	58	63	68	73	77	82	87	92	97
145	23	28	33	37	42	47	51	56	61	66	70	75	80	84	89	94
150	23	28	32	37	41	46	51	55	60	64	69	74	78	83	87	92
155	22	27	31	36	40	45	49	54	58	63	67	72	76	81	85	90
160	22	26	30	35	39	43	48	52	56	61	65	69	74	78	82	87
165	21	25	30	34	38	42	46	51	55	59	63	68	72	76	80	84
170	21	25	29	33	37	41	45	49	53	57	62	66	70	74	78	82
175	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80
180	20	23	27	31	35	39	43	47	51	55	59	62	66	70	74	78
185	19	23	27	30	34	38	42	46	49	53	57	61	65	68	72	76
190	19	22	26	30	33	37	41	44	48	52	56	59	63	67	70	74
195	18	22	25	29	32	36	40	43	47	50	54	58	61	65	68	72
200	18	21	25	28	32	35	39	42	46	49	53	56	60	63	67	70
210	17	20	23	27	30	33	37	40	43	47	50	53	57	60	63	67
220	16	19	22	25	29	32	35	38	41	45	48	51	54	57	60	64
230	15	18	21	24	27	30	33	36	40	43	46	49	52	55	58	61
240	15	17	20	23	26	29	32	35	38	41	44	46	49	52	55	58
250	14	17	20	22	25	28	31	34	36	39	42	45	48	50	53	56
260	14	16	19	22	24	27	30	32	35	38	41	43	46	49	51	54
270	13	16	18	21	23	26	29	31	34	36	39	42	44	47	49	52
280	13	15	18	20	23	25	28	30	33	35	38	40	43	45	48	50
290	12	15	17	20	22	24	27	29	32	34	37	39	41	44	46	49
300	12	14	17	19	21	24	26	28	31	33	35	38	40	42	45	47
320	11	13	16	18	20	22	25	27	29	31	34	36	38	40	43	45
340	10	13	15	17	19	21	23	25	27	29	32	34	36	38	40	42
360	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40

Read down, in the left column: lowercase alphabet length in points. *Read across,* in the top row: line length in picas.

after a period, a colon or any other mark of punctuation. Larger spaces (e.g., en spaces) are *themselves* punctuation.

The rule is sometimes altered, however, when setting classical Latin and Greek, romanized Sanskrit, phonetics or other kinds of texts in which sentences begin with lowercase letters. In the absence of a capital, a full *en space* (M/2) between sentences may be welcome.

2.1.5 *Add little or no space within strings of initials.*

Names such as W. B. Yeats and J. C. L. Prillwitz need hair spaces, thin spaces or no spaces at all after the intermediary periods. A normal word space follows the *last* period in the string.

2.1.6 *Letterspace all strings of capitals and small caps, and all long strings of digits.*

Acronyms such as CIA and PLO are frequent in some texts. So are abbreviations such as CE and BCE or AD and BC. The normal value for letterspacing these sequences of small or full caps is 5% to 10% of the type size. If your software sees the em as 1000 PostScript units, that means 50 to 100 units of letterspacing.

With digital fonts, it is a simple matter to assign extra width to all small capitals, so that letterspacing occurs automatically. The width values of full caps are normally based on the assumption that they will be used in conjunction with the lower case, but letterspacing can still be automated through the use of kerning tables (see pages 33–34).

In titles and headings, extra letterspacing is often desirable. Justified lines of letterspaced capitals are generally set by inserting a normal word space (M/5 to M/4) between letters. This corresponds to letterspacing of 20% to 25% of the type size. But the extra space between letters will also require more space between lines. A Renaissance typographer setting a multi-line head in letterspaced text-size capitals would normally set blanks between the lines: the hand compositor's equivalent of the keyboard operator's extra hard return, or double spacing.

There is no generalized optimum value for letterspacing capitals in titles or display lines. The effective letterspacing of caps in good classical inscriptions and later manuscripts ranges from 5% to 100% of the nominal type size. The quantity of space is far less important than its balance. Sequences like LA or AVA

may need no extra space at all, while sequences like NN and HIH beg to be pried open.

W A V A D O P A T T I M M I L T L

WAVADOPATTIMMILTL

Letterspaced caps, above; kerned but unletterspaced, below.

Many typographers like to letterspace all strings of numbers as well. Spacing is essential for rapid reading of long, fundamentally meaningless strings, such as serial numbers, and it is helpful even for shorter strings such as phone numbers and dates. Numbers set in pairs need not be letterspaced; strings of three or more may need a little air. This is the rationale behind the old European habit of setting phone numbers in the form 00 00 00 instead of 000-0000.

2.1.7 *Don't letterspace the lower case without a reason.*

A man who would letterspace lower case would steal sheep, Frederic Goudy liked to say. If this wisdom needs updating, it is chiefly to add that a woman who would letterspace lower case would steal sheep as well.

Nevertheless, like every rule, this one extends only as far as its rationale. The reason for not letterspacing lower case is that it hampers legibility. But there are some lowercase alphabets to which this principle doesn't apply.

Headings set in exaggeratedly letterspaced, condensed, unserifed capitals are now a hallmark, if not a cliché, of postmodern typography. In this context, secondary display can be set perfectly well in more modestly letterspaced, condensed, unserifed lower case. Moderate letterspacing can make a face such as lowercase Univers bold condensed more legible rather than less. Inessential ligatures are, of course, omitted from letterspaced text.

wharves and wharfingers

Lowercase Univers bold condensed, letterspaced 10%.

It would be possible, in fact, to make a detailed chart of lowercase letterforms, plotting their inherent resistance to letterspacing.

Horizontal Motion

Near the top of the list (most unsuitable for letterspacing) would be Renaissance italics, such as Arrighi, whose structure strongly implies an actual linkage between one letter and the next. A little farther along would be Renaissance romans. Still farther along, we would find faces like Syntax, which echo the forms of Renaissance roman but lack the serifs. Around the middle of the list, we would find other unserifed faces, such as Helvetica, in which nothing more than wishful thinking bonds the letters to each other. Bold condensed sanserifs would appear at the bottom of the list. Letterspacing will always sabotage a Renaissance roman or italic. But when we come to the other extreme, the faces with no calligraphic flow, letterspacing of lowercase letters can sometimes be of genuine benefit.

Because it isolates the individual elements, letterspacing has a role to play where words have ceased to matter and letters are what count. Where letters function one by one (as in acronyms, web-site and e-mail addresses) letterspacing is likely to help, no matter whether the letters are caps, small caps or lower case.

Outside the domain of roman and italic type, the letterspacing of text has other traditional functions. Blackletter faces have, as a rule, no companion italic or bold, and no small caps. The simplest methods of emphasis available are underlining and letterspacing. The former was the usual method of the scribes, but letterspacing is easier for letterpress printers. In digitial typography, however, underlining is just as easy as letterspacing and sometimes does less damage to the page.

In Cyrillic, the difference between lower case and small caps is more subtle than in the Latin or Greek alphabets, but small caps are nonetheless important to skilled Cyrillic typographers. In former days, when Cyrillic cursive type was scarce and small caps almost nonexistent, Cyrillic was routinely set like fraktur, with letterspaced upright (roman) lower case where the small caps and the cursive (italic) would have been. Improved Cyrillic types have made that practice obsolete.

2.1.8 *Kern consistently and modestly or not at all.*

Inconsistencies in letterfit are inescapable, given the forms of the Latin alphabet, and small irregularities are after all essential to the legibility of roman type. *Kerning* – altering the space between selected pairs of letters – can increase consistency of spacing in a word like Washington or Toronto, where the combinations Wa

and To are kerned. But names like Wisconsin, Tübingen, Tbilisi and Los Alamos, as well as common words like The and This, remain more or less immune to alteration.

Hand compositors rarely kern text sizes, because their kerning pairs must be manually fitted, one at a time. Computerized typesetting makes extensive kerning easy, but judgment is still required, and the computer does not make good judgment any easier to come by. Too little kerning is preferable to too much, and inconsistent kerning is worse than none.

In digital type, as in foundry type, each letter has a standard width of its own. But computerized typesetting systems can modify these widths in many ways. Digital fonts are generally kerned through the use of *kerning tables,* which can specify a reduction or increase in spacing for every possible pair of letters, numbers or symbols. By this means, space can be automatically added to combinations like H H and removed from combinations like Ty. Prefabricated kerning tables are now routine components of well-made digital fonts, but they still sometimes require extensive editing to suit individual styles and requirements. If you use an automatic kerning program, test it thoroughly before trusting its decisions, and take the time to repair its inevitable shortcomings.

There is more about kerning tables on pp 203–207.

Kerning tables generally subtract space from combinations such as Av, Aw, Ay, 'A, 'A, L', and all combinations in which the first element is T, V, W or Y and the second element is anything other than b, h, k or l. Not all such combinations occur in English, but a good kerning table will accommodate names such as Tchaikovsky, Tmolos, Tsimshian, Vázquez, Chateau d'Yquem and Ysaÿe.

Top

Töpf

(*f*")

w, f'

The table also normally adds space to sequences like f', f), f], f?, f!, (*f,* [*f,* (J and [J. In some italics, space must also be added to *gg* and *gy.* If your text includes them, other sequences – *gf, gj, qf, qj,* for instance – may need attention as well.

Especially at larger sizes, it is common to kern combinations involving commas and periods, such as r, / r. / v, / v. / w, / w. / y, / y. But use care in kerning combinations such as F. / P. / T. / V. Capitals need their space, and some combinations are easy to misread. P.F. Didot may be misread as R E Didot if too enthusiastically kerned.

Numbers are often omitted from kerning tables, but numbers often need more kerning than letters do. Most fonts, both metal and digital, are equipped with *tabular figures* – figures that all have identical set-width, so columns of typeset figures will align. If you are forced to use such a font, heavy kerning will be required. A

good text font will give you *proportional figures* instead. A digital font in the OpenType format may offer you four choices: proportional and tabular lining (titling) figures, and proportional and tabular old-style (text) figures. No matter how the figures are cut, when used in text, they are likely to need some kerning, to each other and to the en dash.

Horizontal Motion

1740–1900 1740–1900

Unkerned Sabon numerals, left, and well-kerned numerals, right

Whatever kerning you do, make sure it does not result in collisions with diacritics. Wolf can be kerned more than Wölfflin in many faces, and Tennyson more than Tête-à-tête. Also beware the composite effect of sequential kerns. The apostrophes in L'Hôtel and D'Artagnan can be brought up fairly close, but in L'Anse aux Meadows, two close kerns in a row will produce a collision.

A kerning table written expressly for one language will need subtle alteration before it can do justice to another. In English, for example, it is normal to kern the combinations 'd 'm 'r 's 't, which appear in common contractions. In French, 'a 'â 'e 'é 'è 'ê 'o 'ô are kerned instead, because these appear in elisions. In Native American texts, apostrophes can appear in many other contexts. For Spanish, one kerns the combinations ¡ and ¿. For German, a careful typographer will take space out of the combinations ,T „T ,V „V ,W „W and may add some space to ,J and „J.

's a'a ¡¿ ck ij

The letter *c* is not a full-fledged member of the German alphabet, and in former times it was always restricted, in German, to the ligatures *ch* and *ck*. English-speaking readers often find these combinations kerned too close for comfort in German-made fonts – or they find the right sidebearing of the *c* too close-cut to begin with. In fonts from the Netherlands, unusually tight kerning is common in the sequence *ij* instead.

Binomial kerning tables are powerful and useful typographic tools, but they eliminate neither the need nor the pleasure of making final adjustments by hand. Names like T. V. R. Murti and T. R. V. Murti, for example, pose microscopic typographic problems that no binomial kerning table can solve. Fonts with polynomial kerning tables – able to kern a given pair of letters in different ways according to context – have existed for a decade and may someday be the norm. For now, they are a rarity.

2.1.9 *Don't alter the widths or shapes of letters without cause.*

Type design is an art practiced by few and mastered by fewer – but font-editing software makes it possible for anyone to alter in a moment the widths and shapes of letters to which an artist may have devoted decades of study, years of inspiration and a rare concentration of skill. The power to destroy such a type designer's work should be used with caution. And arbitrarily condensing or expanding letterforms is the poorest of all methods for fitting uneditable copy into unalterable space.

In many fonts, the exclamation mark, question mark, semicolon and colon need a wider left sidebearing than manufacturers have given them, but the width of any character should be altered for one purpose only: to improve the set of the type.

Typographic letters are made legible not only by their forms and by the color of the ink that prints them but also by the sculpted empty space between and around them. When type is cast and set by hand, that space is physically defined by blocks of metal. When the type is reduced to a *face,* photographically or digitally stored, the letter still has a room of its own, defined by its stated body height and width, but it is a virtual room. In the world of digital type, it is very easy for a designer or compositor with no regard for letters to squish them into cattle trains and ship them to the slaughter.

When letters are maltreated in this way, their reserve of legibility is sapped. They can do little in their turn except shortchange and brutalize the reader.

2.1.10 *Don't stretch the space until it breaks.*

Lists, such as contents pages and recipes, are opportunities to build architectural structures in which the space between the elements both separates and binds. The two favorite ways of destroying such an opportunity are setting great chasms of space that the eye cannot leap without help from the hand, and setting unenlightening rows of dots (*dot leaders,* they are called) that force the eye to walk the width of the page like a prisoner being escorted back to its cell.

The following examples show two among many ways of han-

dling a list. Splitting titles and numbers apart, setting one flush left and the other flush right, with or without dot leaders, would only muffle the information:

Introduction 7
Chapter 1 The Sex of Centaurs 11
Chapter 2 Poliphilo's Dream 43

Horizontal Motion

Prologue . *page 5*
Points of Possible Agreement . *page 9*
Irreconcilable Differences . *page 11*
Conclusion . *page 163*
Index . *page 164*

2.2 VERTICAL MOTION

2.2.1 *Choose a basic leading that suits the typeface, text and measure.*

Time is divisible into any number of increments. So is space. But for working purposes, time in music is divided into a few proportional intervals: halves, quarters, eighths, sixteenths and so on. And time in most music is measured. Add a quarter note to a bar whose time is already accounted for and, somewhere nearby, the equivalent of that quarter note must come out. Phrasing and rhythm can move in and out of phase – as they do in the singing of Billie Holiday and the trumpet solos of Miles Davis – but the force of blues phrasing and syncopation vanishes if the beat is actually lost.

Space in typography is like time in music. It is infinitely divisible, but a few proportional intervals can be much more useful than a limitless choice of arbitrary quantities.

The metering of horizontal space is accomplished almost unconsciously in typography. You choose and prepare a font, and you choose a measure (the width of the column). When you set the type, the measure fills with the varied rhythm of repeating letter shapes, which are music to the eye.

Vertical space is metered in a different way. You must choose not only the overall measure – the depth of the column or page – but also a basic rhythmical unit. This unit is the leading, which is the distance from one baseline to the next.

Eleven-point type *set solid* is described as 11/11. The theoretical face of the type is 11 points high (from the top of *d* to the bottom of *p*, if the type is full on the body), and the distance from the baseline of line one to the baseline of line two is also 11 points. Add two points of lead (interlinear space), and the type is set 11/13. The type size has not changed, but the distance from baseline to baseline has increased to 13 points, and the type has more room to breathe.

Rhythm and Proportion

The text of the book you are reading, to take an example, is set 10/12 × 21. This means that the type size is 10 pt, the added lead is 2 pt, giving a total leading of 12 pt, and the line length is 21 picas.

A short burst of advertising copy or a title might be set with negative leading (18/15, for example), so long as the ascenders and døscenders don't collide:

this is an example
of negative leading

Continuous text is very rarely set with negative leading, and only a few text faces read well when set solid. Most text requires positive leading. Settings such as 9/11, 10/12, 11/13 and 12/15 are routine. Longer measures need more lead than short ones. Dark faces need more lead than light ones. Large-bodied faces need more lead than smaller-bodied ones. Faces like Bauer Bodoni, with substantial color and a rigid vertical axis, need much more lead than faces like Bembo, whose color is light and whose axis is based on the writing hand. And unserifed faces often need more lead (or a shorter line) than their serifed counterparts.

Extra leading is also generally welcome where the text is thickened by superscripts, subscripts, mathematical expressions, or the frequent use of full capitals. A text in German would ideally have a little more lead than the same text in Latin or French, purely because of the increased frequency of capitals.

brj
erf
brj
erf

Bauer Bodoni and Bembo, both set 40/42.

2.2.2 *Add and delete vertical space in measured intervals.*

For the same reason that the tempo must not change arbitrarily in music, leading must not change arbitrarily in type.

Pages and columns are set most often to uniform depth, but ragged depths are better in some situations. A collection of short

texts, such as catalogue entries, set in multiple-column pages, is likely to look better and read more easily if the text is not sawed into columns of uniform depth. A collection of short poems is bound to generate pages of varying depth as well – and so much the better.

Vertical Motion

Continuous prose offers no such excuse for variation. It is therefore usually set in pages of uniform depth, designed in symmetrical pairs. The lines and blocks of text on facing pages in this format should align, and the lines on the front and back of the leaf (the recto and verso pages) should align as well. Typographers check their reproduction proofs by holding them up to the light in pairs, to see that the text and crop marks match from page to page. Press proofs are checked in the same way, by holding them up to the light to see that textblocks *back each other up* when the sheet is printed on both sides.

Headings, subheads, block quotations, footnotes, illustrations, captions and other intrusions into the text create syncopations and variations against the base rhythm of regularly leaded lines. These variations can and should add life to the page, but the main text should also return after each variation precisely on beat and in phase. This means that the total amount of vertical space consumed by each departure from the main text should be an even multiple of the basic leading. If the main text runs 11/13, intrusions to the text should equal some multiple of 13 points: 26, 39, 52, 65, 78, 91, 104 and so on.

Subheads in this book are leaded in the simplest possible way, with a *white line* (that is, in keyboard terms, a hard return) before and after. They could just as well be leaded asymmetrically, with more space above than below, so long as the total additional lead is equivalent to an even number of text lines.

If you happen to be setting a text 11/13, subhead possibilities include the following:

- subheads in 11/13 small caps, with 13 pt above the head and 13 pt below;
- subheads in 11/13 bold u&lc (upper and lower case), with 8 pt above the head and 5 pt below, since 8 + 5 = 13;
- subheads in 11/13 caps with 26 pt above and 13 pt below;
- one-line subheads in 14/13 italic u&lc, with 16 pt above the head and 10 pt below. (The negative leading is merely to minimize coding in this case. If the heads are one line long, no cramping will occur.)

2.2.3 *Don't suffocate the page.*

Most books now printed in the Latin alphabet carry from 30 to 45 lines per page. The average length of line in most of those books is 60 to 66 characters. In English and the Romance languages, a word is typically assumed to average five letters plus a space. Ten or eleven such words fit on a line of 60 to 66 characters, and the page, if it is full, holds from 300 to 500 words.

Rhythm and Proportion

Outside these conventional boundaries lie many interesting typographic problems. If the text deserves the honor, a handsome page can be made with very few words. A page with 17 lines of 36 characters each, as an example, will carry only 100 words. At the other extreme, a page with 45 lines of 70 characters each will carry 525 words. If you want more than 500 words to the page, it is time to consider multiple columns. A two-column book page will comfortably carry 750 words. If it must, it can carry a thousand.

However empty or full it may be, the page must breathe, and in a book – that is, in a long text fit for the reader to live in – the page must breathe in both directions. The longer the line, the more space necessary between lines. Two columns of short lines are therefore more compact than a single column of long lines.

2.3 BLOCKS & PARAGRAPHS

2.3.1 *Set opening paragraphs flush left.*

The function of a paragraph indent is to mark a pause, setting the paragraph apart from what precedes it. If a paragraph is preceded by a title or subhead, the indent is superfluous and can therefore be omitted, as it is here.

2.3.2 *In continuous text, mark all paragraphs after the first with an indent of at least one en.*

Typography like other arts, from cooking to choreography, involves a balance between the familiar and the unfamiliar, the dependably consistent and the unforeseen. Typographers generally take pleasure in the unpredictable length of the paragraph while accepting the simple and reassuring consistency of the paragraph indent. The prose paragraph and its verse counterpart, the stanza, are basic units of linguistic thought and literary style. The typographer must articulate them enough to make them clear, yet not

so strongly that the form instead of the content steals the show. If the units of thought, or the boundaries between thoughts, look more important than the thoughts themselves, the typographer has failed.

❧ Ornaments can be placed in the paragraph indents, but few texts actually profit from ornamentation.

Blocks and Paragraphs

Paragraphs can also be marked, as this one is, by drop lines, but dropline paragraphs grow tiresome in long texts. They also increase the labor of revisions and corrections. ¶ Pilcrows, boxes and bullets can be used to mark the breaks in a stream of continuous text, sometimes with excellent results. This format is more economical of space than conventional indented paragraphs, but again, extra labor and expense may arise with emendations and corrections.

Outdented paragraphs and indented paragraphs are the two most obvious possibilities that remain. And outdented paragraphs bring with them other possibilities, such as the use of enlarged marginal letters.

All these variants, and others, have their uses, but the plainest, most unmistakable yet unobtrusive way of marking paragraphs is the simple indent: a white square.

How much indent is enough? The most common paragraph indent is one em. Another standard value is *one lead.* If your text is set 11/13, the indent would then be either 11 pt (one em) or 13 pt (one lead). One en (half an em) is the practical minimum.

Where the line is long and margins are ample, an indent of 1½ or 2 ems may look more luxurious than one em, but paragraph indents larger than three ems are generally counterproductive. Short last lines followed by new lines with large indents produce a tattered page.

Block paragraphs open flush left and are separated vertically from their neighbors by extra lead, usually a white line. Block paragraphs are common in business letters and memos, and because they suggest precision, crispness and speed, they can be useful in short documents of other kinds. In longer sequences, they may seem soulless and uninviting.

2.3.3 *Add extra lead before and after block quotations.*

Block quotations (like the one on pp 17–18 of this book) can be distinguished from the main text in many ways. For instance: by

a change of face (usually from roman to italic), by a change in size (as from 11 pt down to 10 pt or 9 pt), or by indention.

Combinations of these methods are often used, but one device is enough. If your paragraph indent is modest, you may for consistency's sake want to use the same indent for quotations. And even if your block quotations are set in a size smaller than normal text, you may want to leave the leading unchanged. If the main text runs 10/12, the block quotations might run 10/12 italic or 9/12 roman. If you prefer greater density or are eager to save space, you might set them 9/11 or 9/10½.

However the block quotations are set, there must be a visible distinction between main text and quotation, and again between the quotation and subsequent text. This usually means a white line or half-line at the beginning and end of the block. But if the leading within the block quotation differs from the leading of the main text, these blanks before and after the quotation must be elastic. They afford the only opportunity for bringing the text back into phase.

Suppose your main text is 11/13 and a five-line block quotation set 10/12 intervenes. The depth of the quotation is $5 \times 12 = 60$. This must be bulked up to a multiple of 13 to bring the text back into phase. The nearest multiple of 13 is $5 \times 13 = 65$. The remaining space is $65 - 60 = 5$, and $5/2 = 2.5$, which is not enough. Adding 2.5 points before and after the quotation will not give adequate separation. The next multiple of 13 is $6 \times 13 = 78$, which is better: $78 - 60 = 18$, and $18/2 = 9$. Add 9 pt lead before and after the quotation, and the text will realign.

2.3.4 *Indent or center verse quotations.*

Verse is usually set flush left and ragged right, and verse quotations within prose should not be deprived of their chosen form. But to distinguish verse quotations from surrounding prose, they should be indented or centered on the longest line. Centering is preferable when the prose measure is substantially longer than the verse line. The following passage, for example, is centered on the first and longest line.

> *God guard me from those thoughts men think*
> *In the mind alone;*
> *He that sings a lasting song*
> *Thinks in a marrow bone.*

William Butler Yeats, "A Prayer for Old Age."

Suppose your main text is set on a 24-pica measure and you have decided to set verse quotations in italic at the text size. Suppose that the longest line in your quotation measures 269 points. The indent for this quotation might be computed as follows: 24 × 12 = 288 pt, which is the full prose measure, and 288 – 269 = 19 pt, which is the difference between the measure and the longest verse line. The theoretically perfect left indent for the verse quotation is 19/2 = 9.5 pt. But if another indent close to 9.5 pt is already in use, either for block quotations in prose, or as a paragraph indent, then the verse quotation might just as well be indented to match.

Suppose however that the longest line in the verse is 128 points. The measure, again, is 288 points, and 288 – 128 = 160. Half of 160 is 80 points. No other indent in the vicinity of 80 points is likely to be in use. The verse quotation would then be indented by precisely that amount.

2.4 ETIQUETTE OF HYPHENATION & PAGINATION

The rules listed below are traditional craft practice for the setting of justified text. Except for the last rule, they are all programmable, but the operation of these rules necessarily affects the spacing of words and thus the texture and color of the page. If decisions are left to the software, they should be checked by a trained eye – and no typesetting software should be permitted to compress, expand or letterspace the text automatically and arbitrarily as a means of fitting the copy. Copyfitting problems should be solved by creative design, not fobbed off on the reader and the text nor cast like pearls before machines.

For a brief discussion of software justification engines, which now do most of the work, see §9.4, page 190.

2.4.1 *At hyphenated line-ends, leave at least two characters behind and take at least three forward.*

Fi-nally is conventionally acceptable line-end hyphenation, but final-ly is not, because it takes too little of the word ahead to the next line.

2.4.2 *Avoid leaving the stub-end of a hyphenated word, or any word shorter than four letters, as the last line of a paragraph.*

2.4.3 *Avoid more than three consecutive hyphenated lines.*

2.4.4 *Hyphenate proper names only as a last resort unless they occur with the frequency of common nouns.*

2.4.5 *Hyphenate according to the conventions of the language.*

In English we hyphenate *cab-ri-o-let* but in French *ca-brio-let.* The old German rule which hyphenated *Glockenspiel* as *Glok-kenspiel* was changed by law in 1998, but when *össze* is broken in Hungarian, it still turns into *ösz-sze.* In Spanish the double consonants *ll* and *rr* are never divided. (The only permissible hyphenation in the phrase *arroz con pollo* is thus *arroz con po-llo.*) The conventions of each language are a part of its typographic heritage and should normally be followed, even when setting single foreign words or brief quotations.

Hart's Rules for Compositors (39th ed, 1983) includes a good, brief guide to hyphenation and punctuation rules for several European languages. Its fat successor, Ritter's *Oxford Guide to Style* (2002) is more thorough but much less handy. It is always worthwhile, however, to consult a style manual written in and for the language at issue – e.g., for French, the *Lexique des règles typographiques en usage à l'imprimerie nationale* (Paris, 1990).

2.4.6 *Link short numerical and mathematical expressions with hard spaces.*

All you may see on the keyboard is a space bar, but typographers use several invisible characters: the word space, fixed spaces of various sizes (em space, en space, thin space, figure space, etc) and a *hard space* or *no-break space.* The hard space will stretch, like a normal word space, when the line is justified, but it will not convert to a linebreak. Hard spaces are useful for preventing linebreaks within phrases such as *6.2 mm, 3 in., 4 × 4,* or in phrases like *page 3* and *chapter 5.*

When it is necessary to break longer algebraic or numerical expressions, such as $a + b = c$, the break should come at the equal sign or another clear logical pause.

2.4.7 *Avoid beginning more than two consecutive lines with the same word.*

2.4.8 *Never begin a page with the last line of a multi-line paragraph.*

The typographic terminology is telling. Isolated lines created when paragraphs *begin* on the *last* line of a page are known as *orphans.* They have no past, but they do have a future, and they

need not trouble the typographer. The stub-ends left when paragraphs *end* on the *first* line of a page are called *widows*. They have a past but not a future, and they look foreshortened and forlorn. It is the custom – in most, if not in all, the world's typographic cultures – to give them one additional line for company. This rule is applied in close conjunction with the next.

Etiquette of Hyphenation and Pagination

2.4.9 *Balance facing pages by moving single lines.*

Pages with more than two columns often look best with the columns set to varying depths. This is the vertical equivalent of ragged-right composition. Where there are only one or two main text columns per page, paired columns and facing pages (except at the end of a chapter or section) are usually set to a uniform depth.

Balance facing pages not by adding extra lead or puffing up the word space, but by exporting or importing single lines to and from the preceding or following spreads. The same technique is used to avoid widows, and to extend or shorten any chapters that would otherwise end with a meager few lines on the final page. But this balancing should be performed with a gentle hand. In the end, no spread of continuous text should have to run more than a single line short or a single line long.

2.4.10 *Avoid hyphenated breaks where the text is interrupted.*

Style books sometimes insist that both parts of a hyphenated word must occur on the same page: in other words, that the last line on a page must never end with a hyphen. But turning the page is not, in itself, an interruption of the reading process. It is far more important to avoid breaking words in those locations where the reader is likely to be distracted by other information. That is, whenever a map, a chart, a photograph, a pull-quote, a sidebar or other interruption intervenes.

2.4.11 *Abandon any and all rules of hyphenation and pagination that fail to serve the needs of the text.*

3

3.1 SIZE

3.1.1 *Don't compose without a scale.*

The simplest scale is a single note, and sticking with a single note draws more attention to other parameters, such as rhythm and inflection. The early Renaissance typographers set each book in a single font – that is, one face in one size – supplemented by hand-drawn or specially engraved large initial letters for the openings of chapters. Their pages show what sensuous evenness of texture and variety of rhythm can be attained with a single font of type: very much greater than on a typewriter, where letters have, more often than not, a single width and a single stroke-weight as well as a single size.

In the sixteenth century, a series of common sizes developed among European typographers, and the series survived with little change and few additions for 400 years. In the early days, the sizes had names rather than numbers, but measured in points, the traditional series is this:

A few examples of the many older names for type sizes:
6 pt: *nonpareil*
7 pt: *minion*
8 pt: *brevier* or *small text*
9 pt: *bourgeois* or *galliard*
10 pt: *long primer* or *garamond*
11 pt: *small pica* or *philosophy*
12 pt: *pica*
14 pt: *english* or *augustin*
18 pt: *great primer*

This is the typographic equivalent of the diatonic scale. But modern equipment makes it possible to set, in addition to these sizes, all the sharps and flats and microtonal intervals between. Twenty-point, 22-point, 23-point, and 10½-point type are all available for the asking. The designer can now choose a new scale or tone-row for every piece of work.

These new resources are useful, but rarely all at once. Use the old familiar scale, or use new scales of your own devising, but limit yourself, at first, to a modest set of distinct and related intervals. Start with one size and work slowly from there. In time, the scales you choose, like the faces you choose, will become recognizable features of personal style.

3.2.1 *Use titling figures with full caps, and text figures in all other circumstances.*

Numerals, Capitals and Small Caps

So the date is 23 August 1832; it could be 3:00 AM in Apartment 6-B, 213-A Beacon Street; it is 27° C or 81° F; the price is $47,000 USD or £28,200; the postal codes are NL 1034 WR Amsterdam, SF 00170 Helsinki 17, Honolulu 96814, London WC1 2NN, New Delhi 110 003, Toronto M5S 2G5, and Dublin 2.

BUT IT IS 1832 AND 81° IN FULL CAPITALS.

١٢٣

٤٥٦٧

٨٩٠

The arabic numerals of Latin script are derived from the Indian numerals of Arabic script (above)

Arabic numerals – known in Arabic as Indian numerals, *arqām hindiyya,* because the Arabs obtained them from India – entered the scribal tradition of Europe in the thirteenth century. Before that (and for many purposes afterward) European scribes used roman numerals, written in capitals when they occurred in the midst of other capitals, and in lowercase in the midst of lowercase letters. Typographers have naturally inherited this custom of setting roman numerals so that they harmonize with the words:

Number xiii lowercase AND XIII UPPERCASE
AND THE NUMBER XIII IN SMALL CAPITALS
and the roman numeral xiii in italic

When arabic numerals joined the roman alphabet, they too were given both lowercase and uppercase forms. Typographers call the former *text figures, hanging figures, lowercase figures,* or *old-style figures* (OSF for short) and make a point of using them whenever the surrounding text is set in lowercase letters or small caps. The alternative forms are called *titling figures, ranging figures* or *lining figures,* because they range or align with one another and with the upper case.

Text 1234567890 figures
TITLING 1234567890 FIGURES
FIGURES 1234567890 WITH SMALL CAPS
Italic text 1234567890 figures

Text figures were the common form in European typography between 1540 and 1800. But in the mid-eighteenth century, when European shopkeepers and merchants were apt to write more numbers than letters, handwritten numerals developed proportions of their own. These quite literally middle-class figures entered the realm of typography in 1788, when a British punchcutter named Richard Austin cut a font of three-quarter-height lining figures for the founder John Bell.

Bell letters and 1234567890 figures
in roman *and 1234567890 in italic*

In the nineteenth century, which was not a great age for typography, founders stretched these figures up to cap height, and titling figures became the norm in commercial typography. Renaissance letterforms were revived in the early twentieth century, and text figures found their way back into books. But in news and advertising work, titling figures remained routine. In the 1960s, phototypesetting machines with their truncated fonts once again made text figures difficult to find. The better digital foundries now offer a wide selection of fonts with text figures and small caps. These are often sold separately and involve extra expense, but they are essential to good typography. It is better to have one good face with all its parts, including text figures and small caps, than fifty faces without.

It is true that text figures are rarely useful in classified ads, but they are useful for setting almost everything else, including good magazine and newspaper copy. They are basic parts of typographic speech, and they are a sign of civilization: a sign that dollars are not really twice as important as ideas, and numbers are not afraid to consort on an equal footing with words.

It is also true that a number of excellent text faces, both serifed and unserifed, were originally issued without text figures. Examples include Adrian Frutiger's Méridien, Eric Gill's Gill Sans, Paul Renner's Futura, Hans Eduard Meier's Syntax, Hermann Zapf's Comenius and Optima, and Gudrun Zapf-von Hesse's Carmina. In several of these cases, text figures were part of the original conception or even the finished design but were scuttled by the foundry. Many such missing components have belatedly been issued in digital form. With any text face that is missing text figures, it is reasonable to enquire whether commercial intimidation or, in effect, commercial censorship may not have played a role.

Numerals, Capitals and Small Caps

During most of the nineteenth and twentieth centuries, lining figures were widely known as 'modern' and text figures as 'old-style.' Modernism was preached as a sacred duty, and numbers, in a sense, were actually deified. Modernism is nothing if not complex, but its gospel was radical simplicity. Many efforts were made to reduce the Latin alphabet back to a single case. (The telegraph and teletype, with their unicameral alphabets, are also products of that time.) These efforts failed to make much headway where letters were concerned. With numbers, the campaign had considerable success. Typewriters soon came to have letters in both upper and lower case but numbers in upper case alone. And from typewriters have come computer keyboards.

Typographic civilization seems, nonetheless, determined to proceed. Text figures are again a normal part of type design – and have thus been retroactively supplied for faces that were earlier denied them. However common it may be, the use of titling figures in running text is illiterate: it spurns the truth of letters.

3.2.2 *For abbreviations and acronyms in the midst of normal text, use spaced small caps.*

This is a good rule for just about everything except two-letter geographical acronyms and acronyms that stand for personal names. Thus: 3:00 AM, 3:00 PM, the ninth century CE, 450 BC to AD 450, the OAS and NATO; World War II or WWII; but JFK and Fr J.A.S. O'Brien, OMI; HMS *Hypothesis* and USS *Ticonderoga*; Washington, DC, and Mexico, DF; J.S. Bach's Prelude and Fugue in B♭ minor, BWV 867.

Many typographers prefer to use small caps for postal abbreviations (San Francisco, CA 94119), and for geographical acronyms longer than two letters. Thus, the USA, or in Spanish, *los EEUU*, and Sydney, NSW. But the need for consistency intervenes when long and short abbreviations fall together. From the viewpoint of the typographer, small caps are preferable in faces with fine features and small x-height, full caps in faces with large x-height and robust form.

Genuine small caps are not simply shrunken versions of the full caps. They differ from large caps in stroke weight, letterfit, and internal proportions as well as in height. Any good set of small caps is designed as such from the ground up. Thickening, shrinking and squashing the full caps with digital modification routines will only produce a parody.

Sloped small capitals – *A B C D E F G* – have been designed and cut for relatively few faces in the history of type design. They can be faked with digital machinery, by sloping the roman small caps, but it is better to choose a face (such as this one, Robert Slimbach's Minion) which includes them, or to live without. Sloped (italic) text figures, on the other hand, are part of the basic requirement and are available for most good text fonts.

Harmony and Counterpoint

3.2.3 *Refer typographic disputes to the higher courts of speech and thinking.*

Type is idealized writing, and its normal function is to record idealized speech. Acronyms such as CD and TV or USA and UFO are set in caps because that is the way we pronounce them. Acronyms like UNESCO, ASCII and FORTRAN, which are pronounced not as letters but as words, are in the process of becoming precisely that. When a writer accepts them fully into her speech and urges readers to do likewise, it is time for the typographer to accept them into the common speech of typography by setting them in lower case: Unesco, Ascii (or ascii) and Fortran. Other acronymic words, such as *laser* and *radar,* have long since traveled the same road.

Logograms pose a more difficult question. An increasing number of persons and institutions, from e.e. cummings to WordPerfect, now come to the typographer in search of special treatment. In earlier days it was kings and deities whose agents demanded that their names be written in a larger size or set in a specially ornate typeface; now it is business firms and mass-market products demanding an extra helping of capitals, or a proprietary face, and poets pleading, by contrast, to be left entirely in the vernacular lower case. But type is visible speech, in which gods and men, saints and sinners, poets and business executives are treated fundamentally alike. Typographers, in keeping with the virtue of their trade, honor the stewardship of *texts* and implicitly oppose private ownership of *words.*

Logotypes and logograms push typography in the direction of hieroglyphics, which tend to be looked at rather than read. They also push it toward the realm of candy and drugs, which tend to provoke dependent responses, and away from the realm of food, which tends to promote autonomous being. Good typography is like bread: ready to be admired, appraised and dissected before it is consumed.

3.3.1 *Use the ligatures required by the font, and the characters required by the language, in which you are setting type.*

f + *f* + *i* → *ffi*

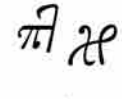
In most roman faces the letter f reaches into the space beyond it. In most italics, the *f* reaches into the space on both sides. Typographers call these overlaps *kerns*. Only a few kerns, like those in the arm of the *f* and the tail of the *j*, are implicit in a normal typefont, while others, like the overlap in the combination *To*, are optional refinements, independent of the letterforms.

ل + ا → ﻻ

Reaching into the space in front of it, the arm of the f will collide with certain letters – b, f, h, i, j, k, l – and with question marks, quotation marks or parentheses, if these are in its way.

Most of the early European fonts were designed primarily for setting Latin, in which the sequences fb, fh, fj, fk do not occur, but the sequences ff, fi, fl, ffi, ffl are frequent. The same set of ligatures was once sufficient for English, and these five ligatures are standard in traditional roman and italic fonts. As the craft of typography spread through Europe, new regional ligatures were added. An fj and æ were needed in Norway and Denmark for words such as *fjeld* and *fjord* and *nær*. In France an œ, and in Germany an ß (*eszett* or double-s) were required, along with accented and umlauted vowels. Double letters which are read as one – *ll* in Spanish, *ij* in Dutch, and *ch* in German, for example – were cast as single sorts for regional markets. An ffj was needed in Iceland. New individual letters were added, like the Polish ł, the Spanish ñ, and the Danish and Norwegian ø. Purely decorative ligatures were added to many fonts as well.

The *lâm-alif* ligature above is from Nabih Jaroudi's Yakout Arabic. The *pi-tau*, *chi-rho* and *mu-alpha-iota* ligatures below are from Matthew Carter's Wilson Greek.



π + τ → πτ

χ + ρ → χρ

μ + α + ι → μαι

English continues to absorb and create new words – *fjord, gaffhook, halfback, hors d'œuvre* – that call for ligatures beyond the Latin list. As an international language, English must also accommodate names like *Youngfox, al-Hajji* and *Asdzą́ą́ Yołgai*. These sometimes make demands on the roman alphabet which earlier designers didn't foresee. In the digital world, some of these compound characters and ligatures can, in effect, take care of themselves. In text work, there is no burning need for a specially crafted fb or fh ligature when the digital forms can be cleanly superimposed, but in display work, such ligatures can be crucial. Recent type designers, alive to these polylingual demands on the alphabet, have often simplified the problem further by designing faces in which no sequence of letters involves a collision.

æœ as ch ct ff ffi ffl fi fl fr
ij is ll qu ſt ſch ſh ſi ſl ſp ſſ ß ſſi ſſl ſt ſz us
Æ Œ æ œ æ œ ß ß ff fi fl ffi ffl ffi ffl
ct ſt ct ſt ſh ſi ſl ſſ ſt ſh ſi ſl ſſ ſt

Top two lines: Ligatures from an italic font cut in the 1650s by Christoffel van Dijck. *Lower two lines*: Ligatures from Adobe Caslon, a digital face by Carol Twombly, after William Caslon, dating from about 1750. These are Baroque typefaces. As such, they include a set of ligatures with *f* and a second set formed with the *long* s (ſ, ∫). Long s and its ligatures were normal in European typography until late in the eighteenth century, though fonts designed to do without them were cut as early as the 1640s.

Separation of the letters *f* and *i* is sometimes crucial. In Turkish, *i* with a dot and *ı* without – or in capitals, *İ* and *I* – are two different letters. To set Turkish well, you need a face whose *f* is designed so it does not disguise the difference.

This does not do away with the question of the five Latin ligatures. Older typefaces – Bembo, Garamond, Caslon, Baskerville and other distinguished creations – are, thankfully, still with us, in metal and in digital revivals. Many new faces also perpetuate the spirit of these earlier designs. These faces are routinely supplied with the five basic ligatures because they require them. And for digital typographers, software is available that will automatically insert them.

ff fi fl ffi ffl
ff fi fl ffi ffl

Bembo, set with ligatures (above) and without (below)

If your software is inserting ligatures automatically, take a moment to verify two things: (1) that the software is inserting all the ligatures you want *and* none that you do not want; (2) that all these ligatures are staying where they're put.

ſt

Th

ffl

Decorative ligatures such as *ſt* and *Th* are now deservedly rare. The ligature *ffl* is rarer, but it has been cut for at least one typeface (Jonathan Hoefler's Requiem italic) and can be used in at least two words: German *Sauerſtofflasche* (oxygen bottle) and *Sauerſtoff-flaſchenſpüler* (oxygen bottle washer).

ffj

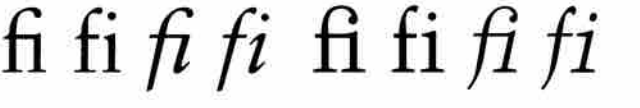
Th

Good OpenType digital fonts usually include the five Latin ligatures (ff, ffi, ffl, fi, fl), and many include the two Scandinavian ligatures (ffj, fj). There may also be a set of ornamentals and archaics (ct, ſp, ſt, Th; ſi, ſk, ſl, ſſi, ſſl, etc) – and sometimes there are more of these special-purpose ligatures (*quaints*, as typographers call them) in italic than in roman. Where such a feast of ligatures is present, they are usually divided into classes: *basic* and *discretionary*. If your software is conversant with OpenType fonts, it can be told to use the ligatures from either class or from both. But the classes are not always well defined. For now at least, fonts in the 'Adobe Originals' series all have the Th ligature misclassified as basic, not discretionary. Unless you edit the font to fix this error, you cannot get fi, fj, ff and ffi without getting Th also. If you *want* the Th ligature, this is fine. But Th has a different pedigree than fi and its brethren. Stylistically, it belongs to a different register. These two registers can certainly be paired; they should not be arbitrarily blurred together.

Some software that inserts ligs automatically will also strip them out again as soon as the type is letterspaced. If you let such software justify a text by adding space between the letters, you may find ligatures present in one line and missing in the next. The solution for this is twofold: (1) good software and (2) intelligent justification. Ligatures should go where they are needed and then stay no matter what.

3.3.2 *If you wish to avoid ligatures altogether, restrict yourself to faces that don't require them.*

It is quite possible to avoid the use of ligatures completely and still set beautiful type. All that is required is a face with non-kerning roman and italic *f* – and some of the finest twentieth-century faces have been deliberately equipped with just this feature. Aldus, Melior, Mendoza, Palatino, Sabon, Trajanus and Trump Mediäval, for example, all set handsomely without ligatures. Full or partial ligatures do exist for these faces, and the ligatures may add a touch



Ligatured and unligatured combinations in Sabon (left) and Trump Mediäval (right). In faces such as these, *f*-ligatures are optional – and in most such faces, only a partial set of ligatures exists.

of refinement – but when ligatures are omitted from these faces, no unsightly collisions occur.

The choice is wider still among sanserifs. Ligatures are important to the design of Eric Gill's Gill Sans, Ronald Arnholm's Legacy Sans, Martin Majoor's Scala Sans and Seria Sans but irrelevant to many unserifed faces. (Dummy ligatures, consisting of separate letters, are usually present on digital versions of those fonts, but using these dummies has no visible effect.)

3.4 TRIBAL ALLIANCES & FAMILIES

3.4.1 *To the marriage of type and text, both parties bring their cultural presumptions, dreams and family obligations. Accept them.*

Each text, each manuscript (and naturally, each language and each alphabet) has its own requirements and expectations. Some types are more adaptable than others in meeting these demands. But typefaces too have their individual habits and presumptions. Many of them, for instance, are rich with historical and regional connections – a subject pursued at greater length in chapter 7. For the moment, consider just the sociology of typefaces. What kinds of families and alliances do they form?

The union of uppercase and lowercase roman letters – in which the upper case has seniority but the lower case has the power – has held firm for twelve centuries. This constitutional monarchy of the alphabet is one of the most durable of European cultural institutions.

Ornamental initials, small caps and arabic figures were early additions to the roman union. Italics were a separate tribe at first, refusing to associate with roman lower case, but forming an alliance of their own with roman (not italic) capitals and small caps. Sloped caps developed only in the sixteenth century. Roman, italic and small caps formed an enlarged tribal alliance at that time, and most text families continue to include them.

Bold and condensed faces became a fashion in the nineteenth century, partially displacing italics and small caps. Bold weights and titling figures have been added retroactively to many earlier faces (Bembo and Centaur for example), though they lack any historical justification. Older text faces, converted from metal to digital form, are usually available in two fundamentally different versions. The better digital foundries supply authentic reconstruc-

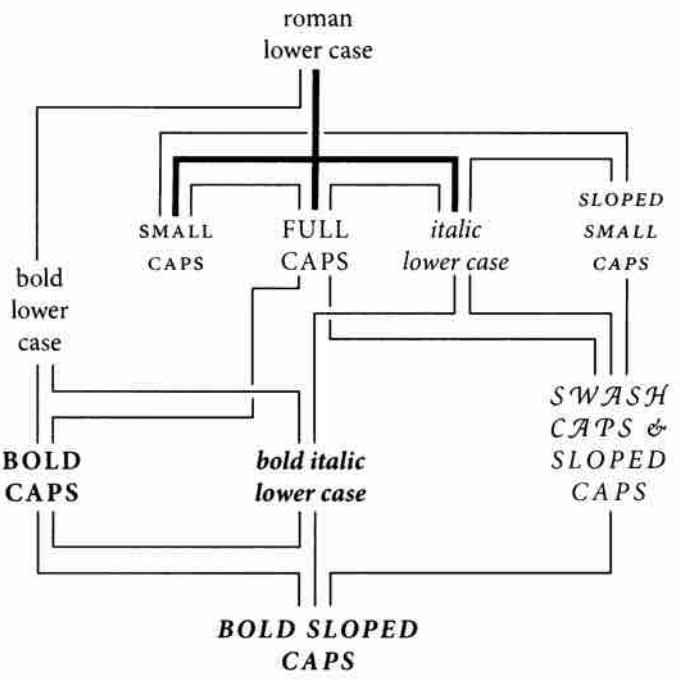
Aa
Bbʙ
ccC
Dd
Eeᴇ*e*
Ff

	Primary:	roman lower case	1.1
	Secondary:	Roman Upper Case	2.1
		ROMAN SMALL CAPS	2.2
		roman text figures: 123	2.3
		italic lower case	2.4
Tribal Alliances and Families	Tertiary:	*True Italic (Cursive) Upper Case & Swash*	3.1
		italic text figures: 123	3.2
		SLOPED SMALL CAPS	3.3
		Roman Titling Figures: 123	3.4
		bold lower case	3.5
	Quaternary:	*False Italic (Sloped) Upper Case*	4.1
		Bold Upper Case	4.2
		BOLD SMALL CAPS	4.3
		bold text figures: 123	4.4
		bold italic lower case	4.5
	Quintary:	*Italic Titling Figures: 123*	5.1
		Bold False Italic (Sloped) Upper Case	5.2
		bold italic text figures: 123	5.3
		Bold Titling Figures: 123	5.4
	Sextary:	***Bold Italic Titling Figures: 123***	6.1

tions; others supply the fonts without small caps, text figures and other essential components, and usually burden them instead with an inauthentic bold.

Among recent text faces, two basic family structures are now common. The simplified model consists only of roman, italic and titling figures, in a range of weights – light, medium, bold and black, for example. The more elaborate family structure includes small caps and text figures, though these are sometimes present only in the lighter weights.

A family with all these elements forms a hierarchical series, based not on historical seniority but on general adaptability and frequency of use. And the series works the way it does not so much from force of custom as from the force of physiology. The monumentality of the capitals, the loudness of the bold face, the calligraphic flow and (most of the time) slope of italic, stand out effectively against a peaceful, largely perpendicular, roman ground. Reverse the order and the text not only looks peculiar, it causes the reader physical strain.



The chart at left is a grammatical road map of a conventional large family of type. (The heavy rules show the extent of the basic nuclear family.) The typographer can move directly along any of the lines – e.g., from roman lower case to bold lower case or to small or full caps. A sudden shift from roman lower case to bold caps or sloped caps short-circuits the conventions of typographic grammar.

Fonts in each of these categories are called into use, through a surprisingly complex grammar of editorial and typographic rules, by fonts in the category above. The typographer can intervene in this process at will, and alter it to any degree. But good type is good because it has natural strength and beauty. The best results come, as a rule, from finding the best type for the work and then guiding it with the gentlest possible hand.

The standard North American reference on the editorial tradition is the *Chicago Manual of Style*, now in its 15th edition (2003).

3.4.2 *Don't use a font you don't need.*

The marriage of type and text requires courtesy to the in-laws, but it does not mean that all of them ought to move in, nor even that all must come to visit.

Boldface roman type did not exist until the nineteenth century. Bold italic is even more recent. Generations of good typographers were quite content without such variations. Font manufacturers nevertheless now often sell these extra weights as part of a basic package, thereby encouraging typographers – begin-

ners especially – to use bold roman and italic whether they need them or not.

Bold and semibold faces do have their value. They can be used, for instance, to flag items in a list, to set titles and subheads u&lc in small sizes, to mark the opening of the text on a complex page, or to thicken the texture of lines that will be printed in pale ink or as dropouts (negative images) in a colored field. Sparingly used, they can effectively emphasize numbers or words, such as the headwords, keywords and definition numbers in a dictionary. They can also be used (as they often are) to shout at readers, putting them on edge and driving them away; or to destroy the historical integrity of a typeface designed before boldface roman was born; or to create unintentional anachronisms, something like adding a steam engine or a fax machine to the stage set for *King Lear.*

Tribal Alliances and Families

3.4.3 *Use sloped romans sparingly and artificially sloped romans more sparingly still.*

It is true that most romans are upright and most italics slope to the right – but flow, not slope, is what really differentiates the two. Italics have a more cursive structure than romans, which is to say that italic is closer to longhand or continuous script. Italic serifs are usually *transitive*; they are direct entry and exit strokes, depicting the pen's arrival from the previous letter and its departure for the next. Roman serifs, by contrast, are generally *reflexive.* They show the pen doubling back onto itself, emphasizing the end of the stroke. Italic serifs therefore tend to slope at a natural writing angle, tracing the path from one letter to another. Roman serifs, especially at the baseline, tend to be level, tying the letters not to each other but to an invisible common line.

Some italics are more cursive than others; so are some romans. But any given italic is routinely more cursive than the roman with which it is paired.

e *e* l *l* m *m* u *u*

Baskerville roman and italic. Baskerville has less calligraphic flow than most earlier typefaces, but the italic serifs are, like their predecessors, *transitive and oblique,* showing the path of the pen from letter to letter. The roman serifs are *reflexive and level,* tying letters to a common line.

Early italic fonts had only modest slope and were designed to be used with upright roman capitals. There are some beautiful fifteenth-century manuscript italics with no slope whatsoever, and some excellent typographic versions, old and new, that slope as little as 2° or 3°. Yet others slope as much as 25°.

Harmony and Counterpoint

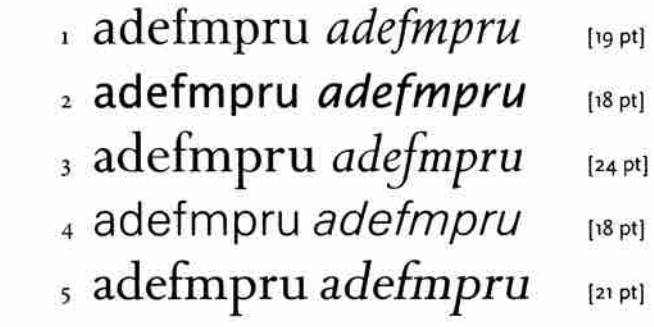
Italic and roman lived quite separate lives until the middle of the sixteenth century. Before that date, books were set in either roman *or* italic, but not in both. In the late Renaissance, typographers began to use the two for different features in the same book. Typically, roman was used for the main text and italic for the preface, headnotes, sidenotes and for verse or block quotations. The custom of combining italic and roman *in the same line*, using italic to emphasize individual words and mark specific classes of information, developed in the sixteenth century and flowered in the seventeenth. Baroque typographers liked the extra activity this mixing of fonts gave to the page, and the convention proved so useful to editors and authors that no subsequent change of typographic taste has ever driven it entirely away. Modulation between roman and italic is now a basic and routine typographic technique, much the same as modulation in music between major and minor keys. (The system of linked major and minor keys in music is, of course, another Baroque invention.)

Since the seventeenth century, many attempts have been made to curb the cursive, fluid nature of italic and to refashion it on the roman model. Many so-called italics designed in the last two hundred years are actually not italics at all, but sloped romans – otherwise known as *obliques*. And many are hybrids between the two.

As lowercase italic letterforms mutated toward sloped roman, their proportions changed as well. Most italics (though not all) are 5% to 10% narrower than their roman counterparts. But most sloped romans (unless designed by Eric Gill) are as wide or wider than their upright roman companions.

Renaissance italics were designed for continuous reading, and modern italics based on similar principles tend to have similar virtues. Baroque and Neoclassical italics were designed to serve as secondary faces only, and are best left in that role. Sloped romans, as a general rule, are even more devotedly subsidiary faces. They have been with us for ten centuries or more, but have rarely succeeded in rising above the status of calligraphic stunts or short-term perturbations of the upright roman.

In addition to families consisting of upright and sloped roman, there are now several families consisting of upright (or nearly upright) and sloped *italic*. Hermann Zapf's Zapf Chancery (ITC, 1979) is an example. The 'roman' is an italic with a slope of 4°; the 'italic' is also an italic, but with swash caps and a slope of 14°. Another example is Eaglefeather Informal (see p 271), in which the 'roman' is an italic with a slope of 0° and the 'italic' is in essence the same design with a slope of 10°.



1 Adrian Frutiger's Méridien roman and *italic*; **2** Lucida Sans roman and *italic*, by Kris Holmes & Charles Bigelow; **3** Perpetua roman and its *italic* – actually a hybridized sloped roman – by Eric Gill; **4** Univers roman and its *oblique* (a pure sloped roman), by Adrian Frutiger; **5** Romulus roman and *oblique* (again a pure sloped roman), by Jan van Krimpen.

Typesetting software is capable of distorting letters in many different ways: condensing, expanding, outlining, shadowing, sloping, and so on. If the only difference between a roman and its companion font were slope, the roman font alone would be enough for the computer. Sloped versions could be generated at will. But italic is not sloped roman, and even a good sloped roman is more than simply roman with a slope.

Direct electronic sloping of letterforms changes the weight of vertical and sloped strokes, while the weight of the horizontal strokes remains the same. Strokes that run northwest-southeast in the parent form – like the right leg of the A or the upper right and lower left corners of the O – are rotated toward the vertical when the letter is given a slope. Rotation toward the vertical causes these strokes to thicken. But strokes running northeast-southwest, like the left leg of the A, and the other corners of the O, are rotated farther away from the vertical. Rotation away from the vertical thins them down. Stroke curvature is altered in this translation process as well. The natural inclinations of a calligrapher drawing a sloped roman differ from what is convenient for the machine. Even 'italic' capitals – which nowadays are rarely anything except sloped roman – require individual shaping and editing to reach a durable form.

Through the collaborative efforts of calligraphers, typographers and engineers, software for the design and editing of typographic letterforms continues to improve. As it does, it continues

to mimic more and more closely those subtle and primitive tools that lie at the root of all typography: the stick, the brush, the chisel and the broadnib pen. Rules for transforming roman into good sloped roman forms, instead of into parodies, can surely be derived through close analysis of what the best scribes do. When parts of the procedure can be stated with mechanical precision, they can also be entrusted to machines. But rules for translating roman into *italic* cannot be stated clearly because no such rules exist. The two kinds of letterform have different genealogies, like apples and bananas. They form a common heritage and share an evolutionary source, yet neither one is a direct modification of the other.

Adobe Caslon roman, the same roman sloped electronically, and the true 'italic' capitals as drawn. Caslon italics have an average slope of 20°.

Palatino roman, the same roman sloped electronically, and the genuine italic, whose average slope is 9°.

True italic capitals: the swash forms from Robert Slimbach's Minion italic. It is the structure, not the slope, of the letters that marks them as italic.

Once in a while, nevertheless, a typographer will pine for a sloped version of a font such as Haas Clarendon or André Gürtler's Egyptian 505, for which no italic, nor even a sloped roman, has been drawn. On such occasions, a sloped roman generated by computer may suffice as a temporary solution. But the slope should be modest (perhaps 10° maximum), because less slope yields less distortion.

3.5.1 *Change one parameter at a time.*

Contrast

When your text is set in a 12 pt medium roman, it should not be necessary to set the heads or titles in 24 pt bold italic capitals. If boldface appeals to you, begin by trying the bold weight of the text face, u&lc, *in the text size.* As alternatives, try u&lc italic, or letterspaced small caps, or letterspaced full caps in the text weight and size. If you want a larger size, experiment first with a larger size of the text face, u&lc in the text weight. For a balanced page, the weight should *decrease* slightly, not increase, as the size increases.

3.5.2 *Don't clutter the foreground.*

When boldface is used to emphasize words, it is usually best to leave the punctuation in the background, which is to say, in the basic text font. It is the words, not the punctuation, that merit emphasis in a sequence such as the following:

> ... on the islands of **Lombok, Bali, Flores, Timor** and **Sulawesi,** the same textiles ...

But if the same names are emphasized by setting them in italic rather than bold, there is no advantage in leaving the punctuation in roman. With italic text, italic punctuation normally gives better letterfit and thus looks less obtrusive:

> ... on the islands of *Lombok, Bali, Flores, Timor* and *Sulawesi,* the same textiles ...

If spaced small caps are used for emphasis – changing the stature and form of the letters instead of their weight or slope, and thereby minimizing the surface disturbance on the page – the question of punctuation does not arise. The punctuation used with small caps is (except for question and exclamation marks) usually the same as roman punctuation; it is only necessary to check it for accurate spacing:

> ... on the islands of LOMBOK, BALI, FLORES, TIMOR and SULAWESI, the same textiles ...

4

4.1 OPENINGS

4.1.1 *Make the title page a symbol of the dignity and presence of the text.*

If the text has immense reserve and dignity, the title page should have these properties as well – and if the text is devoid of dignity, the title page should in honesty be the same.

Think of the blank page as alpine meadow, or as the purity of undifferentiated being. The typographer enters this space and must change it. The reader will enter it later, to see what the typographer has done. The underlying truth of the blank page must be infringed, but it must never altogether disappear – and whatever displaces it might well aim to be as lively and peaceful as it is. It is not enough, when building a title page, merely to unload some big, prefabricated letters into the center of the space, nor to dig a few holes in the silence with typographic heavy machinery and then move on. Big type, even huge type, can be beautiful and useful. But poise is usually far more important than size – and poise consists primarily of emptiness. Typographically, poise is made of white space. Many fine title pages consist of a modest line or two near the top, and a line or two near the bottom, with little or nothing more than taut, balanced white space in between.

4.1.2 *Don't permit the titles to oppress the text.*

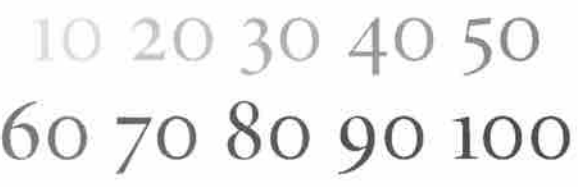
In books, spaced capitals of the text size and weight are often perfectly adequate for titles. At the other extreme, there is a fine magazine design by Bradbury Thompson, in which the title, the single word BOOM, is set in gigantic bold condensed caps that fill the entire two-page spread. The text is set in a tall narrow column *inside the stem* of the big B. The title has swallowed the text – yet the text has been reborn, alive and talkative, like Jonah from the whale.

For examples of Thompson's work, see Bradbury Thompson, *The Art of Graphic Design* (1988)

Most unsuccessful attempts at titling fall between these two extremes, and their problem is often that the title throws its weight around, unbalancing and discoloring the page. If the title is set in a larger size than the text, it is often best to set it u&lc in a light

titling font or a lightened version of the text font. Inline capitals (like the Castellar initials on pages 64 and 160) are another device that typographers have used since the fifteenth century to get large size without excessive weight.

There are other ways of creating large letters of light weight, but some of these are printerly instead of typographic. First of all, if the budget permits, the typographer can design the work to be printed in two or even in twenty different colors. An inexpensive alternative is the same one your monochrome desktop printer uses to render that colorful file: screening the type: breaking up the solid image with an electronic filter. (Note however that screened text always looks different on screen than on paper.)



Screened text. The numbers indicate the percentage of ink coverage permitted by the screen.

4.1.3 *Set titles and openings in a form that contributes to the overall design.*

Renaissance books, with their long titles and ample margins, generally left no extra space at the heads of chapters. In modern books, where the titles are shorter and the margins have been eaten by inflationary pressure, a third of a page sometimes lies vacant just to celebrate the fact that the chapter begins. But space alone is not enough to achieve the sense of richness and celebration, nor is absence of space necessarily a sign of typographic poverty.

Narrow row houses flush with the street are found not only in urban slums but in the loveliest of the old Italian hill towns and Mediterranean villages. A page full of letters presents the same possibilities. It can lapse into a typographic slum, or grow into a model of architectural grace, skilled engineering and simple economy. Broad suburban lawns and wide typographical front yards can also be uninspiringly empty or welcoming and graceful. They can display real treasure, including the treasure of empty

space, or they can be filled with souvenirs of wishful thinking. Neoclassical birdbaths and effigies of liveried slaves, stable boys and faded pink flamingoes all have counterparts in the typographic world.

4.1.4 *Mark each beginning and resumption of the text.*

The simplest way of beginning any block of prose is to start from the margin, flush left, as this paragraph does. On a peaceful page, where the text is announced by a head or subhead, this is enough. But if the text, or a new section of text, begins at the top of a page with no heading to mark it, a little fanfare will probably be required. The same is true if the opening page is busy. If there is a chapter title, an epigraph, a sidenote, and a photograph and caption, the opening of the text will need a banner, a ten-gallon hat or a bright red dress to draw the eye.

Fleurons (typographic ornaments) are often used to flag text openings, and are often printed in red, the typographer's habitual second color. The opening phrase, or entire first line, can also be set in small caps or in bold u&lc. Another excellent method of marking the start of the text, inherited from ancient scribal practice, is a large initial capital: a versal or lettrine. Versals can be treated in many ways. Indented or centered, they can stick up from the text. Flush left, they can be nested into the text (typographers call these drop caps, as opposed to elevated or stick-up caps). If there is room, they can hang in the left margin. They can be set in the same face as the text or in something outlandishly different. In scribal and typographic tradition alike, where the budget permits, versals too are generally red or another color in preference to black.

Elevated caps are easier to set well from a keyboard, but drop caps have closer links with the scribal and letterpress tradition. And the tooling and fitting of drop caps is something typographers do for fun, to test their skill and visual intuition. It is common practice to set the first word or phrase after the versal in caps, small caps or boldface, as a bridge between versal and normal text. Examples are shown on the following page.

In English, if the initial letter is A, I or O, a question can arise: is the initial letter itself a word? The answer to this question must come in the spacing of the text in relation to the versal. If the first word of the text is *Ahead,* for example, excessive space betwen the initial A and the rest of the word is bound to cause confusion.

OSCULETUR me osculo oris sui; quia meliora sunt ubera tua vino, ¶ fragantia unguentis optimis. Oleum effusum nomen tuum; ideo adolescentulae dilexerunt te.

TRAHE ME, post te curremus in odorem unguentorum tuorum. Introduxit me rex in cellaria sua; exsultabimus et laetabimur in te, memores uberum tuorum super vinum. Recti diligunt te.

« NIGRA SUM, sed formosa, filiae Ierusalem, sicut tabernacula Cedar, sicut pelles Salomonis. Nolite me considerare quod fusca sim, quia decoloravit me sol. Filii matris meae pugnaverunt contra me.... »

" ADIURO VOS, filiae Ierusalem, per capreas cervosque camporum, ne suscitetis, neque evigilare faciatis dilectam, quoadusque ipsa velit."

VOX DILECTI MEI; ecce iste venit, saliens in montibus, transiliens colles. ¶ Similis est dilectus meus capreae, hinnuloque cervorum. En ipse stat post parietem nostrum, respiciens per fenestras, prospiciens per cancellos. En dilectus meus loquitur mihi.

SURGE, propera, amica mea, columba mea, formosa mea, et veni. ¶ Iam enim hiems transiit; imber abiit, et recessit. ¶ Flores apparuerunt in terra nostra....

LAVI PEDES MEOS, quomodo inquinabo illos? ¶ Dilectus meus misit manum suam per foramen, et venter meus intremuit ad tactum eius. ¶ Surrexit ut aperirem dilecto meo; manus meae stillaverunt myrrham, et digiti mei pleni myrrha probatissima. Pessulum ostii mei....

Passages from the Song of Songs, set in Aldus 10/12 × 10 RR. Elevated cap: Castellar 54 pt. Drop caps: Aldus 42 pt, mortised line by line.

4.1.5 *If the text begins with a quotation, include the initial quotation mark.*

Quotation marks have a long scribal history as editorial signs added after the fact to other people's texts, but they did not come into routine typographic use until late in the sixteenth century. Then, because they interfered with established habits for positioning large initials, they were commonly omitted from the open-

ings of texts. Some style books still prescribe this concession to convenience as a fixed procedural rule. But digital typography makes it simple to control the size and placement of the opening quotation mark, whether or not the text begins with a versal. For the reader's sake, it should be there.

4.2 HEADINGS & SUBHEADS

Structural Forms and Devices

4.2.1 *Set headings in a form that contributes to the style of the whole.*

Headings can take many forms, but one of the first choices to make is whether they will be symmetrical or asymmetrical. Symmetrical heads, which are centered on the measure, are known to typographers as *crossheads.* Asymmetrical heads usually take the form of *left sideheads,* which is to say they are set flush left, or modestly indented or outdented from the left. *Right sideheads* work well in certain contexts, but more often as main heads than as subheads. A short, one-line head set flush right needs substantial size or weight to prevent the reader from missing it altogether.

These principles are reversed, of course, when setting leftward-reading alphabets such as Arabic and Hebrew.

One way to make heads prominent without making them large is to set them entirely in the margin, like the running heads (in typographic terms, they are *running shoulderheads*) used throughout this book.

4.2.2 *Use as many levels of headings as you need: no more and no fewer.*

As a rule it is best to choose a predominantly symmetrical or asymmetrical form for subheads. Mixing the two haphazardly leads to stylistic as well as logical confusion. But the number of levels available can be slightly increased, if necessary, by judicious combinations. If symmetrical heads are added to a basically asymmetrical series, or vice versa, it is usually better to put the visiting foreigners at the top or bottom of the hierarchical pile. Two six-level series of subheads are shown, by way of example, on the following pages.

In marking copy for typesetting, the various levels of subheads are generally given letters rather than names: A-heads, B-heads, C-heads, and so on. Using this terminology, the heads on the following pages run from A through F.

Main Section Title

Headings and Subheads

IF A MAN walk in the woods for love of them half of each day, he is in danger of being regarded as a loafer; but if he spends his whole day as a speculator, shearing off those woods and making earth bald before her time, he is esteemed an industrious and enterprising citizen.

MAIN CROSSHEAD

The ways by which you may get money almost without exception lead downward. To have done anything by which you earned money *merely* is to have been truly idle or worse.... If you would get money as a writer or lecurer, you must be popular, which is to go down perpendicularly....

Heavy Crosshead

In proportion as our inward life fails, we go more constantly and desperately to the post office. You may depend on it, that the poor fellow who walks away with the greatest number of letters ... has not heard from himself this long while.

MEDIUM CROSSHEAD

I do not know but it is too much to read one newspaper a week. I have tried it recently, and for so long it seems to me that I have not dwelt in my native region. The sun, the clouds, the snow, the trees say not so much to me....

Light Crosshead

You cannot serve two masters. It requires more than a day's devotion to know and to possess the wealth of a day.... Really to see the sun rise or go down every day, so to relate ourselves to a universal fact, would preserve us sane forever.

hypethral: from Greek ἐν ὑπαίθρῳ, 'in the open air'

RUN-IN SIDEHEAD Shall the mind be a public arena...? Or shall it be a quarter of heaven itself, an hypethral temple, consecrated to the service of the gods?

Main Section Title

❀ If I am to be a thoroughfare, I prefer that it be of the mountain brooks, the Parnassian streams, and not the town sewers.... I believe that the mind can be permanently profaned by attending to trivial things, so that all our thoughts shall be tinged with triviality.

Structural Forms and Devices

MAIN CROSSHEAD

Our very intellect shall be macadamized, as it were: its foundation broken into fragments for the wheels of travel to roll over; and if you would know what will make the most durable pavement, surpassing rolled stones, spruce blocks, and asphaltum, you have only to look into some of our minds....

ORNAMENTED CROSSHEAD

Read not the Times. Read the Eternities.... Even the facts of science may dust the mind by their dryness, unless they are in a sense effaced each morning, or rather rendered fertile by the dews of fresh and living truth.

INDENTED SIDEHEAD

Knowledge does not come to us by details, but in flashes of light from heaven. Yes, every thought that passes through the mind helps to wear and tear it, and to deepen the ruts, which, as in the streets of Pompeii, evince how much it has been used.

Secondary Indented Sidehead

When we want culture more than potatoes, and illumination more than sugar-plums, then the great resources of a world are taxed and drawn out, and the result, or staple production, is not slaves, nor operatives, but ... saints, poets, philosophers....

Run-in Sidehead In short, as a snowdrift is formed where there is a lull in the wind, so, one would say, where there is a lull of truth, an *institution* springs up....

The texts on this and the facing page are excerpts from HENRY DAVID THOREAU'S "Life Without Principle," c. 1854, first published in 1863. The type on the facing page is Adobe Caslon 10/12 × 21, and on this page, recut Monotype Centaur & *Arrighi* 11/12 × 21.

4.3.1 *If the text includes notes, choose the optimum form.*

Notes

If notes are used for subordinate details, it is right that they be set in a smaller size than the main text. But the academic habit of relegating notes to the foot of the page or the end of the book is a mirror of Victorian social and domestic practice, in which the kitchen was kept out of sight and the servants were kept below stairs. If the notes are permitted to move around in the margins – as they were in Renaissance books – they can be present where needed and at the same time enrich the life of the page.

Footnotes are the very emblem of fussiness, but they have their uses. If they are short and infrequent, they can be made economical of space, easy to find when wanted and, when not wanted, easy to ignore. Long footnotes are inevitably a distraction: tedious to read and wearying to look at. Footnotes that extend to a second page (as some long footnotes are bound to do) are an abject failure of design.

Endnotes can be just as economical of space, less trouble to design and less expensive to set, and they can comfortably run to any length. They also leave the text page clean except for a peppering of superscripts. They do, however, require the serious reader to use two bookmarks and to read with both hands as well as both eyes, swapping back and forth between the popular and the persnickety parts of the text.

Sidenotes give more life and variety to the page and are the easiest of all to find and read. If carefully designed, they need not enlarge either the page or the cost of printing it.

Footnotes rarely need to be larger than 8 or 9 pt. Endnotes are typically set in small text sizes: 9 or 10 pt. Sidenotes can be set in anything up to the same size as the main text, depending on their frequency and importance, and on the overall format of the page.

4.3.2 *Check the weight and spacing of superscripts.*

If they are not too frequent, sidenotes can be set with no superscripts at all (as in this book), or with the same symbol (normally an asterisk) constantly reused, even when several notes appear on a single page. For endnotes, superscript numbers are standard. For footnotes, symbols can be used if the notes are few. (The

traditional order is * † ‡ § || ¶. But beyond the asterisk, dagger and double dagger, this order is not familiar to most readers, and never was.) Numbers are more transparent, and their order is much less easy to confuse.

Many fonts include sets of superscript numbers, but these are not always of satisfactory size and design. Text numerals set at a reduced size and elevated baseline are sometimes the best or only choice. Establishing the best size, weight and spacing for superscripts will, however, require some care. In many faces, smaller numbers in semibold look better than larger numbers of regular weight. And the smaller the superscripts are, the more likely they are to need increased character space.

Superscripts frequently come at the ends of phrases or sentences. If they are high above the line, they can be kerned over a comma or period, but this may endanger readability, especially if the text is set in a modest size.

4.3.3 *Use superscripts in the text but full-size numbers in the notes themselves.*

In the main text, superscript numbers are used to indicate notes because superscript numbers minimize interruption. They are typographic asides: small because that is an expression of their relative importance, and raised for two reasons: to keep them out of the flow of the main text, and to make them easier to find. In the note itself, the number is not an aside but a target. Therefore the number in the note should be full size.[1]

a[1] b

1. Ba

To make them easy to find, the numbers of footnotes or endnotes can be hung to the left (like the marginal numbers on the following two pages and the footnote number below). Punctuation, apart from empty space, is not normally needed between the number and text of the note.

4.3.4 *Avoid ambiguity in the numbering and placement of endnotes.*

Readers should never be forced to hunt for the endnotes. As a rule, this means the endnotes should not appear in small clumps

This footnote is flagged by a superscript in the text, but the note itself is introduced by an outdented figure of the same size used for the text of the note. The main text on this page is set 10/12 × 21, and the note is 8/11.

at the end of each chapter. It is better to place them together at the end of the book. Wherever possible, they should also be numbered sequentially from the beginning to end of the book, and the notes themselves should be designed so the numbers are readily visible. If the notes are numbered anew for each section or chapter or essay, running heads will be needed along with the notes to point the way. If the running heads accompanying the notes say, for instance, "Notes to Pages 44–62," readers will know their way. But if the running heads say something like "Notes to Chapter 5," then chapter 5 must be identified as such by running heads of its own.

Notes

4.4 TABLES & LISTS

4.4.1 *Edit tables with the same attention given to text, and set them as text to be read.*

Tables are notoriously time-consuming to typeset, but the problems posed are often editorial as much as typographic. If the table is not planned in a readable form to begin with, the typographer can render it readable only by rewriting or redesigning it from scratch.

For graphic alternatives to typographic tables, see Edward R. Tufte, *The Visual Display of Quantitative Information* (2nd ed., 2001) and *Envisioning Information* (1990).

Tables, like text, go awry when approached on a purely technical basis. Good typographic answers are not elicited by asking questions such as "How can I cram this number of characters into that amount of space?"

If the table is approached as merely one more form of text, which must be made both good to read and good to look at, several principles will be clear:

1. All text should be horizontal, or in rare cases oblique. Setting column heads vertically as a space-saving measure is quite feasible if the text is in Japanese or Chinese, but not if it is written in the Latin alphabet.
2. Letterforms too small or too condensed for comfortable reading are not part of the solution.
3. There should be a minimum amount of furniture (rules, boxes, dots and other guiderails for traveling through typographic space) and a maximum amount of information.
4. Rules, tint blocks or other guides and dividers, where they are necessary at all, should run in the predominant reading direction: vertically in the case of lists, indices and some numerical tables, and horizontally otherwise.

5 A rule located at the edge of a table, separating the first or final column from the adjacent empty space, ordinarily serves no function.
6 A table, like any other text in multiple columns, must contain within itself an adequate amount of white space.

4.4.2 *Avoid overpunctuating lists.*

A list is an inherently spatial and numerical arrangement. Speakers reciting lists often enumerate on their fingers, and lists set in type often call for equivalent typographic gestures. This means that the list should be clarified as much as possible through spatial positioning and pointing, usually done with bullets, dashes or numerals. (Examples occur on these two pages and throughout this book.) If the numbers are made visible either through position (e.g., by hanging them in the margin) or through prominence (e.g., by setting them in a contrasting face), additional punctuation – extra periods, parentheses or the like – should rarely be required.

Dot leaders (lines of dots leading the eye from one word or number to another) are rarely beneficial in tables.

4.4.3 *Set lists and columns of figures to align flush right or on the decimal.*

The numerals in many fonts are all of equal width, though there is sometimes an alternative, narrower form of the numeral one. This fitted one is generally used when setting figures in the midst of text, while the unfitted one (of standard numeral width) is often used when setting figures in columns. The font itself or the composition software will also include a figure space – a fixed blank space corresponding to the width of a standard, unkerned numeral. This makes it a simple matter to compose lists and columns of figures in rigorous mechanical alignment.

100
111
100
111

If you use proportionally fitted numerals (always the best choice for text), or kern the numeral permutations in a font with tabular figures, the individual figures will not align in columns or lists, but *columns* of figures can still be aligned. For much tabular matter (e.g., the first table overleaf) this is sufficient. If notes are required in a table with flush-right columns, the superscripts should be hung to the right (as in column 3, line 2 of the first example overleaf) so they will not disrupt the alignment.

8	98	998	9.75
9	99	999*	10
10	100	1000	10.25
11	101	1001	10.5

Above: aligning columns of nonaligning figures, with a hanging asterisk.
Below: columns in mixed alignment.

Aster	2 : 3	24 × 36	0.667	$a = 2b$
Valerian	271 : 20	813 × 60	13.550	$6a = c$

4.4.4 *For text and numerals alike, choose harmonious and legible tabular alignments.*

Simple tables and lists of paired items, like the sample tables of contents on page 36, are often best aligned against each other, the left column flush right and the right column flush left. Financial statements and other numerical tables usually follow the opposite pattern: a column of words, on the left, aligns flush left, while the subsequent columns of numbers all align flush right or on the decimal. Any repeating character – a dimension sign or equal sign, for instance – is potentially of use in tabular alignment. But many columns with many different alignments can generate overall visual chaos. Occasionally it is better, in such cases, to set all columns or most columns either flush right or flush left, for the sake of general clarity.

4.5 FRONT & BACK MATTER

4.5.1 *Leave adequate space at the beginning and end of every publication.*

A brief research paper may look its best with no more space at beginning and end than is provided by the standard page margins. The same is rarely true of a book, whose text should generally be, and should seem to be, a living and breathing entity, not aged and shrink-wrapped meat. A chapbook or saddle-stitched booklet can begin directly with the title page. Otherwise, a half-title is customary, preceding the title page. It is equally customary to leave a blank leaf, or at least a blank page, at the end of a book. These blanks provide a place for inscriptions and notes and allow the text to relax in its binding.

4.5.2 *Give adequate space to the prelims.*

A text preceded by an interminable chain of forewords, prefaces, introductions and prologues is unlikely to be read. But a dedication that is stuffed, like a typographic afterthought, onto an already overfilled copyright page is no dedication at all. And a list of contents which is incomplete (or missing altogether), and which does not have the page to itself, is usually a sign of typographic desperation or of disregard for the reader.

4.5.3 *Balance the front and back matter.*

Books are normally built up from gatherings or signatures – printed and folded sheets – with each signature forming a unit of 8, 12, 16, 24 or 32 pages. The 16-page signature is by far the most common. Typographers therefore work to make most of their books seem divinely ordained and conceived to be some multiple of 16 pages in length. Seasoned book typographers recite in their meditations not only the mantra of points and picas – 12, 24, 36, 48, 60, 72 ... – but also the mantra of octavo signatures: 16, 32, 48, 64, 80, 96, 112, 128, 144, 160, 176, 192, 208, 224, 240, 256, 272, 288, 304, 320, 336, 352, 368, 384, 400.... These are the lengths of the books that we read.

In a work of continuous prose, the illusion of divine love for the number sixteen is obtained by straightforward copyfitting. If the length of the text is accurately measured, the page can be designed to yield a book of appropriate length. More complicated books are often surrounded by paraphernalia – not only the standard half-title, title page, copyright page, dedication page and some blanks, but also perhaps a detailed table of contents, a list of charts, illustrations and maps, a table of abbreviations, a page or two of acknowledgements, and a preface, counterbalanced by appendices, endnotes, bibliography, index and a colophon. Copyfitting the main text for a volume of this kind may be highly complex, and room may be taken up or conserved in the large aura of front and back matter. But for complex books and simple books alike, it is up to the typographer to balance the front matter, back matter and text. A wad of blank leaves at the end of a book is a sign of carelessness, not of kindliness toward readers who like to take notes.

ABCDEFGHIKL
MNOPQ RSTV
XYZ a b c d e f g h i l
m n o p q r s ſ t u v x y z
1 2 3 4 5 6 7 8 9 0 , . ' ! ? ; : - ꝰ
Æ æ ct ff ffi ffl œ ſſ ſi ſt ſl ℞
& ã á à â ç ẽ é è ê ë ę ĩ í ì î ï ꝑ

Iuris præcepta ſunt hæc , Honeſté viuere , alterum non lædere , ſuum cuiq́; tribuere . Huius ſtudij duæ ſunt poſitiones , Publicum & priuatum . Publicum ius eſt , quod ad ſtatum rei Romanæ ſpectat . Priua tum , quod ad ſingulorum vtilitatem pertinet .
Dicendum eſt igitur de iure priuato , quòd triperti- tum eſt : collectum eſt enim ex naturalibus præcep- tis , aut gẽtium aut ciuilibus . Ius naturale eſt quòd

A 42 pt roman titling font (cut *c.* 1530, revised *c.* 1550) and a 16 pt italic text font (*c.* 1539). Both were cut by Claude Garamond, Paris. The italic is shown actual size and the roman reduced by about one fifth. Matrices for the roman font survive at the Plantin-Moretus Museum, Antwerp.

6

6.1 TECHNICAL CONSIDERATIONS

6.1.1 *Consider the medium for which the typeface was originally designed.*

Typographic purists like to see every typeface used with the technology for which it was designed. Taken literally, this means that virtually all faces designed before 1950 must be set in metal and printed letterpress, and the majority must be set by hand. Most typographers apply this principle in a more relaxed and complex way, and settle for preserving something rather than everything of a type's original character.

On the technical side, several things can be done to increase the chance that a letterpress typeface will survive translation to digital composition and offset printing.

6.1.2 *When using digital adaptations of letterpress faces, choose fonts that are faithful to the spirit as well as the letter of the old designs.*

Letterpress printing places the letterform *into* the paper, while offset printing lays it on the surface. Many subtle differences result from these two approaches to printing. The letterpress adds a little bulk and definition to the letter, especially in the thin strokes, and increases the prominence of the ends of thin serifs. Metal typefaces are designed to take advantage of these features of letterpress printing.

On the offset press – and in the photographic procedures by which camera-ready art and offset printing plates are prepared – thin strokes tend to get thinner and the ends of delicate serifs are eaten away. In a face like Bembo, for instance, offset printing tends to make features like the feet of i and l, and the heads and feet of H and I, slightly convex, while letterpress printing tends to make them slightly concave.

Ili

Faces designed for photographic manipulation and offset printing are therefore weighted and finished differently from letterpress designs. And adapting a letterpress face for digital composition is a far from simple task.

Digital fonts poorly translated from metal originals are sometimes too dark or light or blunt throughout, or uneven in stroke weight, or faithless in their proportions. They sometimes lack text figures or other essential components of the original design. But digital translations can also be *too faithful* to the original. They sometimes neglect the subtle adjustments that the shift from three-dimensional letterpress to two-dimensional offset printing requires.

Technical Considerations

6.1.3 *Choose faces that will survive, and if possible prosper, under the final printing conditions.*

a a
a a

Bembo and Centaur, Spectrum and Palatino, are subtle and beautiful alphabets, but if you are setting 8 pt text with a laser printer on plain paper at 300 dpi, the refined forms of these faces will be rubbed into the coarse digital mud of the imaging process. If the final output will be 14 pt text set directly to plate at 2800 dpi, then printed by good offset lithography on the best coated paper, every nuance may be crystal clear, but the result will still lack the character and texture of the letterpress medium for which these faces were designed.

lr

Some of the most innocent looking faces are actually the most difficult to render by digital means. Optima, for example – an unserifed and apparently uncomplicated face – is (in its authentic form) entirely constructed of subtle tapers and curves that can be adequately rendered only at the highest resolutions.

a a
a a

Faces with blunt and substantial serifs, open counters, gentle modeling and minimal pretensions to aristocratic grace stand the best chance of surviving the indignities of low resolution. Amasis, Caecilia, Lucida Sans, Stone and Utopia, for example, while they prosper at high resolutions, are faces that will also survive under cruder conditions lethal to Centaur, Spectrum, Linotype Didot or almost any version of Bodoni.

6.1.4 *Choose faces that suit the paper you intend to print on, or paper that suits the faces you wish to use.*

Most Renaissance and Baroque types were made to be pressed into robust, lively papers by fairly robust means. They wilt when placed on the glossy, hard-surfaced sheets that came into vogue toward the end of the eighteenth century. Most Neoclassical and Romantic types, on the other hand, were designed to

require smooth papers. Rough, three-dimensional papers break their fragile lines. Geometric Modernist types such as Futura, and overhauled Realist types such as Helvetica, can be printed on rough and smooth papers alike, because they are fundamentally *monochrome*. (That is to say, the stroke is nearly uniform in width.) But the aura of machine precision that emanates from a type like Futura is reinforced by a smooth paper and contradicted (*or* counterbalanced) by a paper that feels homespun.

The types associated with these historical categories are epitomized on pp 12–15 and explored in more detail in chapter 7.

6.2 PRACTICAL TYPOGRAPHY

6.2.1 *Choose faces that suit the task as well as the subject.*

You are designing, let us say, a book about bicycle racing. You have found in the specimen books a typeface called Bicycle, which has spokes in the O, an A in the shape of a racing seat, a T that resembles a set of racing handlebars, and tiny cleated shoes perched on the long, one-sided serifs of ascenders and descenders, like pumping feet on the pedals. Surely this is the perfect face for your book?

Actually, typefaces and racing bikes are very much alike. Both are ideas as well as machines, and neither should be burdened with excess drag or baggage. Pictures of pumping feet will not make the type go faster, any more than smoke trails, pictures of rocket ships or imitation lightning bolts tied to the frame will improve the speed of the bike.

The best type for a book about bicycle racing will be, first of all, an inherently good type. Second, it will be a good type for books, which means a good type for comfortable long-distance reading. Third, it will be a type sympathetic to the theme. It will probably be lean, strong and swift; perhaps it will also be Italian. But it is unlikely to be carrying excess ornament or freight, and unlikely to be indulging in a masquerade.

6.2.2 *Choose faces that can furnish whatever special effects you require.*

If your text includes an abundance of numerals, you may want a face whose numerals are especially well designed. Palatino, Pontifex, Trump Mediäval and Zapf International, for example, all recommend themselves. If you prefer three-quarter-height lining numerals, your options include Bell, Trajanus and Weiss.

If you need small caps, faces that lack them (such as Frutiger and Méridien) are out of the running. If you need a range of weights, Spectrum is disqualified but Frutiger may work. If you need matching phonetics, your options include Stone Serif and Sans, Lucida Sans, and Times Roman. For the sake of a matching Cyrillic, you might choose Charter, Minion, Lazurski, Officina, Quadraat, Warnock, or, among the unserifed faces, Syntax, Myriad or Futura. For the sake of a matching Greek, you might choose Georgia or Palatino, or for the sake of a matching Cherokee, Plantagenet. To obtain a perfectly mated sanserif, you might choose Haarlemmer, Legacy, Lucida, Le Monde, Officina, Quadraat, Scala, Seria or Stone. These matters are explored in more detail in chapter 11, which addresses individual typefaces.

Special effects can also be obtained through more unorthodox combinations, which are the subject of §6.5.

6.2.3 *Use what there is to the best advantage.*

If there is nothing for dinner but beans, one may hunt for an onion, some pepper, salt, cilantro and sour cream to enliven the dish, but it is generally no help to pretend that the beans are really prawns or chanterelles.

When the only font available is Cheltenham or Times Roman, the typographer must make the most of its virtues, limited though they may be. An italic, small caps and text figures will help immensely if they can be added, but there is nothing to be gained by pretending that Times Roman is Bembo or Cheltenham is Aldus in disguise.

As a rule, a face of modest merits should be handled with great discretion, formality and care. It should be set in modest sizes (better yet, in one size only) with the caps well spaced, the lines well leaded, and the lower case well fitted and modestly kerned. The line length should be optimal and the page impeccably proportioned. In short, the typography should be richly and superbly *ordinary*, so that attention is drawn to the quality of the composition, not to the individual letterforms. Only a face that warrants close scrutiny should be set in a form that invites it.

Using what there is to best advantage almost always means using less than what is available. Baskerville, Helvetica, Palatino and Times Roman, for example – which are four of the most widely available typefaces – are four faces with nothing to offer

Baskerville roman
and its italic

Helvetica roman
and its oblique

Palatino roman
and its italic

Times New Roman
and its italic

Baskerville is an English Neoclassical face designed in Birmingham in the 1750s by John Baskerville. It has a rationalist axis, thoroughgoing symmetry and delicate finish.

Helvetica is a twentieth-century Swiss revision of a late nineteenth-century German Realist face. The first weights were drawn in 1956 by Max Miedinger, based on the Berthold Foundry's old Odd-job Sanserif, or Akzidenz Grotesk, as it is called in German. The heavy, unmodulated line and tiny aperture evoke an image of uncultivated strength, force and persistence. The very light weights issued in recent years have done much to reduce Helvetica's coarseness but little to increase its readability.

Palatino is a lyrical modernist face with a neohumanist architecture, which is to say that it is *written*, not drawn, and that it is based on Renaissance forms. It was created in 1948 by Hermann Zapf.

Times Roman – properly Times *New* Roman – is an historical pastiche drawn by Victor Lardent for Stanley Morison in London in 1931. It has a humanist axis but Mannerist proportions, Baroque weight, and a sharp, Neoclassical finish.

one another except public disagreement. None makes a good companion face for any of the others, because each of them is rooted in a different concept of what constitutes a letterform. If the available palette is limited to these faces, the first thing to do is choose *one* for the task at hand and ignore the other three.

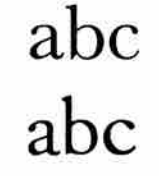
Historical Considerations

6.3 HISTORICAL CONSIDERATIONS

Typography, like other arts, preys on its own past. It can do so with the callousness of a grave robber, or with the piety of unquestioning ancestor worship. It can also do so in thoughtful, enlightened and deeply creative ways.

Roman type has been with us for more than five centuries. Its root components – the roman upper and lower case, basic analphabetic symbols, and the arabic numerals – have been with us for much longer yet. There are typographers who resolutely avoid using any typeface designed in an earlier era, but even they must learn something of how the older letterforms functioned, because the ancient forms are living in the new. Typographers who willingly use the old faces, and who wish to use them intelligently, need to know all they can learn about the heritage they enjoy.

6.3.1 *Choose a face whose historical echoes and associations are in harmony with the text.*



Any contemporary library will furnish examples of typographic anachronism. There are books on contemporary Italy and on seventeenth-century France set in typefaces such as Baskerville and Caslon, cut in eighteenth-century England. There are books about the Renaissance set in faces that belong to the Baroque, and books about the Baroque set in faces from the Renaissance. To a good typographer it is not enough merely to avoid these kinds of laughable contradictions. The typographer seeks to *shed light* on the text, to generate insight and energy, by setting every text in a face and form in which it actually belongs.

It is not that good typographers object to mixing centuries and cultures. Many take delight in doing so – especially when they have no other choice. A text from ancient Athens, for example, cannot be set in an ancient Athenian version of roman type. A face designed in North America in the 1990s may well be used instead. Texts from seventeenth-century France or eighteenth-

century England also might be set perfectly well in faces of recent design. But a face that truly suits an historical text is likely to have some fairly clear historical content of its own. There is no typeface *equally suited* to texts from Greek antiquity, the French Baroque and the English Neoclassical period – though faces equally *unsuited* to each of them abound.

The historical affiliations of individual typefaces are discussed in chapters 7 and 11.

6.3.2 *Allow the face to speak in its natural idiom.*

Books that leap historical boundaries and mix historical subjects can pose complex and exciting typographic problems. But often, if a text calls for a Renaissance type, it calls for Renaissance typography as well. This usually means Renaissance page proportions and margins, and an absence of bold face. It may also mean large Renaissance versals, Renaissance style in the handling of quotations, and the segregation of roman and italic. If the text calls for a Neoclassical type, it likewise often calls for Neoclassical page design. When you undertake to use an historical typeface, take the trouble to learn the typographic idiom for which it was intended. (Works of reference that may be useful in solving particular problems are listed in the bibliography, page 357.)

6.4 CULTURAL & PERSONAL CONSIDERATIONS

6.4.1 *Choose faces whose individual spirit and character is in keeping with the text.*

Accidental associations are rarely a good basis for choosing a typeface. Books of poems by the twentieth-century Jewish American poet Marvin Bell, for example, have sometimes been set in Bell type – which is eighteenth-century, English and Presbyterian – solely because of the name. Such puns are a private amusement for typographers; they also sometimes work. But a typographic page so well designed that it attains a life of its own will be based on real affinities, not on an inside joke.

abc
abc

Letterforms have character, spirit and personality. Typographers learn to discern these features through years of working first-hand with the forms, and through studying and comparing the work of other designers, present and past. On close inspec-

tion, typefaces reveal many hints of their designers' times and temperaments, and even their nationalities and religious faiths. Faces chosen on these grounds are likely to give more interesting results than faces chosen through mere convenience of availability or coincidence of name.

If, for example, you are setting a text by a woman, you might prefer a face, or several faces, designed by a woman. Such faces were rare or nonexistent in earlier centuries, but there are now a number to choose from. They include Gudrun Zapf-von Hesse's admirable Alcuin, Carmina, Diotima and Nofret families; Elizabeth Friedländer's Elizabeth; Kris Holmes's Sierra and Lucida; Kris Holmes's and Janice Prescott Fishman's Shannon; Carol Twombly's handsome text face Chaparral and her titling faces Charlemagne, Lithos, Nueva and Trajan; Zuzana Ličko's Journal and Mrs Eaves, and Ilse Schüle's Rhapsodie. For some purposes, one might also go back to the work of Elizabeth Colwell, whose Colwell Handletter, issued by ATF in 1916, was the first American typeface designed by a woman.

But perhaps a text by a French author, or a text dealing with France, might best be set in a French typeface, without regard to the gender of author or designer. The choices include Garamond, Jannon, Mendoza, Méridien, Vendôme and many others, but even this abbreviated list covers considerable range. Garamond – of which there are many recent revivals – was designed in sixteenth-century Paris. It owes much to Italian forms and belongs to the world of Renaissance Catholicism. Jannon is equally elegant but nonconformist. It belongs to the Reformation rather than the Renaissance, and its designer, Jean Jannon, was a French Protestant who suffered all his life from religious persecution. Vendôme, designed by François Ganeau, is a witty twentieth-century face much indebted to Jannon. Mendoza, designed in Paris in 1990, goes back to the tough humanist roots from which Garamond sprang. Méridien, from the 1950s, is more in touch with the secular spirit of twentieth-century Swiss industrial design, yet it includes a regal, even imperious, upper case and a very crisp and graceful italic. These five different faces invite additional differences in page design, paper and binding as well as different texts, just as different musical instruments invite different phrasings, different tempi, different musical modes or keys.

Even nations such as Greece and Thailand, which have alphabets of their own, share in a multinational tradition of type

Garamond roman
and its italic

Jannon roman
and its italic

Mendoza roman
and its italic

Méridien roman
and its italic

Vendôme roman
and its oblique

Stempel Garamond is the Stempel Foundry's replica of a text roman and italic designed by Claude Garamond (*c.* 1490–1561). (Compare the reproductions of some of Garamond's actual type on page 74.)

Monotype 'Garamond' 156 is a revival of a type designed by Jean Jannon (1580–1658), the greatest typecutter of the French Baroque. Jannon's type was once misidentified as Garamond's and is still routinely sold under his name.

Mendoza was designed about 1990 by José Mendoza y Almeida. Adrian Frutiger's Méridien and François Ganeau's Vendôme are products of the 1950s. Ganeau – who worked as a painter, sculptor and set designer more than as a typographer – based Vendôme on Jannon's letters, but moved them playfully in the direction of French Neoclassicism.

design. Nevertheless, some typefaces seem more redolent of national character than others. Frederic Goudy, for example, is widely regarded as the most ebulliently American of all American type designers. The sensitive typographer would not choose one of Goudy's faces to set, let us say, the text of the Canadian or Mexican constitution.

Cultural and Personal Considerations

This subject is a lifelong study, and for serious typographers it is a lifelong source of discovery and delight. Here it is pursued at greater length in chapter 11. Appendix D (page 333) is a cross-indexed list of type designers.

6.5 THE MULTICULTURAL PAGE

Consistency is one of the forms of beauty. Contrast is another. A fine page, even a fine book, can be set from beginning to end in one type in one size. It can also teem with variety, like an equatorial forest or a modern city.

6.5.1 *Start with a single typographic family.*

Most pages, and most entire documents, can be set perfectly well with only one family of type. But perhaps the page confronting you requires a chapter title, two or three levels of subheads, an epigraph, a text in two languages, block quotations within the text, a couple of mathematical equations, a bar graph, several explanatory sidenotes, and captions for photographs and a map. An extended type family, such as Legacy, Lucida, Quadraat, Seria or Stone, may provide sufficient resources even for this task. Another possibility is Gerard Unger's comprehensive series known as Demos, Praxis and Flora – which is a family with no surname to unite it. Each of these series includes both roman and italic in a range of weights, matching serifed and unserifed forms, and other variations. If you restrict yourself to faces within the family, you can have variety and homogeneity at the same time: many shapes and sizes but a single typographic culture. Such an approach is well suited to some texts, poorly suited to others.

a A *a*

a A *a*

a A *a*

a A *a*

You can also, of course, mix faces at random, by drawing them out of a hat.

Between these two extremes is the wide arena of thoughtful mixing and matching, in which the typographic intelligence often does its most creative work and play.

6.5.2 *Respect the integrity of roman, italic and small caps.*

It has been the normal practice of type designers since the middle of the sixteenth century to offer text faces in the form of a matched triad, consisting of roman, italic and small caps. Because some of these marriages are more successful than others, it is wise to examine the roman and the italic both separately and together when choosing a text face.

There are several celebrated instances in which an italic designed by one artist has been happily and permanently married to another designer's roman. These matches always involve some redrawing (and the face that is most heavily redrawn is almost always the italic, which is the subsidiary and 'feminine' font in post-Renaissance typography). There are also instances in which a roman and its italic have been designed by the same artist many years apart. But casual liaisons, in which the roman of one family is paired momentarily with the italic of another, have little hope of success. Mixing small caps from one face with full caps from another is even less likely to succeed.

If you use type strictly in the Renaissance manner, treating the roman and italic as separate but equal, not mixing them on the line, you may find that greater latitude is possible. Jan van Krimpen's Lutetia italic mixes well with his later Romanée roman, for example, if the two are not too intimately combined. One is visibly more mature than the other, but they are close in color and structure, and they are patently the work of the same designer.

6.5.3 *Consider bold faces on their own merits.*

The original boldface printing types are the blackletters used by Gutenberg in the 1440s. For the next two centuries, blackletter fonts were widely used not only in Germany but in France, Spain, the Netherlands and England. (That is why blackletter fonts are occasionally sold in the USA as 'Olde English.')

Boldface romans, however, are a nineteenth-century invention. Bold italic is even more recent, and it is hard to find a successful version designed before 1950. Bold romans and italics have been added retroactively to many earlier faces, but they are often simply parodies of the original designs.

Before using a bold weight, especially a bold italic, ask yourself whether you really need it at all. If the answer is yes, you may want

to avoid type families such as Bembo, Garamond or Baskerville, to which bold weights have been retroactively added but do not in fact belong. You might, instead, choose a twentieth-century family such as Apollo, Nofret or Scala, in which a range of weights is part of the original design.

The Multicultural Page

If your text face lacks a bold weight, you may also find an appropriate bold close by. Hermann Zapf's Aldus, for example, is a twentieth-century family on the Renaissance model, limited to roman, italic and small caps. But Aldus is a close cousin of the same designer's Palatino family, which does include a bold, and Palatino bold sits comfortably enough with Aldus text.

a aardvark; **b** *balloon;* **3** thruppence

Aldus 16 pt roman and italic with Palatino 15 pt bold

Equally interesting results can often be obtained by reaching much farther afield. The normal function of boldface type is, after all, to contrast with the roman text. If the bold is used in small amounts, and bold and roman are not too intimately combined, a difference in structure as well as weight may be an asset. Under these conditions, a typographer is free to choose both roman and bold on their own merits, seeking basic compatibility rather than close genetic connection.

c chinstrap; **d** *daffodil*; **6** saxophone

Sabon 16 pt roman and italic with Zapf International 15 pt demibold

A text might be set in Sabon, for example, with Zapf International as a titling face and Zapf International demi or heavy for subheads and flags. Structurally, these are very different faces, with very different pedigrees. But Sabon has the calm and steady flow required for setting text, while Zapf International's vitality makes it a good face for titling – and this vitality persists even in the boldest weights. The bold weights of fonts that are closer in structure Sabon often look splayed and deformed.

Fifteenth-century typographers – Nicolas Jenson for example – rarely mixed fonts except when mixing languages. They loved an even page. Bold roman is therefore an appendage they did happily without. If, nevertheless, you were using one of the fine text faces

based on Jenson's single roman font and wanted to embellish it with bold, you might consider using Jenson's kind of bold. The only dark faces he cut were blackletters.

Élève elephant; **fool** filibuster; **lvi** phytogenic

Bruce Rogers's Centaur (here 16 pt) with Karlgeorg Hoefer's San Marco (12 pt). Centaur is based on the roman that Nicolas Jenson cut at Venice in 1469. San Marco is based on the rotundas he cut there in the 1470s.

6.5.4 *Choose titling and display faces that reinforce the structure of the text face.*

Titling faces, display faces and scripts can be chosen on much the same principles as bold faces. Incestuous similarity is rarely a necessity, but empathy and compatibility usually are. A geometrically constructed, high-contrast face such as Bauer Bodoni, beautiful though it may be, has marginal promise as a titling face for a text set in Garamond or Bembo, whose contrast is low and whose structure is fundamentally calligraphic. (Bodoni mixes far more happily with Baskerville – of which it is not a contradiction but rather an exaggeration.)

6.5.5 *Pair serifed and unserifed faces on the basis of their inner structure.*

When the basic text is set in a serifed face, a related sanserif is frequently useful for other elements, such as tables, captions or notes. In complicated texts, such as dictionary entries, it may also be necessary to mix unserifed and serifed fonts on the same line. If you've chosen a family that includes a matched sanserif, your problems may be solved. But many successful marriages between serifed and unserifed faces from different families are waiting to be made.

Frutiger Méridien Univers

The version of Frutiger used here is the recent revision known as Frutiger Next.

Suppose your main text is set in Méridien – a serifed roman and italic designed by Adrian Frutiger. It would be reasonable to look first of all among Frutiger's other creations for a related sanserif. Frutiger is a prolific designer of types, both serifed and

in addition three sets of long vowels with iota subscripts (ᾰ̔, ῆ̔, ᾠ̔, etc). With luck, the font will include a sensible kerning table as well. This is a lot to ask from an industry in which there is, officially, no culture other than commerce and no purpose except monetary gain. It is a lot to ask, but not by itself enough. In Greek as in any other alphabet, *the face must suit the text.* It must also suit the context, which is likely to be roman and italic.

Choosing and Combining Type

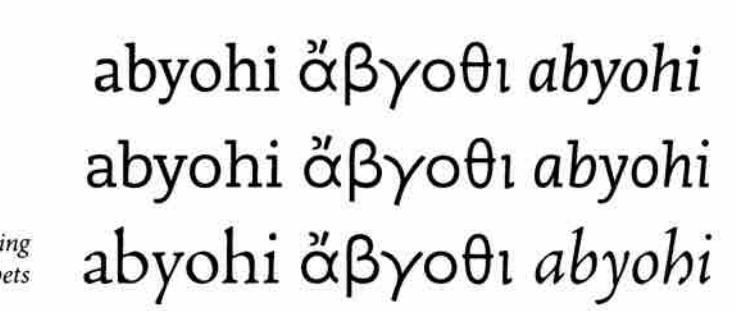
There may be 60,000 fonts of type for the Latin alphabet now on the market in digital form. These comprise some 7,000 families. Perhaps two per cent of them are truly useful for text work – but a hundred families of type is still a very generous number, and the available text faces cover a wide stylistic range. With a little scrounging, one can turn up several dozen digital fonts of Greek – but again, only a small percentage of these have any real potential for text work. It is therefore often best to choose a Greek font *first,* and then a roman and italic to go with it, even when only a few Greek words or a single Greek quotation is present in the text you are going to set.

Two Greek text fonts with eminent credentials – Victor Scholderer's New Hellenic, designed in 1927, and Richard Porson's Porson, designed in 1806 – are shown, in their digital incarnations, on pages 108–109. Porson's Greek was first commissioned by Cambridge University Press, but it became in the twentieth century the favorite Greek at Oxford, while Scholderer's New Hellenic became the favorite Cambridge Greek. New Hellenic in particular has an eminent Renaissance pedigree further discussed in §11.7.

6.6.2 *Match the continuity of the typography to the continuity of thought.*

A text composed in a single dialect may be full of leaps and holes, while a text that hops and skips through several languages and alphabets may in fact be tracing a path that is perfectly smooth. The continuity, or lack of continuity, that underlies the text should as a rule be revealed, not concealed, in the cloth the typographer weaves.

An author who quotes Greek or Hebrew or Russian or Arabic fluently and gracefully in speech should be permitted to do likewise on the page. Practically speaking, this means that when the alphabets are mixed, they should be very closely balanced both in *color* and in *contrast.*



Victor Scholderer's New Hellenic paired with José Mendoza's Mendoza (above), with Peter Matthias Noordzij's Caecilia (center) and with Adobe Jenson (below). Mendoza is a face with very low contrast (the thicks and thins are nearly the same). New Hellenic and Caecilia have an unmodulated stroke – in other words, no contrast at all. New Hellenic and Adobe Jenson have stylistic compatibility of a different kind. Both stem from the work of Nicolas Jenson, who in 1469 cut the father of this roman and in 1471 the grandfather of this Greek.

Flow and *slope* are other factors to consider, especially when balancing Latin and Greek. Many Greek text faces (the Porson and Didot Greeks for example) are structurally comparable to italics. That is, they are cursive. Some of them are upright nonetheless (like the Didot), and some (like the Porson) slope. When roman, italic and Greek are combined on the page, the Greek may be upright like the roman, or it may harmonize with the italic in flow and slope. It may also stand aloof, with a gait and inclination of its own.

6.6.3 *Balance the type optically more than mathematically.*

Two other factors of importance when types sit side by side are their *torso* (x-height) and *extension*. When a long-limbed Greek is paired with a short-limbed Latin, the difference will stand out. Large disparities in x-height are far more obvious still. In metal, this is a harsh typographic constraint. In the digital medium, it is easy to match the torso of any Greek face to that of any Latin face exactly, through microscopic adjustments in size. But an optical, not mathematical, match is the goal. Classical Greek, beneath its cloud of diacritics, needs more room to breathe than roman type. And when setting Greek in footnotes, the minimum practical size is the size at which the accents are still legible.

7

Printing from movable type was first invented not in Germany in the 1450s, as Europeans often claim, but in China in the 1040s. In preference to Gutenberg, we should honor a scholarly engineer by the name of Bí Shēng (畢昇). The earliest surviving works printed in Asia from movable type seem to date from the thirteenth century, but there is a clear account of the typesetting process, and Bí Shēng's role in its development, by the eleventh-century essayist Shěn Kuò.

The new technology reached Korea before the middle of the thirteenth century and Europe by the middle of the fifteenth. There it intersected the already long and fertile history of the roman letter. And there typesetting flourished as it had failed to do in China, because of the far smaller number of glyphs European scripts required. Even at the end of the nineteenth century, most printing in China was done by the same method used in the eighth century to make the first printed books: entire pages of text were carved by hand into wooden printing plates. Corrections were made by drilling out the error, installing a wooden plug, and cutting the new characters. Text, in other words, was treated just like woodcut illustrations. To this day, a page of type is known in Chinese as *huóbǎn* (活板), "a living plank."

Shěn Kuò's account is contained in his *Mèngxi Bitán* (夢溪筆談), "Dream Creek Essays." For more information in English, see Denis Twitchett, *Printing and Publishing in Medieval China* (1983) and Thomas F. Carter, *The Invention of Printing in China and Its Spread Westward*, 2nd ed. (1955).

7.1 THE EARLY SCRIBAL FORMS

The earliest surviving European letterforms are Greek capitals scratched into stone. The strokes are bony and thin, almost ethereal – the opposite of the heavy substance they are carved in. The letters are made primarily from straight lines, and when curved forms appear, they have a very large *aperture*. This means that forms like S and C and M, which can be relatively open or relatively closed, are about as open as they can get. These early Greek letters were drawn freehand, not constructed with compasses and rule, and they have no serifs – neither the informal entry and exit strokes left by a relaxed and fluent writer, nor the symmetrical finishing strokes typically added to letters by a formal scribe.

In time, the strokes of these letters grew thicker, the aperture lessened, and serifs appeared. The new forms, used for inscriptions throughout the Greek empire, served as models for formal

lettering in imperial Rome. And those Roman inscriptional letters – written with a flat brush, held at an angle like a broadnib pen, then carved into the stone with mallet and chisel – have served in their turn as models for calligraphers and type designers for the past two thousand years. They have a modest aperture, a *modulated* stroke (a stroke whose thickness varies with direction), and they have lively but full and formal serifs.

The Early Scribal Forms

ABCSPQR

Trajan, designed by Carol Twombly in 1988, is based on the inscription at the base of Trajan's Column, Rome, carved in AD 113.

Between the Roman inscriptions and Gutenberg's time, there were many further changes in European letterforms. Narrow rustic capitals, wide uncials and other forms evolved. Writing spread to the farthest corners of Europe, and many regional scripts and alphabets arose. Monastic scribes – who were designers, copyists and archivists as well – kept many of the older letterforms alive. They used them for titles, subheads and initials, choosing newer and more compact scripts for running text. Out of this rich multiplicity of letters, a basic dichotomy evolved: *majuscules* and *minuscules*: large formal letters and smaller, more casual ones: the upper and lower case, as we call them now.

CAROLUS MAGNUS

Caroline or Carolingian means of the time of the Emperor Charlemagne: «Big Charles».

Carol Twombly's Charlemagne (above), Gudrun Zapf-von Hesse's Alcuin (center) and Gottfried Pott's Carolina (below) are typefaces based on Carolingian majuscules and minuscules from ninth- and tenth-century European manuscripts.

Many of the old scribal conventions survive in typesetting today. Titles are still set in large, formal letters; large initials mark the beginnings of chapters or sections; small capitals mark an opening phrase. The well-made page is now what it was then: a window into

history, language and the mind: a map of what is being said and a portrait of the voice that is silently speaking.

In the later Middle Ages and the early Renaissance, a well-trained European scribe might know eight or ten distinct styles of script. Each was defined as precisely as a typeface, stored like a font in the human memory, and each had certain uses. Sacred scriptures, legal documents, romance literature, business and personal letters all required different scripts, and particular forms evoked specific languages and regions.

Historical Interlude

When the technology of movable type arrived, Europe was rich with Gothic, Byzantine, Romanesque and humanistic hands, and with a wealth of older letters. They are all still with us in some way, but the humanistic hand, based on the Carolingian minuscule, has become the central form: the roman lower case, evolving into a thousand variations, sports and hybrids, like the willow or the rose.

7.2 THE TYPOGRAPHIC LATIN LETTER

Several systems are in use for classifying typefaces. Some of them use fabricated terms such as 'garalde' and 'didone.' Others rely on familiar but vague labels such as 'old style,' 'modern' and 'transitional.' All these systems work to a certain extent, but all leave much to be desired. They are neither good science nor good history.

Rigorously scientific descriptions and classifications of typefaces are certainly possible, and important research has been under way in this field for several years. Like the scientific study of plants and animals, the infant science of typology involves precise measurement, close analysis, and the careful use of technically descriptive terms.

But letterforms are not only objects of science. They also belong to the realm of art, and they participate in its history. They have changed over time just as music, painting and architecture have changed, and the same historical terms – Renaissance, Baroque, Neoclassical, Romantic, and so on – are useful in each of these fields.

The art history of Latin letterforms is treated in greater detail in an incomplete series of essays in *Serif* magazine, issues 1–5 (1994–97).

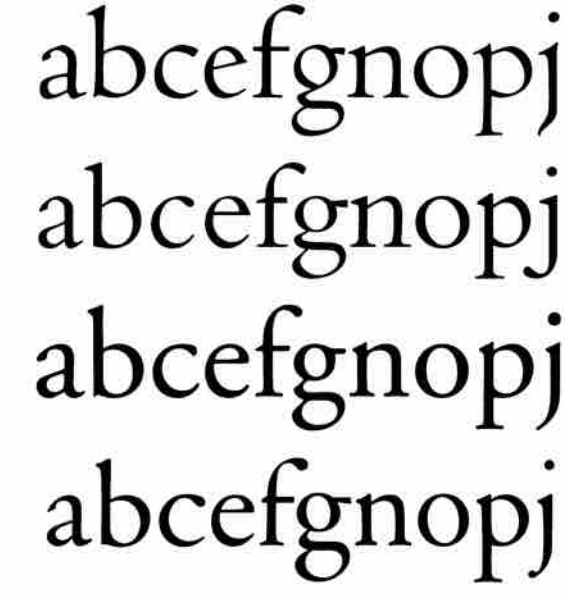
This approach to the classification of letterforms has another important advantage. Typography never occurs in isolation. Good typography demands not only a knowledge of type itself, but an understanding of the relationship between letterforms and the

other things that humans make and do. Typographic history is just that: the study of the relationships between type designs and the rest of human activity – politics, philosophy, the arts, and the history of ideas. It is a lifelong pursuit, but one that is informative and rewarding from the beginning.

The Typographic Latin Letter

7.2.1 *The Renaissance Roman Letter*

Renaissance roman letters developed among the scholars and scribes of northern Italy in the fourteenth and fifteenth centuries. Their translation from script to type began in Italy in 1465 and continued for more than a century. Like Renaissance painting and music, Renaissance letterforms are full of sensuous



Four twentieth-century reconstructions of Renaissance roman typefaces. Centaur (top) was designed by the American typographer Bruce Rogers, Boston, *c.* 1914, after Nicolas Jenson, Venice, 1469. Bembo (second) was cut by Monotype, London, in 1929, based on the design of Francesco Griffo, Venice, 1499. Adobe Garamond (third) was designed by Robert Slimbach, San Francisco, 1988, after Claude Garamond, Paris, *c.* 1540. DTL Van den Keere (bottom) is Frank Blokland's reconstruction of a font cut for Christophe Plantin by Hendrik van den Keere, Antwerp, in 1575.

and unhurried light and space. They have served as typographic benchmarks for five hundred years.

The earliest surviving roman punches or matrices may well be Garamond's, cut in Paris in the 1530s. For earlier type, we have no evidence beyond the printed books themselves. The basic structure and form of these early typefaces is clear beyond dispute, but in their subtlest details, all the existing replicas of fifteenth-century Italian type are hypothetical reconstructions.

Like Roman inscriptional capitals, Renaissance roman lowercase letters have a modulated stroke (the width varies with direction) and a *humanist* axis. This means that the letters have the form produced by a broadnib pen held in the right hand in a comfortable and relaxed writing position. The thick strokes run NW/SE, the axis of the writer's hand and forearm. The serifs are crisp, the stroke is light, and the contrast between thick strokes and thin strokes is generally modest.

In summary, the characteristics of the early Renaissance roman letter are these:

- *stems vertical*
- *bowls nearly circular*
- *modulated stroke*
- *consistent humanist axis*
- *modest contrast*
- *modest x-height*
- *crisp, oblique head serifs (on letters such as* b *and* r)
- *abrupt, flat or slightly splayed bilateral foot serifs (on letters such as* r, l *and* p)
- *abrupt, pen-formed terminals on* a, c, f *and* r
- *rising crossbar in* e, *perpendicular to the stroke axis*
- *the roman font is solitary (there is no italic or bold)*

In later Renaissance forms (from 1500 on), the letterforms grow softer, smoother and more self-contained in subtle ways:

- *head serifs become more wedge-shaped*
- *foot serifs become adnate (flowing smoothly into the stem) instead of abrupt*
- *terminals of* c, f *and* r *become less abrupt and more lachrymal (teardrop-shaped)*
- *crossbar of* e *becomes horizontal*

Rome is located in the midst of Italy. Why is roman type a category separate from italic? It seems a question to which typographers might possess the answer. But the question and the answer both have as much to do with politics and religion as with calligraphy and typography.

The Typographic Latin Letter

Roman type consists of two quite different basic parts. The upper case, which does indeed come from Rome, is based on Roman imperial inscriptions. The lower case was developed in northern Europe, chiefly in France and Germany, in the late Middle Ages, and given its final polish in Venice in the early Renaissance. Nevertheless, it too is Roman in the larger sense. While the roman upper case is a legacy of the Roman Empire, the lower case is a legacy of the Holy Roman Empire, the pagan empire's Christianized successor. It acquired its fundamental form at the hands of Christian scribes, many of them employed during the late eighth century as administrators and teachers by the Holy Roman Emperor Charlemagne.

Italic letterforms, on the other hand, are an Italian Renaissance creation. Some early italics come from Rome, others from elsewhere in Italy, and when they were first converted to type, italics were still full of local flavor and freshness. But the earliest italic fonts, cut between 1500 and 1540, consist of lower case only. They were used with upright roman caps but not in conjunction with the roman lower case.

abcefgnopxyz

abcefgnopxyz

Two revivals of Renaissance italic type. Monotype Arrighi (above) is derived from one of a series of italics designed by Frederic Warde, London and Paris, 1925–29, after Ludovico degli Arrighi, Rome, 1524. Monotype Bembo italic (below) was cut in London in 1929, based on the work of both Arrighi and Giovanantonio Tagliente, Venice, 1524.

The characteristics of the Renaissance italic letter can be summarized as follows:

- *stems vertical or of fairly even slope, not exceeding 10°*
- *bowls generally elliptical*
- *light, modulated stroke*
- *consistent humanist axis*
- *low contrast*
- *modest x-height*
- *cursive forms with crisp, oblique entry and exit serifs*
- *descenders serifed bilaterally or not at all*
- *terminals abrupt or lachrymal*
- *italic lower case paired with small, upright roman capitals, and with occasional swash capitals; italic otherwise fully independent of roman*

Early Renaissance italics are known as *Aldine* italics, in honor of the scholar and publisher Aldus Manutius, who commissioned the first italic type from Francesco Griffo in 1499. Strange to say, in 2004, not a single authentic reconstruction of an Aldine italic appears to be on the market, in either metal or digital form. Monotype Bembo roman and Monotype Poliphilus are both based on Griffo's work, but their companion italics are not; they come from a different age. The digital italic nearest to an Aldine in design is Giovanni Mardersteig's Dante italic, but even this has sloped instead of upright capitals.

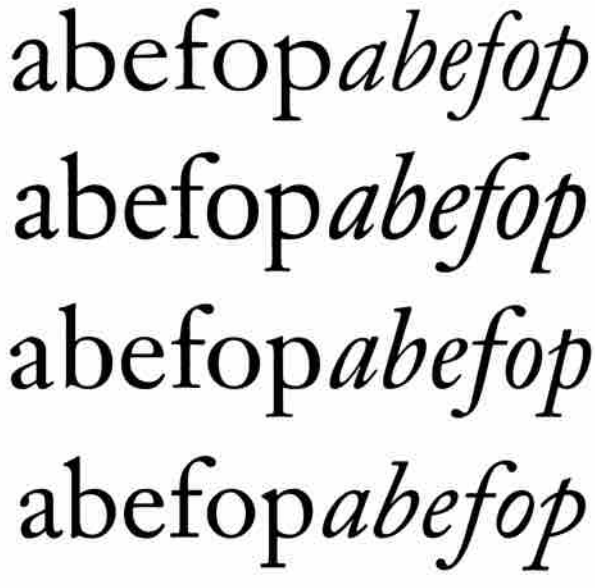
See page 210 for reproductions of two Aldine italics.

ae

Two recent typefaces in the Mannerist tradition. Poetica (above) is a chancery italic based on sixteenth-century models. It was designed by Robert Slimbach and issued by Adobe in 1992. Galliard (below), designed by Matthew Carter, was issued by Linotype in 1978. It is based on letterforms cut in the sixteenth century by Robert Granjon.

Mannerist art is Renaissance art to which subtle exaggerations – of length, angularity or tension, for example – have been added. Mannerist typographers, working chiefly in Italy and France early in the sixteenth century, began the practice of using roman and italic in the same book, and even on the same page – though rarely on the same line. It was also during the Mannerist period that sloped roman capitals were first added to the italic lower case.

There are many fine sixteenth-century examples of Mannerist typefaces, including roman titling fonts with long, delicate extenders, chancery italics with even longer and often ornamented extenders, and text faces with short extenders but increased tension in the forms. Digital interpretations of a number of these faces have recently been made. Two significant examples – one ornate and one restrained – are shown overleaf.



Four revivals of Baroque typefaces. Monotype 'Garamond' (top) is based on fonts cut in France by Jean Jannon, about 1621. DTL Elzevir (second) is based on fonts cut by Christoffel van Dijck at Amsterdam in the 1660s. Linotype Janson Text (third) is based on fonts cut by Miklós Kis, Amsterdam, about 1685. Adobe Caslon (bottom), by Carol Twombly, is based on faces cut by William Caslon, London, in the 1730s.

7.2.4 *The Baroque Letter*

Baroque typography, like Baroque painting and music, is rich with activity and takes delight in the restless and dramatic play of contradictory forms. One of the most obvious features of any Baroque typeface is the large *variation in axis* from one letter to the next. Baroque italics are *ambidextrous*: both right- and lefthanded. And it was during the Baroque that typographers first made a habit of mixing roman and italic *on the same line.*

In general, Baroque letterforms appear more modeled and less *written* than Renaissance forms. They give less evidence of the direct trace of the pen. Yet they take many different forms, and they thrived in Europe throughout the seventeenth century, endured through much of the eighteenth, and enjoyed an enthusiastic revival during the nineteenth.

Baroque letterforms generally differ from Renaissance letters in the following ways:

- *stroke axis of the roman and italic lower case varies widely within a single alphabet*
- *slope of italic averages 15° to 20° and often varies considerably within a single alphabet*
- *contrast increased*
- *x-height increased*
- *aperture generally reduced*
- *further softening of terminals from abrupt to lachrymal*
- *roman head serifs become sharp wedges*
- *head serifs of italic ascenders become level and sharp*

7.2.5 *The Rococo Letter*

The historical periods listed here – Renaissance, Baroque and so on – belong to all the arts, and they are naturally not limited, in typography, to roman and italic letters. Blackletter and script types passed through the same phases as well. But the Rococo period, with its love of florid ornament, belongs almost entirely to blackletters and scripts.

Roman and italic type was certainly used by Rococo typographers, who often surrounded their texts with typographic ornaments, engraved medallions, and so on. They produced a good deal of Rococo *typography*, but not much Rococo roman and italic *type*. Several romans and italics that might indeed be classified

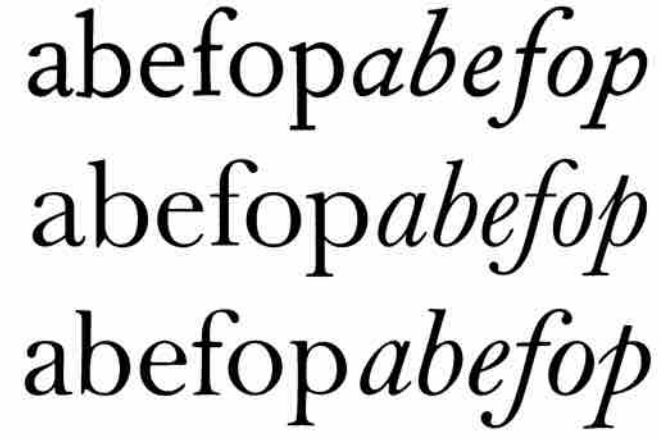
DTL Fleischmann. Note the ornate forms of *g*, *y* and several of the capitals, and the exaggerated contrast in italic *o*. This exaggerated contrast is typical of the Romantic types cut by Firmin Didot and Giambattista Bodoni after Fleischman's death in 1768. But Romantic types have an obsessively vertical axis. The primary axis of Fleischman's type is oblique. Structurally, these letters belong to the Baroque. But their tendency to ornamentation and exaggeration sets them apart from earlier Baroque types. That is a reason for calling them Rococo.

Though he was born and trained in Germany, Fleischman moved to the Netherlands before his 30th birthday and remained there the rest of his life. *Fleischmann* is the German spelling of his name; the Dutch form *Fleischman* is the one he chose to use in all his published specimens. The digital versions of Fleischman's type, published in the Netherlands, were created by the German type designer Erhard Kaiser, who christened them *Fleischmann*.

as Rococo were, however, cut in Amsterdam in 1738–39 by the German-born punchcutter Johann Michael Fleischman. Digital versions of these fonts have recently been released by the Dutch Type Library in 's-Hertogenbosch.

7.2.6 *The Neoclassical Letter*

Generally speaking, Neoclassical art is more static and restrained than either Renaissance or Baroque art, and far more interested in rigorous consistency. Neoclassical letterforms follow this pattern. In Neoclassical letters, an echo of the broadnib pen can still be seen, but it is rotated away from the natural writing angle to a strictly vertical or *rationalist* axis. The letters are moderate in contrast and aperture, but their axis is dictated by an idea, not by the truth of human anatomy. They are products of the Rationalist era: frequently beautiful, calm forms, but forms oblivious to the more complex beauty of organic fact. If Baroque letterforms are ambidextrous, Neoclassical letters are, in their quiet way, *neitherhanded*.



Three twentieth-century revivals of Neoclassical letterforms. *Above*: Monotype Fournier, which is based on types cut by Pierre Simon Fournier, Paris, about 1740. *Center*: Monotype Baskerville, which is based on the designs of John Baskerville, Birmingham, about 1754. *Below*: Monotype Bell, based on the types cut in London in 1788 by Richard Austin for the typefounder and publisher John Bell.

The first Neoclassical typeface, known as the *romain du roi* or King's Roman, was designed in France in the 1690s, not by a typographer but by a government committee consisting of two priests, an accountant and an engineer. Other Neoclassical faces were designed and cut in France, England, Italy and Spain during the eighteenth and nineteenth centuries, and some of them have remained in continuous use throughout all subsequent changes of style and fashion.

The American printer and statesman Benjamin Franklin deeply admired the Neoclassical type of his English contemporary John Baskerville, and it is partly due to Franklin's support that Baskerville's type became more important in the United States and France than it ever was in Baskerville's native land. But the connection between Baskerville and America rests on more than Benjamin Franklin's personal taste. Baskerville's letters correspond very closely to the federal style in American architecture. They are as purely and unperturbably Neoclassical as the Capitol Building, the White House, and many another federal and state edifice. (The Houses of Parliament in London and in Ottawa, which are Neogothic instead of Neoclassical, call for typography of a different kind.)

In brief, Neoclassical letterforms differ from Baroque letters as follows:

- *predominantly vertical axis in both roman and italic*
- *slope of italic generally uniform, averaging 14° to 16°*
- *serifs generally adnate, but thinner, flatter, more level*

7.2.7 *The Romantic Letter*

Neoclassicism and Romanticism are not sequential movements in European history. They marched through the eighteenth century and much of the nineteenth side by side: vigorously opposed in some respects and closely united in others. Both Neoclassical and Romantic letterforms adhere to a rationalist axis, and both look more drawn than written, but it is possible to make some precise distinctions between the two. The most obvious difference is one of contrast. In Romantic letters we will normally find the following:

- *abrupt modulation of the stroke*
- *vertical axis intensified through exaggerated contrast*
- *hardening of terminals from lachrymal to round*
- *serifs thinner and more abrupt*
- *aperture reduced*

This remarkable shift in type design – like *all* structural shifts in type design – is the record of an underlying change in handwriting. Romantic letters are forms from which the broadnib pen has vanished. In its place is the pointed and flexible quill. The broadnib pen produces a smoothly modulated stroke whose thickness varies with direction, but the pointed quill performs quite differently. The stroke of a flexible quill shifts suddenly from thin to thick to thin again, in response to changes in pressure. Used with restraint, it produces a Neoclassical flourish. Used with greater force, it produces a more dramatic and Romantic one. Dramatic contrast, which is essential to much Romantic music and painting, is essential to Romantic type design as well.

Romantic letters can be extraordinarily beautiful, but they lack the flowing and steady rhythm of Renaissance forms. It is that rhythm which invites the reader to enter the text and read. The statuesque forms of Romantic letters invite the reader to stand outside and *look* at the letters instead.

Four revivals of Romantic letterforms. Monotype Bulmer (top) is based on a series of fonts William Martin cut in London in the early 1790s. Linotype Didot (second), drawn by Adrian Frutiger, is based on fonts Firmin Didot cut in Paris between 1799 and 1811. Bauer Bodoni (third) is based on fonts cut by Giambattista Bodoni at Parma between 1803 and 1812. Berthold Walbaum (bottom) is based on types cut by Justus Erich Walbaum, Weimar, about 1805.

7.2.8 *The Realist Letter*

The nineteenth and twentieth centuries have entertained a bewildering variety of artistic movements and schools – Realism, Naturalism, Impressionism, Expressionism, Art Nouveau, Art Deco, Constructivism, Cubism, Abstract Expressionism, Pop Art, Op Art, and many more. Virtually all of these movements have raised waves in the typographic world as well, though not all are important enough to merit a place in this brief survey. One of these movements – one which has not by any means yet expired – is typographic Realism.

The Realist painters of the nineteenth century – Gustave Courbet, François Millet and many others – turned their backs on the subjects and poses approved by the academy. They set out instead to paint ordinary people doing their ordinary tasks. Realist type designers – Alexander Phemister, Robert Besley

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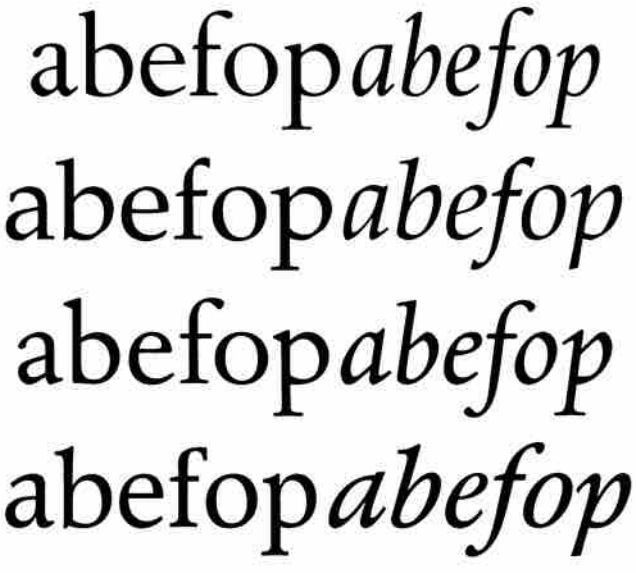
Akzidenz Grotesk (above) is a Realist typeface issued by the Berthold Foundry, Berlin, in 1898. It is the immediate ancestor of Morris Benton's Franklin Gothic (1903) and of Helvetica, issued by the Haas Foundry in 1952. Haas Clarendon (below), designed in 1951 by Hermann Eidenbenz, is a revival of an earlier Realist face, the first Clarendon, cut by Benjamin Fox for Robert Besley, London, 1845.

and others, who have not achieved the posthumous fame of the painters – worked in a similar spirit. They made blunt and simple letters, based on the script of people denied the opportunity to learn to read and write with fluency and poise. Realist letters very often have the same basic shape as Neoclassical and Romantic letters, but most of them have heavy, slab serifs or no serifs at all. The stroke is often uniform in weight, and the aperture (often a gauge of grace or good fortune in typefaces) is tiny. Small caps, text figures and other signs of sophistication and elegance are almost always missing.

7.2.9 *Geometric Modernism: The Distillation of Function*

Early modernism took many intriguing typographic forms. One of the most obvious is geometric. The sparest, most rigorous architecture of the early twentieth century has its counterpart in the equally geometric typefaces designed at the same time, often by the same people. These typefaces, like their Realist predecessors, make no distinction between main stroke and serif. Their serifs are equal in weight with the main strokes or are missing altogether. But most Geometric Modernist faces seek purity more than populism. Some show the study of archaic inscriptions, and some include text figures and other subtleties, but their shapes owe more to pure mathematical forms – the circle and the line – than to scribal letters.

Two Geometric Modernist typefaces. Futura (above) was designed in Germany in 1924–26 by Paul Renner. Memphis (below) was designed in 1929 by Rudolf Wolf, art director at the Stempel Foundry. The original design for Futura included text figures and many highly geometric, alternative characters which have never been issued in metal, though The Foundry (London) issued them in digital form in 1994.



Four neohumanist or Lyrical Modernist typefaces. Spectrum (top) was designed by Jan van Krimpen in the Netherlands during the 1940s and issued by both Enschedé and Monotype in 1952. Palatino (second) was designed by Hermann Zapf, Frankfurt, 1948. Dante (third) was designed by Giovanni Mardersteig, Verona, 1952. Pontifex (bottom) was designed by Friedrich Poppl, Wiesbaden, 1974. All but the last were originally cut by hand in steel, just like Renaissance faces.

7.2.10 *Lyrical Modernism: The Rediscovery of Humanist Form*

The Typographic Latin Letter

Another major phase of modernism in type design is closely allied with abstract expressionist painting. Painters in the twentieth century rediscovered the physical and sensory pleasures of painting as an act, and the pleasures of making organic instead of mechanical forms. Designers of type during those years were equally busy rediscovering the pleasures of *writing* letterforms rather than drawing them. In rediscovering calligraphy, they rediscovered the broadnib pen, the humanist axis and humanist scale of Renaissance letters. Typographic modernism is fundamentally the reassertion of Renaissance form. There is no hard line between modernist design and Renaissance revival.

7.2.11 *The Expressionist Letter*

In yet another of its aspects, typographic modernism is rough and concrete more than lyrical and abstract. Rudolf Koch, Vojtěch Preissig and Oldřich Menhart are three designers who explored this path in the early part of the twentieth century. They are in some respect the typographic counterparts of expressionist painters such as Vincent van Gogh and Oskar Kokoschka. More recent painters and type designers, such as Zuzana Ličko, have proven that the genre is still richly productive.

Expressionist designers use many different tools. Koch and Preissig often cut their own letters in metal or wood. Menhart worked with a pen and rough paper. Ličko has exploited the

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Two Expressionist types – one Modernist and one Postmodern. Preissig (above) was designed in New York in 1924 by the Czech artist Vojtěch Preissig. It was cut and cast in Prague in 1925. Zuzana Ličko's Journal (below) was designed in Berkeley in 1990 and issued in digital form by Emigre.

harsh economies of digital plotting routines, slicing from control point to control point not with a knife, file or chisel but with digitized straight lines.

7.2.12 *Elegiac Postmodernism*

Historical Interlude

Modernism in type design has its roots in the study of history, the facts of human anatomy, and in the pleasures of calligraphy. Like the Renaissance itself, modernism is more than a phase or fad that simply runs its course and expires. It remains very much alive in the arts generally and in type design in particular, though it no longer seems the final word. In the last decades of the twentieth century, critics of architecture, literature and music – along with others who study human affairs – all perceived movements away from modernism. Lacking any proper name of their own, these movements have come to be called by the single term postmodernism. And postmodernism is as evident in the world of type design as it is in other fields.

Postmodern letterforms, like Postmodern buildings, frequently recycle and revise Neoclassical, Romantic and other premodern forms. At their best, they do so with an engaging lightness of touch and a fine sense of humor. Postmodern art is for the most part highly self-conscious, but devoutly unserious. Postmodern designers – who frequently are or have been Modernist designers as well – have proven that it is possible to infuse Neoclassical and Romantic form, and the rationalist axis, with genuine calligraphic energy.

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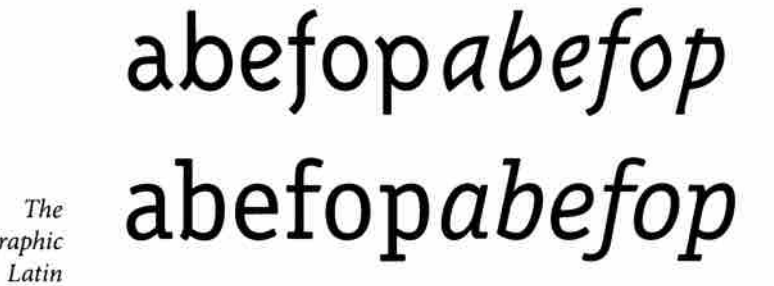
abefop*abefop*

Two Postmodern faces. Esprit (above) was designed by Jovica Veljović, Beograd, 1985. Nofret (below) was designed by Gudrun Zapf-von Hesse, Darmstadt, 1990. Both types sing, where many Postmodern faces merely screech. But the song is elegiac more than lyrical.



Two Geometric Postmodern faces: Triplex Sans (above) and Officina Serif (below). Triplex italic was designed by John Downer in 1985. Its companion romans – one with serifs, one without – were designed by Zuzana Ličko in 1989–90, and the full *ménage à trois* was issued in 1990 by Emigre. Officina (ITC, 1990) was designed by Erik Spiekermann. It has been issued in both serifed and unserifed versions.

7.2.13 *Geometric Postmodernism*

Some Postmodern faces are highly geometric. Like their predecessors the Geometric Modernist faces, they are usually slab-serifed or unserifed, but often they exist in both varieties at once or are hybrids of the two. They are rarely, it seems, based on the pure and simple line and circle, but almost always on more mannered, often asymmetric forms. And like other Postmodern types, they are rich with nostalgia for something premodern. Many of these faces are indebted to older industrial letterforms, including typewriter faces and the ubiquitous factory folk-art of North American highway signs. They recycle and revise not Romantic and Neoclassical but Realist ideas. To this industrial unpretentiousness, however, they often add not only Postmodern humor but also the fruits of typographic sophistication: text figures, small caps, large aperture, and subtle modeling and balancing of forms.

Postmodern art, like Neoclassical art, is above all an art of the surface: an art of reflections rather than visions. It has thrived in the depthless world of high-speed offset printing and digital design, where modernism starves. But the world of the scribes, in which the craft of type design is rooted, was a depthless world too. It was the world of the Gothic painters, in which everything is present in one plane. In that respect at least, postmodernism and modernism alike confront the basic task with which typography began. That is the task of answering in two (or little more than two) dimensions to a world that has many.

7.3 MECHANICAL TYPESETTING

7.3.1 *The Linotype Machine*

The Linotype machine, invented in the 1880s by Ottmar Mergenthaler and much modified over the years, is a kind of cross between a casting machine, a typewriter, a vending machine and a backhoe. It consists of a series of slides, belts, wheels, lifts, vises, plungers and screws, controlled from a large mechanical keyboard. Its complex mechanism composes a line of matrices, justifies the line by sliding tapered wedges into the spaces between the words, then casts the entire line as a single metal slug for letterpress printing.

For a detailed account of the growth of mechanized typesetting, see Richard E. Huss, *The Development of Printers' Mechanical Typesetting Methods 1822–1925* (1973).

Typeface design for the Linotype was restricted by three basic factors. First, kerning is impossible without special compound matrices. (The basic italic *f* in a Linotype font therefore always has a stunted head and tail.) Second, the em is divided into only 18 units, which discourages subtlety of proportion. Third, the italic and roman matrices are usually paired. In most faces, each italic letter must therefore have the same width as its counterpart in roman.

A number of typefaces designed for the Linotype were artistically successful in spite of these constraints. Hermann Zapf's Aldus and Optima, Rudolph Růžička's Fairfield, Sem Hartz's Juliana, and W. A. Dwiggins's Electra, Caledonia and Falcon were all designed for the Linotype machine. Linotype Janson, adapted by Zapf in 1952 from the seventeenth-century originals of Miklós Kis, is another eminent success. Many Linotype faces have nevertheless been modified in the course of digitization, to make use of the kerning capabilities of digital machines and restore the independent proportioning of roman and italic.

7.3.2 *The Monotype Machine*

In 1887, in competition with Mergenthaler, Tolbert Lanston created a machine that stamped individual letters in cold metal and assembled them into lines. This device was soon abandoned for another – built in 1900 by Lanston's colleague John Bancroft – that cast individual letters from molten metal rather than cold-stamping them. It was soon sold worldwide as the Monotype machine. It is two machines in fact, a terminal and an output device, and in this respect resembles most computer-driven

typesetting machines. But the Monotype terminal carries a large mechanical keyboard, including seven full alphabets as well as analphabetics. The keyboard punches holes in a paper tape, like a narrow player-piano roll, by driving pins with compressed air. The output device is the caster, which reads the paper tape by blowing more compressed air through the punched holes, then casts and assembles the letters.

Mechanical Typesetting

The Monotype em, like the Linotype em, is divided into only 18 units, but italic and roman are independent in width, kerning is possible, and because the type remains in the form of separate letters, typeset lines can be further adjusted by hand. Characters larger than 24 pt are cast individually and left for hand assembly. In fact, the Monotype machine is a portable typefoundry as much as it is a composing machine – and it is increasingly used as such, even though its unit system imposes restrictions on letterform design, and it is incapable of casting in hard metal.

7.3.3 *Two-Dimensional Printing*

From the middle of the fifteenth century to the middle of the twentieth, most roman letters were printed by a technique rooted in sculpture. In this process, each letter is carved at actual size on the end of a steel punch. The punch is then struck into a matrix of softer metal, the matrix is fitted into a mold, and three-dimensional metal type is cast from an alloy of lead, tin and antimony. The cast letters are locked in a frame and placed in a printing press, where they are inked. Their image is then imprinted *into* the paper, producing a tactile and visual image. The color and sheen of the ink join with the smooth texture of crushed paper, recessed into the whiter and rougher fibers surrounding the letters and lines. A book produced by this means is a folding inscription, a flexible sculpture in low relief. The black light of the text *shines out from within* a well-printed letterpress page.

Renaissance typographers reveled in the physical depth and texture they could achieve by this method of printing. Neoclassical and Romantic printers, like Baskerville, often took a different view. Baskerville printed his sheets by letterpress – since he had no other method – but then had them ironed like laundry to remove the sculptural tinge.

With the development of lithography, at the end of the eighteenth century, printing moved another step back toward the two-dimensional world of the medieval scribes. Since the

middle of the twentieth century, most commercial printing has been by two-dimensional means. The normal method is offset photolithography, in which a photographic or digital image is etched into a plate, inked, *offset* to a smooth intermediary blanket, then laid flat on the surface of the page.

In the early days of commercial offset printing, type was still set with Linotype or Monotype machines. Proofs were pulled in a letterpress, then cut, pasted and photographed. Type designers saw their work altered by this process. Most letters designed to be printed in three dimensions look weaker when printed in two. But other letters prospered: geometric letters, which evoked the world of the draftsman rather than the goldsmith, and flowing letters recalling the heritage of the scribe.

Historical Interlude

7.3.4 *Phototype Machines*

Light flashes through the image of a letter carried on glass or photographic film; the size of the letter is altered with a lens; its target location is fixed by a mirror, and it is exposed like any other photographic image onto photosensitive paper or film. Machines that operate on this principle are the natural children of the camera and the offset press. They were designed and patented in the 1890s and in regular use for setting titles and headlines by 1925, though it was not until the 1960s that they came to dominate the trade.

Just as the sophistication and subtlety of handset type seemed at first to be swept aside when composing machines appeared, so the sophistication slowly achieved with Linotype and Monotype machines seemed to be swept aside by this new technological wave. The photosetters were fast, but they knew nothing of subtle changes in proportion from size to size. Their fonts lacked ligatures, text figures and small caps. American-made fonts lacked even the simplest accented characters. The choice of faces was poor. And with the sudden, widespread use of these complex but simplistic machines came the final collapse of the old craft system of apprenticeships and guilds.

Phototypesetting machines and their users had only begun to answer these complaints when digital equipment arrived to replace them. Some excellent faces were designed for phototype machines – from Adrian Frutiger's Apollo (1962) to Bram de Does's Trinité (1982) – but in retrospect, the era of phototype seems only a brief interregnum between hot metal and digital

composition. The important innovation of the period was not, after all, the conversion of fonts from metal to film, but the introduction of microcomputers to edit, compose and correct the text and to drive the last generations of photosetting machines.

7.3.5 *Historical Recutting and Twentieth-Century Design*

Mechanical Typesetting

New typefaces have been designed in vast numbers in the past hundred years, and many old ones have been resuscitated. From 1960 to 1980, most new types and revivals were designed for photosetting, and since 1980, almost all have been planned for digital composition. But most of the older faces now sold in digital form have already passed through another stylistic filter. They were recut in the early twentieth century, either as foundry type or as matrices for the Monotype or Linotype machines. Typography was radically reformed between 1920 and 1950, through the commercial reinvention of typographic history. It is worth looking back at this process to see something of what went on, because its legacy affects us still.

Two separate companies – one based in England, one in America – rose up around the Monotype machine and followed two quite separate development programs. The English company, advised during its heyday by a scholar named Stanley Morison, cut a series of facsimiles based on the work of Francesco Griffo, Giovanantonio Tagliente, Ludovico degli Arrighi and other early designers. It was Morison who conceived the idea of turning independent Renaissance faces into families by mating one designer's roman with another's formerly self-sufficient italic. The fruits of this enterprise included Poliphilus and Blado (one of Griffo's romans mated with an altered version of one of Arrighi's italics), Bembo (a later version of the same roman, paired with an altered version of one of Tagliente's italics), and the brilliantly successful shotgun marriage of Centaur roman (designed by Bruce Rogers) with the Arrighi italic (designed by Frederic Warde). This program was supplemented by commissioning new faces from artists such as Eric Gill, Alfred Fairbank, Jan van Krimpen and Berthold Wolpe.

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Lanston Monotype, as the American company was called, made some historical recuttings of its own and issued many new and historically based faces designed by its own advisor, Frederic Goudy. A third campaign to recreate typographic history in

marketable form was mounted by Linotype, under the direction of the English master printer George William Jones.

Several of the larger typefoundries – including ATF (American Type Founders) in the United States, Deberny & Peignot in France, Enschedé in the Netherlands, Stempel in Germany and Grafotechna in Czechoslovakia – continued ambitious programs of their own, lasting in some cases into the 1980s. Revivals of faces by Claude Garamond, Miklós Kis and other early designers came from these foundries during the twentieth century, along with important new faces by such designers as Hermann Zapf, Jan van Krimpen, Adrian Frutiger, Oldřich Menhart and Hans Eduard Meier. Zapf's Palatino, which became the most widely used (and most widely pirated) face of the twentieth century, was cut by hand in steel and cast as a foundry type in the ancient way, in 1949–50, while phototype machines and a few cumbersome early computers were humming no great distance away.

The earlier history of type design is the history of forms made by individual artists and artisans who began their careers as apprentices and ended them as independent masters and small businessmen. The scale of the industry enlarged in the seventeenth and eighteenth centuries, and questions of fashion increasingly superseded questions of artistry. By the end of the nineteenth century, commercial considerations had changed the methods as well as the taste of the trade. Punches and matrices were increasingly cut by machine from large pattern letters, and calligraphic models were all but unknown.

The twentieth-century rediscovery of the history and principles of typographic form was not associated with any particular technology. It occurred among scholars and artists who brought their discoveries to fruition wherever they found employment: in typefoundries, typesetting-machine companies, art schools and their own small, independent studios.

Despite commercial pressures, the best of the old metal foundries, like the best of the new digital ones, were more than merely market-driven factories. They were cultural institutions, on a par with fine publishing houses and the ateliers of printmakers, potters, weavers and instrument makers. What made them so was the stature of the type designers, living and dead, whose work they produced – for type designers are, at their best, the Stradivarii of literature: not merely makers of salable products, but artists who design and make the instruments that other artists use.

7.3.6 *Digital Typography*

It is much too soon to summarize the history of digital typography, but the evolution of computerized bitmapping, hinting and scaling techniques has proceeded very quickly since the development of the microchip at the beginning of the 1970s. At the same time, the old technologies, freed from commercial duties, have by no means died. Foundry type, the Monotype, the Linotype and letterpress remain important artistic instruments, alongside brush and chisel, pencil, graver and pen.

Mechanical Typesetting

Typographic style is founded not on any one technology of typesetting or printing, but on the primitive yet subtle craft of writing. Letters derive their form from the motions of the human hand, restrained and amplified by a tool. That tool may be as complex as a digitizing tablet or a specially programmed keyboard, or as simple as a sharpened stick. Meaning resides, in either case, in the firmness and grace of the gesture itself, not in the tool with which it is made.

7.4 THE PLURALITY OF TYPOGRAPHIC HISTORY

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Every alphabet is a culture. Every culture has its own version of history and its own accumulation of tradition – and this chapter has dwelt on the recent history of one alphabet only. The Arabic, Armenian, Burmese, Cherokee, Cree, Cyrillic, Devanagari, Georgian, Greek, Gujarati, Hebrew, Japanese, Korean, Malayalam, Tamil and Telugu alphabets and syllabaries – to name only a few – have other histories of their own, in some cases every bit as intricate and long as – or longer than – the history of Latin letterforms. So, of course, has the logographic script of Chinese. These histories have touched at certain points; at other points, they diverge. Here at the beginning of the twenty-first century, an unusual degree of convergence can be seen. But the challenge and excitement of multilingual typography still lies largely in the fact that different typographic histories momentarily share the page. Typographers working with multiple alphabets are multiply blessed: with a chance to learn the cultural history as well as the typographic technicalities of every script concerned.

The histories of Greek and Cyrillic types are taken up more briefly in chapter 11, and the legacies of individual typefoundries are summarized briefly in appendix E, page 346.

8

A book is a flexible mirror of the mind and the body. Its overall size and proportions, the color and texture of the paper, the sound it makes as the pages turn, and the smell of the paper, adhesive and ink, all blend with the size and form and placement of the type to reveal a little about the world in which it was made. If the book appears to be only a paper machine, produced at their own convenience by other machines, only machines will want to read it.

8.1 ORGANIC, MECHANICAL & MUSICAL PROPORTION

A page, like a building or a room, can be of any size and proportion, but some are distinctly more pleasing than others, and some have quite specific connotations. A brochure that unfolds and refolds in the hand is intrinsically different from a formal letter that lies motionless and flat, or a handwritten note that folds into quarters and comes in an envelope of a different shape and size. All of these are different again from a book, in which the pages flow sequentially in pairs.

Much typography is based, for the sake of convenience, on standard industrial paper sizes, from 35 × 45 inch press sheets to 3½ × 2 inch conventional business cards. Some formats, such as the booklets that accompany compact discs, are condemned to especially rigid restrictions of size. But many typographic projects begin with the opportunity and necessity of selecting the dimensions of the page.

There is rarely a free choice. A page size of 12 × 19 inches, for example, is likely to be both inconvenient and expensive because it is just in excess of 11 × 17, which is a standard industrial unit. And a brochure that is 5 × 9 inches, no matter how handsome, might be unacceptable because it is too wide to fit into a standard business envelope (4×9½). But when the realm of practicality has been established, and it is known that the page must fall within certain limits, how is one to choose? By taking whatever is easiest, or biggest, or whatever is the most convenient standard size? By trusting to blind instinct?

Instinct, in matters such as these, is largely memory in disguise. It works quite well when it is trained, and poorly otherwise.

But in a craft like typography, no matter how perfectly honed one's instincts are, it is useful to be able to calculate answers exactly. History, natural science, geometry and mathematics are all relevant to typography in this regard – and can all be counted on for aid.

Organic, Mechanical and Musical Proportion

Scribes and typographers, like architects, have been shaping visual spaces for thousands of years. Certain proportions keep recurring in their work because they please the eye and the mind, just as certain sizes keep recurring because they are comfortable to the hand. Many of these proportions are inherent in simple geometric figures – equilateral triangle, square, regular pentagon, hexagon and octagon. And these proportions not only seem to please human beings in many different centuries and countries, they are also prominent in nature far beyond the human realm. They occur in the structures of molecules, mineral crystals, soap bubbles, flowers, as well as books and temples, manuscripts and mosques.

Two very useful works on natural form and structure are D'Arcy Thompson, *On Growth and Form* (rev. ed., 1942) and Peter S. Stevens, *Patterns in Nature* (1974). An equally important book on structures made by humans is Dorothy Washburn & Donald Crowe, *Symmetries of Culture: Theory and Practice of Plane Pattern Analysis* (1988)

The tables on pages 148–149 list a number of page proportions derivable from simple geometric figures. These proportions occur repeatedly in nature, and pages that embody them recur in manuscripts and books from Renaissance Europe, Táng and Sòng dynasty China, early Egypt, precolumbian Mexico and ancient Rome. It seems that the beauty of these proportions is more than a matter of regional taste or immediate fashion. They are therefore useful for two purposes. Working and playing with them is a way of developing good typographic instincts, and they serve as useful references in analyzing old designs and calculating new ones.

For comparison, several other proportions are included in the tables. There are several simple numerical ratios, several standard industrial sizes, and several proportions involving four irrational numbers important in the analysis of natural structures and processes. These numbers are $\pi = 3.14159\ldots$, which is the circumference of a circle whose diameter is one; $\sqrt{2} = 1.41421\ldots$, which is the diagonal of a unit square; $e = 2.71828\ldots$, which is the base of the natural logarithms; and $\varphi = 1.61803\ldots$, a number discussed in greater detail on page 155. Certain of these proportions reappear in the structure of the human body; others appear in musical scales. Indeed, one of the simplest of all systems of page proportions is based on the familiar intervals of the diatonic scale. Pages that embody these basic musical proportions have been in common use in Europe for more than a thousand years.

Sizing and spacing type, like composing and performing music or applying paint to canvas, is largely concerned with intervals and differences. As the texture builds, precise relationships and very small discrepancies are easily perceived. Establishing the overall dimensions of the page is more a matter of limits and sums. In this realm, it is usually sufficient, and often it is better, if structural harmony is not so much enforced as implied. That is one of the reasons typographers tend to fall in love with books. The pages flex and turn; their proportions ebb and flow against the underlying form. But the harmony of that underlying form is no less important, and no less easy to perceive, than the harmony of the letterforms themselves.

Shaping the Page

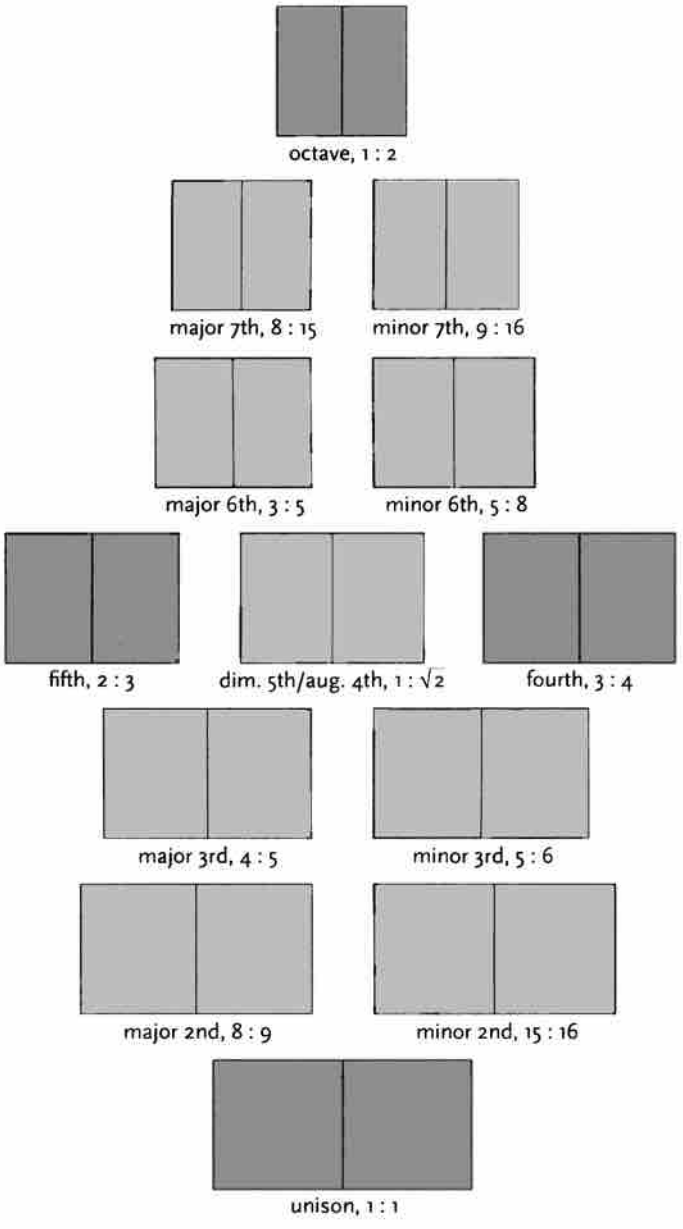
The page is a piece of paper. It is also a visible and tangible proportion, silently sounding the thoroughbass of the book. On it lies the textblock, which must answer to the page. The two together – page and textblock – produce an antiphonal geometry. That geometry alone can bond the reader to the book. Or conversely, it can put the reader to sleep, or put the reader's nerves on edge, or drive the reader away.

The textblock is known in Chinese as *yèxin* (頁心), a useful phrase. *Yè* means *page*; *xin* means *heart* and *mind*.

Arithmetic and mathematics also drive away some readers, and this is a chapter peppered with both. Readers may well ask whether all this is necessary, merely in order to choose where some letters should sit on a piece of paper and where the paper itself should be trimmed. The answer, naturally, is no. It is not in the least necessary to understand the mathematics in order to perform the actions that the math describes. People walk and ride bicycles without mathematical analyses of these complex operations. The chambered nautilus and the snail construct perfect logarithmic spirals without any need of logarithmic tables, sliderules or the theory of infinite series. The typographer likewise can construct beautiful pages without knowing the meaning of symbols like π or φ, and indeed without ever learning to add and subtract, if he has a well-educated eye and knows which buttons to push on the calculator and keyboard.

The mathematics are not here to impose drudgery upon anyone. On the contrary, they are here entirely for pleasure. They are here for the pleasure of those who like to examine what they are doing, or what they might do or have already done, perhaps in the hope of doing it still better. Those who prefer to act directly at all times, and to leave the analysis to others, may be content in this chapter to study the pictures and skim the text.

Chromatic Scale of Page Proportions



Page proportions corresponding to the chromatic scale, from unison (at the bottom) to octave (at the top). The musical correlations are shown in detail on the facing page.

The Golden Section

THIS PARAGRAPH, for example, is indented according to the golden section. The indent is to the remainder of the line as that remainder is to the full text measure. Here the measure is 21 picas, and the indent is 38.2% of that, which is to say 8 picas.

The amount of *sinkage* (the extra white space allowed at the top of the page) is 7 lines (here equal to 7 picas). Add the extra pica of white space created by the indent itself, and you have an imaginary 8-pica square of empty space in the upper left corner of the textblock.

The size of the elevated cap is related in turn to the size of the indent and the sinkage. Eight picas is 96 pt, and 61.8% of that is 59.3 pt. But the relationship between 59 or 60 pt type and an 8-pica indent would be difficult to perceive, because a 60 pt letter is not visibly 60 pt high. The initial used has an actual 60 pt cap height instead. Depending on the face, such a letter could be anywhere from 72 to 100 pt nominal size; here it is 84 pt Castellar.

8.3 PROPORTIONS OF THE EMPTY PAGE

8.3.1 *Choose inherently satisfying page proportions in preference to stock sizes or arbitrary shapes.*

The proportions of a page are like an interval in music. In a given context, some are consonant, others dissonant. Some are familiar; some are also inescapable, because of their presence in the structures of the natural as well as the man-made world. Some proportions also seem particularly linked to living things. It is true that wastage is often increased when an 8½ × 11 inch page is trimmed to 7¾ × 11 or 6¾ × 11, or when a 6 × 9 book page is narrowed to 5⅝ × 9. But an organic page looks and feels different from a mechanical page, and the shape of the page itself will provoke certain responses and expectations in the reader, independently of whatever text it contains.

8.4.1 *If the text is meant to invite continuous reading, set it in columns that are clearly taller than wide.*

Shaping the Page

Horizontal motion predominates in alphabetic writing, and for beginners, it predominates in reading. But vertical motion predominates in reading for those who have really acquired the skill. The tall column of type is a symbol of fluency, a sign that the typographer does not expect the reader to have to puzzle out the words.

The very long and very narrow columns of newspapers and magazines, however, have come to suggest disposable prose and quick, unthoughtful reading. A little more width not only gives the text more presence; it implies that it might be worth savoring, quoting and reading again.

8.4.2 *Shape the textblock so that it balances and contrasts with the shape of the overall page.*

The proportions that are useful for the shapes of pages are equally useful in shaping the textblock. This is not to say that the proportions of the textblock and the page should be the same. They often were the same in medieval books. In the Renaissance, many typographers preferred a more polyphonic page, in which the proportions of page and textblock differ. But it is pointless for them to differ unless, like intervals in music, they differ to a clear and purposeful degree.

For all the beauty of pure geometry, a perfectly square block of type on a perfectly square page with even margins all around is a form unlikely to encourage reading. Reading, like walking, involves navigation – and the square block of type on a square block of paper is short of basic landmarks and clues. To give the reader a sense of direction, and the page a sense of liveliness and poise, it is necessary to break this inexorable sameness and find a new balance of another kind. Some space must be narrow so that other space may be wide, and some space emptied so that other space may be filled.

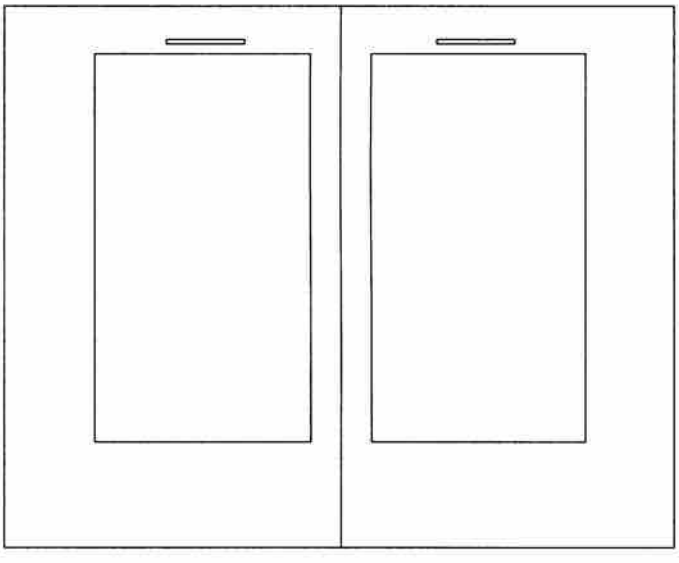
In the simple format shown overleaf, a page whose proportions are 1 : 1.62 (the golden section) carries a textblock whose proportions are 1 : 1.8 [5 : 9]. This difference constitutes a primary visual chord which generates both energy and harmony in the

page. It is supplemented by secondary harmonies created by the proportions of the margins and the placement of the textblock – not in the center of the page but high and toward the spine.

The Textblock

The textblock itself, in this example, is symmetrical, but it is placed asymmetrically on the page. The lefthand page is a mirror image of the right, but no mirror image runs the other way. The two-page spread is symmetrical horizontally – the direction in which the pages turn, either backward or forward, as the reader consults the book – but it is asymmetrical vertically – the direction in which the page stays put while the reader's eye repeatedly works its way in one direction: down.

This interlocking relationship of symmetry and asymmetry, and of balanced and contrasted shape and size, was not new when this example was designed (in Venice in 1501). The first European typographers inherited some two thousand years' worth of research into these principles from their predecessors, the scribes. Yet the principles are flexible enough that countless new typographic pages and page-spreads wait to be designed.



Page spread, probably by Francesco Griffo, Venice, 1501. The text is Virgil's *Aeneid*, set entirely in a crisp, simple italic lower case, 12/12 × 16, with roman small capitals, approximately 5 pt high. The original page size is 10.7 × 17.3 cm.

8.5 MARGINS & SATELLITES

8.5.1 *Bring the margins into the design.*

In typography, margins must do three things. They must *lock the textblock to the page* and *lock the facing pages to each other* through the force of their proportions. Second, they must *frame the textblock* in a manner that suits its design. Third, they must *protect the textblock*, leaving it easy for the reader to see and convenient to handle. (That is, they must leave room for the reader's thumbs.) The third of these is easy, and the second is not difficult. The first is like choosing type: it is an endless opportunity for typographic play and a serious test of skill.

Shaping the Page

Perhaps fifty per cent of the character and integrity of a printed page lies in its letterforms. Much of the other fifty per cent resides in its margins.

8.5.2 *Bring the design into the margins.*

The boundaries of the textblock are rarely absolute. They are nibbled and punctured by paragraph indents, blank lines between sections, gutters between columns, and the sinkage of chapter openings. They are overrun by hanging numbers, outdented paragraphs or heads, marginal bullets, folios (page numbers) and often running heads, marginal notes and other typographic satellites. These features – whether recurrent, like folios, or unpredictable, like marginal notes and numbers – should be designed to give vitality to the page and further bind the page and the textblock.

8.5.3 *Mark the reader's way.*

Folios are useful in most documents longer than two pages. They can be anywhere on the page that is graphically pleasing and easy to find, but in practice this reduces to few possibilities: (**1**) at the head of the page, aligned with the outside edge of the textblock (a common place for folios accompanied by running heads); (**2**) at the foot of the page, aligned with or slightly indented from the outside edge of the text; (**3**) in the upper quarter of the outside margin, beyond the outside edge of the text; (**4**) at the foot of the page, horizontally centered beneath the textblock.

The fourth of these choices offers Neoclassical poise but is not the best for quick navigation. Folios near the upper or lower outside

corner are the easiest to find by flipping pages in a small book. In large books and magazines, the bottom outside corner is generally more convenient for joint assaults by eye and thumb. Folios placed on the inner margin are rarely worth considering. They are invisible when needed and all too visible otherwise.

Margins and Satellites

It is usual to set folios in the text size and to position them near the textblock. Unless they are very black, brightly colored or large, the folios usually drown when they get very far away from the text. Strengthened enough to survive on their own, they are likely to prove a distraction.

8.5.4 *Don't restate the obvious.*

In Bibles and other large works, running heads have been standard equipment for two thousand years. Photocopying machines, which can easily separate a chapter or a page from the rest of a book or journal, have also given running heads (and running feet, or footers) new importance.

Except as insurance against photocopying pirates, running heads are nevertheless pointless in many books and documents with a strong authorial voice or a unified subject. They remain essential in most anthologies and works of reference, large or small.

Like folios, running heads pose an interesting typographic problem. They are useless if the reader has to hunt for them, so they must somehow be distinguished from the text, yet they have no independent value and must not become a distraction. It has been a common typographic practice since 1501 to set them in spaced small caps of the text size, or if the budget permits, to print them in the text face in a second color.

8.6 PAGE GRIDS & MODULAR SCALES

8.6.1 *Use a modular scale if you need one to subdivide the page.*

Grids are often used in magazine design and in other situations where unpredictable graphic elements must be combined in a rapid and orderly way.

Modular scales serve much the same purpose as grids, but they are more flexible. A modular scale, like a musical scale, is a prearranged set of harmonious proportions. In essence, it is a measuring stick whose units are *indivisible* (or are treated as

adjust the margins thereafter – paying more attention in the latter case to absolute proportion than to convenient units of measurement. When space is measured purely in points, the temptation to rearrange it into even picas is miraculously lessened.

Improvisations and Adjustments

8.8.3 *Keep the page design supple enough to provide a livable home for the text.*

Architects build perfectly proportioned kitchens, living rooms and bedrooms in which their clients will make, among other things, a mess. Typographers likewise build perfectly proportioned pages, then distort them on demand. The text takes precedence over the purity of the design, and the typographic texture of the text takes precedence over the absolute proportions of the individual page.

If, for instance, three lines remain at the end of a chapter, looking forlorn on a page of their own, the design must flex to accommodate them. The obvious choices are: (1) running two of the previous spreads a line long (that is, adding one line to the depth of two pairs of facing pages), which will leave the final page one line short; (2) running half a dozen of the previous spreads a line short, thereby bumping a dozen lines along to the final page; or (3) reproportioning some non-textual element – perhaps an illustration or the sinkage, if any, at the head of the chapter.

Spacious chapter heads stand out in a book, as they are meant to. Reproportioning the sinkage is therefore a poor option unless all chapter heads can be reproportioned to match. And running six spreads short is, on the face of it, clearly a greater evil than running two spreads long.

If there are only a few pages to the document, the whole thing can, and probably should, be redesigned to fit the text. But in a book of many pages, widow lines, orphaned subheads, and the runt ends of chapters or sections are certain to require reproportioning some spreads. A rigid design that demands an invariant page depth is therefore inappropriate for a work of any length. Altering the leading on short pages to preserve a standard depth (vertical justification, it is sometimes called) is not a solution. Neither is stuffing extra space between the paragraphs. These antics destroy the fabric of the text and thus strike at the heart of the book.

There is, of course, no limit to the number of typographic characters. Still less is there a limit to the number of variant glyphs by which these characters are realized. This appendix lists characters included on standard ISO (PS-1, TrueType or OpenType) and pan-European (TTO or OpenType) Latin text fonts. It also lists a few additional characters of long-standing typographic importance. Unicode numbers are given in square brackets at the end of each entry. Some characters (especially diacritics) have more than one address in Unicode. As a rule, only one of these addresses is given here. Two addresses are given for characters (such as *aesc*) that occur in both the upper and lower case.

acute An accent used on vowels – á é í ó ú ý ǽ – in Czech, French, Gaelic, Hungarian, Icelandic, Italian, Navajo, Spanish and other languages, and on consonants – ć ń ŕ ś ź – in Basque, Croatian, Polish and romanized Sanskrit. In romanized Chinese it is used with vowels and a nasal – á é í ń ó ú ű – to mark the rising tone. It is also used with Cyrillic consonants – ѓ and ќ – in Macedonian, and with all the vowels in Greek. Upper- and lowercase versions of the basic six acute vowels appear on standard ISO Latin text fonts. Pan-European fonts usually include both upper- and lowercase forms of the basic five acute consonants and the old Icelandic vowel *ǽ*. The acute schwa (ɔ́) and open O (ɔ́) and the Athapaskan high nasal vowels – ą́ ę́ į́ ǫ́ ų́ – are present only on specialized fonts. [U+0301]

á

aesc This ligature is a letter of the alphabet in Danish, Norwegian, Anglo-Saxon and Old Norse, corresponding in part to the Swedish *ä*. It is also sometimes used (unnecessarily) in Latin. In English, words of Greek origin were formerly spelled with æ corresponding to Greek αι (alpha iota). Thus *aesthetics* in older texts is *æsthetics*. Deliberate archaism and pedantically correct quotation still, therefore, require the ligature even in English. *Aesc* (*æsc* in the older spelling) is pronounced *ash*. [U+00C6, +00E6]

æ *æ*

Æ

ampersand A scribal abbreviation for *and*, dating back to Roman times. It takes many forms – *e&* *&* *&* *&* &c – all derived from the Latin word *et*. [U+0026]

&

⟨a⟩

angle brackets These useful characters are missing from most text fonts, but they are readily found on pi fonts and on some fonts of blackletter and Greek. They serve many functions in mathematical and scientific writing. In the editing of classical texts, angle brackets are used to mark editorial *additions* while *braces* mark the editor's *deletions.* See also *square brackets.* [U+2329, +232A]

’a

apostrophe Also called *raised comma* or *single close-quote.* A mark of elision in English, French, Italian and many other languages. It grew from that use in English to become also a sign of the possessive. (*It's* = *it is,* but *John's* = *Johnes* = belonging to John.) A superimposed apostrophe (not to be confused with the *acute*) is the standard symbol in linguistics for a glottalized consonant: ṁ ṗ q̇ ẇ, etc. As a matter of convenience, these symbols are often converted to consonants *followed* by normal apostrophes: m' p' q', etc. Apostrophized consonants of this sort are frequent in typography. The apostrophized *d* and *t* (d' and t', whose capital forms are D' and T') are letters of the alphabet in Czech; so are ľ and Ľ in Slovak, while ch', k', <u>k</u>', l', s', t', tl', ts', x', <u>x</u>' and their corresponding capitals (written with apostrophes, not carons) are letters of the alphabet in Tlingit. Used alone, the apostrophe often serves as a sign for the glottal stop. In Unicode, these functions are carefully distinguished. See also *dumb quotes, glottal stop, palatal hook* and *quotation marks.* [U+02BC, +0313, +0315, +2019]

a͡

arch A diacritic used with vowels and one syllabic consonant – a͡ e͡ i͡ o͡ u͡ r͡ (and the corresponding Cyrillic letters, а͡ е͡ и͡ о͡ у͡ р͡) – to mark the long falling tone in Serbo-Croatian. Though not employed in ordinary writing, these forms are used in teaching, in linguistics, and in some editions of metrical poetry. Few text fonts include either the arch or the composite glyphs in which it is used. Not to be confused with the circumflex, which is pointed. Also known as a *dome* or *inverted breve.* It has also been called a *cap,* which leads to confusion. [U+0311]

± =
< + >
× ÷

arithmetical signs Only eight basic signs, + − ± × ÷ < = >, are included in most text fonts. When other mathematical symbols, such as ≠ ≈ ∇ ≡ √ ≤ ≥, are required, it is generally best to take all signs, including the basic ones, from the same technical font so that all forms match in color and size. [U+002B, +2212, +00B1, +00D7, 00F7, 003C, 003D, 003E, &c.]

asterisk This is usually a superscript, used primarily for marking referents and keywords. In European typography, it is widely used to mark a person's year of birth (as the dagger, substituting for a cross, is used to mark the year of death). In philology and other sciences, it is used to mark hypothetically reconstructed or fetal forms. The asterisk takes many forms (* ✱ ✧ ✶ * ⋆, for example). It appears in the earliest Sumerian pictographic writing and has been in continuous use as a graphic symbol for at least 5,000 years. [U+002A]

a*

at A commercial symbol meaning *at* or *at the rate of*. Electronic mail has given it new life, and it is now therefore occasionally well designed. Still, it has no role in normal text. [U+0340]

@

backslash This is an unsolicited gift of the computer keyboard. Basic though it may be to elementary computer operations, it has no accepted function in typography. [U+005C]

\

bar The vertical bar is used in mathematics as a sign of absolute value, in prosodical studies to mark a caesura, and in propositional calculus (where it is called *Sheffer's stroke*) as a sign of nonconjunction. In bibliographical work, both single and double bars are used. Also called *caesura*. [U+007C]

|

barred H A letter of the Maltese alphabet (and of the IPA), corresponding to Arabic ح (*ḥ*). Its Maltese name is *h maqtugha*, "cut h." It is found on pan-European fonts. [U+0126, +0127]

ħ Ħ

barred L This is a basic letter of the alphabet in Chipewyan, Navajo, Polish, and many other languages. Henryk Mikołaj Górecki's Symphony Nº 3, for example, is entitled *Symfonia Pieśni Żałosnych*, "Symphony of Sorrowful Songs." Also known by its Polish name, *ew*. The barred L is present on most Latin text fonts but often inaccessible to narrow-minded software. [U+0141, +0142]

ł Ł

barred T A letter of the Northern Saami alphabet, representing a sound like *th* in English *thing* [IPA θ]. It is normally included on pan-European Latin text fonts. [U+0166, +0167]

ŧ Ŧ

braces Braces are rarely required in text work, but they can function perfectly well as an extra and outer (or inner) set of parentheses: { ([–]) }. In mathematics they are used to mark

{a}

phrases and sets. In editing classical papyri, braces are often used to mark editorial deletions. [U+007B, +007D]

brackets See *angle brackets* and *square brackets.*

breve An accent used on vowels and consonants – ă ĕ ĭ ğ ŏ ŭ – in Malay, Romanian, Turkish, Vietnamese, and in some forms of romanized Korean. In English, it is used in informal phonetic transcriptions to mark lax (or so-called 'short') vowels. In writings on metrics and prosody, it is the sign of a quantitatively short vowel or syllable. It is also used on the Russian *i* (й, whose cursive form is *ŭ*) and on a second vowel, ў, in Belarusian and Uzbek. The breve is always rounded, and should not be confused with the angular caron. (*Breve* is two syllables, with the stress on the first, as in *brave, eh?*) Also called *short.* [U+0306]

bullet A large version of the midpoint, used chiefly as a typographic flag. Bullets are commonly hung, like numbers, in the margin to mark items in a list, or centered on the measure to separate larger blocks of text. See also *midpoint.* [U+2022]

caron An inverted circumflex. It is used on consonants and vowels – č ě ň ř š ž – in Croatian, Czech, Lithuanian, Northern Saami, Slovak, Slovene, Sorbian and other scripts. In romanized Thai, the caron indicates a rising tone. In romanized Chinese, it marks the retroflexive third tone (falling/rising tone) of standard Mandarin: ǎ ě ǐ ǐ ǒ ǔ ǔ. It is also used in new scripts for sevferal Native American languages. For no good reason, most ISO fonts include a prefabricated upper- and lowercase š and ž, while other combinations must be built with the floating accent. Pan-European fonts contain a larger but still incomplete set of caroned letters, usually č ě ň ř š ž and Č Ď Ě Ň Ř Š Ť Ž. Also called a *wedge* or a *háček* (*hah-check*), which is its Czech name. In Czech, however, this character is actually a variant of the *palatal hook,* which can take the form of caron or apostrophe. [U+030C]

cedilla A diacritic used with consonants, such as the ç in Catalan, French, Nahuatl and Portuguese, and ç and ş in Turkish. In Latvian and Romanian, the *undercomma* is preferred. Not to be confused with the *ogonek* or nasal hook, which curves the other way and is used with vowels. The name means *little z.* Turkish ş and Ş are missing from standard ISO text fonts. [U+0327]

circumflex A diacritic used on vowels – â ê î ô û ŵ ŷ – in Cree, French, Portuguese, Romanian, Vietnamese, Welsh and many other languages. In transliterated texts (e.g., from Arabic, Greek, Hebrew and Sanskrit), it is sometimes used as a substitute for the macron, to mark long vowels. In romanized Thai, a circumflex signifies a falling tone. Most Latin text fonts include all the circumflected vowels except Welsh ŵ and ŷ. [U+0302]

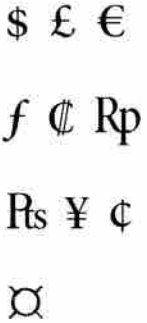
colon A grammatical marker inherited from the medieval European scribes. It is also used in mathematics to indicate ratios and in linguistics as a mark of prolongation. The name is from Greek. In classical rhetoric and prosody, a *colon* (plural, *cola*) is a long clause, and a *comma* is a short one. [U+003A]

comma A grammatical marker, descended from early scribal practice. In German, and often in East European languages, the comma is used as an open quote. Throughout Europe, it is also used as a decimal point, where most North Americans expect a period. In North American usage, the comma separates thousands, while a space is preferred in Europe. Thus 10,000,000 = 10 000 000, but a number such as 10,001 is typographically ambiguous. It could mean either ten and one one-thousandth or ten thousand and one. See also *quotation marks.* [U+002C]

copyright On poorly designed fonts, the copyright symbol sometimes appears as a superscript, but its rightful place in typography is on the baseline: ©. [U+00A9]

curl See *hoi.*

currency symbols Most ISO character sets of recent vintage include six genuine currency signs – $ £ € ƒ ¥ ¢ – and one imaginary sign, ¤. That so-called 'general currency sign,' the *louse*, has no typographic function. It merely holds a place on the font to which a real symbol for local currency (rupee, cruzeiro, peseta, etc) can be assigned. The cent sign (¢), now an American typographical heirloom, is equally irrelevant for most work. It remains in the character set chiefly out of nostalgia.



The dollar sign, a slashed S, is descended from an old symbol for the shilling. The same sign has come to be used for currencies with many other names: sol, peso, escudo, yuan, etc. The sign of the pound sterling, a crossed cursive L, actually stands

for the Latin *libra* (also the source of the abbreviation *lb*, used for the pound avoirdupois). This £ sign is now used not only for British currency but for the pound, lira or livre of many African and Middle Eastern states. The sign for Dutch guilders is *ƒ*, for *florin*, which is the old name for the currency. This *ƒ* is often cut shorter and wider than the normal italic lowercase *f*. The sign for the shekel (Hebrew *sheqel*), the Israeli currency unit, is ₪. See also *louse*. [U+0024, +00A2, +00A3, +00A5, +0192, +20AC, &c.]

dagger A reference mark, used chiefly with footnotes. In European typography, it is also a sign of mortality, used to mark the year of death or the names of deceased persons, and in lexicography to mark obsolete forms. In editing classical texts, daggers are used to flag passages judged to be corrupt. Also called *obelisk, obelus* or *long cross*. [U+2020]

dashes Latin text fonts include, at minimum, an em dash, en dash and hyphen. A figure dash and three-quarter em dash are sometimes included as well, and a three-to-em dash more rarely. [U+2013, +2014, &c.]

degree Used in mathematics and in normal text to give temperatures, inclinations, latitudes, longitudes and compass bearings. Not to be confused with the *superior o* or *ordinal o* used in abbreviations such as N°, nor with the *ring*, a diacritic. [U+00B0]

diaeresis / umlaut A diacritic used with vowels – ä ë ï ö ü ẅ ÿ – in many languages, including Albanian, Dinka, Estonian, Finnish, German, Swedish, Turkish, Welsh, and less frequently also in English, Greek, Spanish, Portuguese and French. Linguists distinguish between the *umlaut*, which marks a *change* in pronunciation of a single vowel (as in the German *Schön*) and the *diaeresis*, which marks the *separation* of adjacent vowels (as in naïve and Noël). The typographic symbol is the same, but in reference to English and the Romance languages, the correct term is usually diaeresis, while umlaut is correct in reference to most other languages in which the symbol is used. Except for the Welsh ẅ and African ë and ɔ̈, the umlauted or diaeretic vowels are present on most Latin text fonts. Also called *tréma*, its French name.

In Hungarian there are two forms of umlaut: the double dot, which is used for short vowels, and the *double acute* or *long umlaut*, used for long vowels (ű is the long form of ü).

The letter *ÿ* is a vowel sometimes used in archaic French and still required in the modern form of a few personal names and place names. It is also an alternate form of the *ij* ligature in Flemish. [U+0308]

diesis An alternate name for the *double dagger*.

dimension sign An unserifed x, usually square, also known as a multiplication sign. See *arithmetical signs*. [U+00D7]

dotless i and **dotted I** These are both letters of the alphabet in Turkish, where the lowercase form of I is ı and the uppercase form of i is İ. The dotless form signifies a back vowel (IPA ɯ), the dotted one a front vowel (IPA i, as in English *liter*. [U+0130, +0131]

dome See *arch*.

double acute A diacritic used on two Hungarian vowels: ő and ű. Also called *long umlaut*. The name 'Hungarian umlaut' (used in PostScript jargon) is unhelpful, since the short umlauted vowels ö and ü also appear in Hungarian. Not to be confused with the double prime nor with the close quote. [U+030B]

double bar This is a standard symbol in bibliographical work and an old standard reference mark in European typography. It is missing from most text fonts but is easily made by kerning two single bars together. [U+2016]

double dagger A reference mark for footnoting. Also called *diesis* or *double obelisk*. [U+2021]

double grave A Serbo-Croatian diacritic used, like the arch, with five vowels and one syllabic consonant: ä ë ï ö ü r̈ (and in Cyrillic, ӓ ӗ ӣ ӧ ӱ p̈). This is a prosodic sign, to indicate the short falling tone. Though not employed in ordinary writing, the double grave is used in teaching, in linguistics, and in editions of metrical poetry. It is rarely found on text fonts. [U+030F]

double prime An abbreviation for inches (1″ = 2.54 cm) and for seconds of arc (360″ = 1°). Not to be confused with quotation marks, the double acute, nor with dumb quotes. Prime and double prime are rarely found on text fonts. See also *prime*. [U+2033]

a ∧ b

dumb caret Also known, in vain, as the *ascii circumflex.* This is a stray, like the backslash and dumb quotes, ossified into the standard ASCII keyboard. The true circumflex (ˆ) is a different and genuine character. So is the *logical and* (∧, the sign of logical conjunction). Since it has no typographic function, the dumb caret also has no typographic form. In other words, this is not really a character at all. It is a wasted slot on the keyboard, waiting for something else to take up residence. [U+005E]

" ' a ' a "

dumb quotes These are refugees from the typewriter keyboard. Typesetting software interprets quotation-mark keystrokes in context, converting the dumb quotes to smart quotes (never infallibly). Yet the dumb quotes are still there, taking space on the font. They have no typographic function. See also *double prime, quotation marks* and *prime.* [U+0022, +0027]

đ Đ

dyet A basic letter of the alphabet in Serbo-Croatian (where it has the sound of IPA d͡ʒ) and Vietnamese (where it is now IPA d and used to be ɗ). The uppercase form of the letter is, as a rule, graphically the same as the uppercase *eth,* but it is notionally different. It therefore has a different Unicode address. [U+0110, +0111]

. . .

ellipsis The sign of elision and of rhetorical pause: three dots. [U+2026]

ŋ Ŋ

eng A letter of the alphabet in Northern Saami and in many African languages. Lowercase eng is also used in linguistics and lexicography to represent the *ng* sound in the word *wing.* (Note the different sounds represented by the same letters in the words *wing, Wingate, singlet* and *singe*: ŋ, n-g, ŋg, ndʒ.) The eng is found on pan-European and pan-African fonts. [U+014A, +014B]

ß ß

eszett The *ss* ligature, *long s* + *short s* (ſ + s). It was once essential for setting English and is still essential for German. Not to be confused with the Greek beta, β. Also known as *sharp s.* Note that *not all instances* of *ss* in German turn to ß. [U+00DF]

ð Ð

eth A letter of the alphabet in Anglo-Saxon, Faroese, Icelandic, and in IPA. The uppercase eth is the same as the uppercase *dyet,* but the lowercase forms are not interchangeable, and the letters represent quite different sounds. (The name *eth,* also spelled *edh,* is pronounced like the *eth* in *whether.*) [U+00D0, +00F0]

ethel A ligature formerly used in English and still essential for setting French. English words and names derived from Greek were formerly spelled with the ethel (or *æthel*) corresponding to the Greek οι (omicron iota). Thus the old form of *ecumenical* is *œcumenical* (from οἶκος, Greek for 'house') and the Greek name Οἰδίπους (Oidípous), Latinized as Oedipus, was formerly written Œdipus. The ligature is required, therefore, for deliberate archaism and for academically correct quotation from older English sources, as well as for spelling French terms such as *hors d'œuvre*. In IPA, œ, Œ and ɞ are three different letters. [U+0152, +0153]

œ Œ

ew See *barred* L.

exclamation In Spanish, the inverted exclamation mark is used at the beginning of the phrase and the upright mark at the end. In mathematics, the upright exclamation mark is the symbol for factorials ($4! = 4 \times 3 \times 2 \times 1$). It is also often used to represent the palatal clicks of the Khoisan languages of Africa. Thus, for example, the name !Kung. British printers often call the exclamation mark a *screamer*. [U+0021, +00A1]

¡a!

ezh This is an altered form of z, generally representing a sound like that of *z* in English *azure* or *j* in French *justice*, which is the sound of Czech ž or Polish ż. Ezh is a letter of the alphabet in Skolt, a language of the Saami family, spoken in northern Russia and Finland. The lowercase form is also part of the IPA and therefore present on any font of phonetic characters. Not to be confused with *yogh*. [U+01B7, +0292]

ʒ

figures A text font normally includes at least one set of figures, which usually ought to be (and usually are not) text figures (OSF). Supporting fonts and OpenType fonts often include three further sets: titling (i.e., lining) figures, superiors and inferiors. The superiors are used for exponents, superscripts and the numerators of fractions, the inferiors for the denominators of fractions. For chemical formulae (H_2O etc) and mathematical subscripts, lowered inferior figures are needed. [U+0030—0039; +00B2, +00B3, +00B9, +2070, +2074—2079; +2080—2089]

1 2 3

4 5

fist The typographer's fist is neither a blunt instrument nor a closed purse. It is a silent, pointing hand. All too often, however, it is overdressed, with ruffles at the cuff. A Baroque invention, the

fist is missing from the standard ISO character set and must be found on a supplementary font. [U+261A—261F]

fractions Three fractions – ¼ ½ ¾ – appear on most ISO text fonts, and six more – ⅛ ⅓ ⅜ ⅝ ⅔ ⅞ – on some pan-European fonts. [U+00BC—00BE; +2153—215E]

½ ⅔

glottal stop The glottal stop is a sound in search of a character: a basic sound in many languages now written in Latin letters, but one for which the Latin, Greek and Cyrillic alphabets have no traditional symbol. Linguists use the character ʔ or ˀ – a gelded question mark – to represent this sound, but the symbol most commonly used in setting texts is the apostrophe. In romanized Arabic the inverted comma or open quote (‘) is often used to represent the letter *'ain* (ع), whose phonetic symbol is ʕ or ˁ, and the apostrophe (') is used to represent *hamza* (ء, ʾ, ˌ, etc), the Arabic glottal stop. Thus, the Koran in romanized Arabic is *al-Qur'ān*; Arab is *'arab*; the family is *al-'ā'ila*. Also known by its Spanish name, *saltillo,* "little leap." See also *apostrophe, inverted comma* and *quotation marks.* [U+0294, +02BC, +02C0]

a ʔ a

لا ع

grave An accent used with vowels – à è ì ò ù ỳ – in French, Italian, Portuguese, Catalan, Vietnamese and many other languages. In romanized Chinese it is used with vowels – à è ì ò ù ǜ – to mark the falling tone. In Gaelic the grave is normally used instead of the macron to mark elongated vowels. The basic five grave vowels are present on most Latin text fonts. [U+0300]

à

guillemets Single and double guillemets are widely used as quotation marks with the Latin, Cyrillic and Greek alphabets in Europe, Asia and Africa. Attempts to introduce them into North America have met with only slight success. In French and Italian, the guillemets almost always point out, «thus» and ‹thus›, but in German they more frequently point in, »so« and ›so‹. Single guillemets should not be confused with angle brackets nor with the arithmetical operators meaning greater-than and less-than.

‹ é ›

» › ä ‹ «

« é »

Guillemet means Little Willy, in honor of the sixteenth-century French typecutter Guillaume [William] Le Bé, who may have invented them. Also called *chevrons, duck feet* and *angle quotes.* [U+00AB, +00BB, +2039, +203A]

háček See *caron* and *palatal hook.*

hedera An ivy leaf: a type of fleuron. (*Hedera* is the Latin name for ivy.) This is one of the oldest of all typographic ornaments, present in early Greek inscriptions. [U+2619, +2766, +2767]

hoi This is one of the five tonemarks used with vowels in the Vietnamese alphabet. It resembles a small dotless question mark and signifies the dipping-rising tone. The spelling in Vietnamese is, naturally, *hỏi* – and the name in Vietnamese does mean "question." In English it is also called a *curl*. [U+0309]

horned o A letter of the Vietnamese alphabet, representing a close mid-back unrounded vowel (an unrounded *o*, the IPA ɤ). [U+01A0, +01A1]

horned u A letter of the Vietnamese alphabet, representing a close back unrounded vowel (IPA ɯ). [U+01AF, +01B0]

hyphen The shortest of the dashes. [U+002D]

inverted breve See *arch.*

inverted comma Also called a single open-quote, and used for that purpose in English, Spanish and many other languages. In transliterated Arabic and Hebrew, it also represents the letter *'ain* (ع) or *ayin* (ע), a pharyngeal continuant (IPA ʕ), while its opposite, the apostrophe, represents the glottal stop. Thus: King Ibn Sa'ūd; the Beqa'a Valley. Only the well-curved form of the glyph (' instead of ') is useful in transliteration. See also *glottal stop, quotation marks, reversed apostrophe.* [U+2018]

kropka See *overdot.*

kroužek See *ring.*

letters At least three varieties of letters appear in an ordinary font of Latin type. There is normally a full alphabet in both upper and lower case and a partial alphabet of superior letters. The latter are used in numerical abbreviations such as 1st, 2nd, 3rd, the French 1e (*premier, première*) and the Spanish 2ª, 2º (*segunda, segundo*). They are also used in a few verbal abbreviations, such as 4º = quarto; 8º = octavo; Mr = mister; Nº = number, but in English most such forms are now archaic. The basic ISO alphabet includes

only two superior letters, the *ordinal a* and *ordinal o*, which are essential for setting text in Romance languages. (They are called ordinals because they are used for ordinal numbers: first, second, third....) A fuller set – conventionally limited to ᵃ ᵇ ᵈ ᵉ ⁱ ˡ ᵐ ⁿ ᵒ ʳ ˢ ᵗ – is often to be found on an 'expert' or OpenType font.

OpenType fonts routinely include small caps in addition to u&lc and superior letters. Full pan-European fonts also include a complete set of Cyrillic and Greek characters. Some fonts include swashes and quaints such as the *long s* (ſ) and its ligatures.

Note that the identity of the letters varies from language to language. The digraph *ch*, for example, is regarded as a single letter in Czech, Lithuanian and Spanish; *ll* is treated as a single letter in Spanish and Basque; *dd, ff, ng, ll, ph, rh, th* are all treated as single letters in Welsh; and in Serbo-Croatian the digraphs *dz, lj, nj* are regarded as single letters (corresponding to Cyrillic џ, љ and њ). [U+0041—005A; +0061—007A; +00C0—00D6; +00D8—00F6; +00F8—00FF, &c.]

ligatures Basic ISO fonts are limited to two typographic ligatures, *fi* and *fl*. Rigid definitions of the glyph set, leaving no provision for additional ligatures (such as *ff, ffi, ffl, fj*) are a hazard to typography. Ligatures required by the design of the individual typeface should always reside on the basic font.

The *lexical* ligatures *æ, Æ, œ, Œ* and *ß* are bonafide Unicode characters, separately listed in this appendix. *Typographic* ligatures such as *fi* and *ſt* are glyphs, not characters; they are now consigned to the 'private use' section of Unicode.

logical not See *negation*.

long s This taller form of *s* looks like *f* without its crossbar. (Note however that the roman form usually *does* have a spur on the left.) Long s was commonly used in English (uſed in Engliſh, *uſed in Engliſh*, USED IN ENGLISH) through the end of the eighteenth century. It was then the normal form of *s* in initial and medial positions. Short *s* was used at the ends of words and (usually) as the second *s* in a pair. Long s + short s forms the ligature ß, still used in German. Long s itself is still routinely used in blackletter though archaic in roman and italic. It often entails a substantial further set of ligatures – e.g., ſb ſh ſi ſk ſl ſſ ſſi ſſl. [U+017F]

long umlaut See *double acute*.

louse From *Filzlaus*, "pubic louse," a German name for the currency symbol placeholder (¤). Also known in English as a *sputnik*. Since the symbol is parasitic (it takes up space on the font but offers nothing in return), *louse* may be the better name. Having no true function, it has no authentic form. [U+00A4]

lowline This is a standard ISO character, positioned as a baseline rule. Not to be confused with the *underscore*. [U+005F]

macron A diacritic used to mark long vowels – ā ē ī ō ū – in many languages: Fijian, Hausa, Latvian and Lithuanian, among others. It marks long vowels in romanized Arabic, Greek, Hebrew, Japanese, Sanskrit and other languages, and level tones in romanized Chinese. Some writers of Lakhota (Sioux) also use it to write de-aspirated consonants (c̄ k̄ p̄ t̄). [U+0304]

midpoint An ancient European mark of punctuation, widely used in typography to flag items in a vertical list and to separate items in a horizontal line. A closely spaced midpoint is also often used to separate syllables or letters, especially in Catalan when one *l* adjoins another. (In Catalan as in Spanish, *ll* is treated as a single letter. When one *l* is adjacent to but separate from another, they are written *l·l*. Examples: the Catalan words *cel·les* [cells], *col·lecció* [collection] and *paral·lel*.) The same sign is used in mathematics for scalar multiplication and in symbolic logic for logical conjunction. Also called *interpoint*. [U+00B7]

(Upper- and lowercase *L* + *midpoint* [L & l·] are needlessly treated by ISO, and therefore by Unicode, as single characters: U+013F & +0140.)

mu The Greek lowercase *m* represents the prefix *micro-* = 10^{-6}. Thus milligrams is written *mg* and micrograms *μg*. (A millionth of a meter or *micron*, formerly written *μ*, is now ordinarily written *μm*.) [U+03BC]

musical signs Three elementary musical symbols – ♭ ♯ ♮, the flat, sharp and natural – are needed for setting normal texts that make reference to standard European musical pitches and keys (Beethoven's Sonata Op. 110 in A♭, Ennemond Gaultier's Suite for Lute in F♯m, the drop from C♯ to C♮, etc). These characters are, however, missing from most text fonts. (The octothorp is not an adequate substitute for the sharp.) [U+266D—266F]

nang See *underdot.*

nasal hook See *ogonek.*

negation The negation sign used in the propositional calculus (symbolic logic) was formerly the swung dash (~). Since the swung dash is also used as a sign of similarity, this created confusion. The usual form of the negation sign now is the angled dash (¬). This is part of the standard ISO Latin character set and is included on most digital text fonts, even though it is useless without the other logical operators, such as ∪ ∩ ∧ ∨ ≡, which are almost never found on text fonts. Also called *logical not.* [U+00AC]

¬ b

null Also known as a slashed or crossed zero. This glyph is used to distinguish zero from the letters *O* and *o*. But the null in its usual form is easily confused with *slashed o* (ø, ø), a letter of the alphabet in Danish and Norwegian, and even with the Greek letter phi (φ, ϕ). The crossed form of the null, ⊖, is also confusible with theta (θ). A null glyph is present on some text fonts and on many phonetic and technical fonts. (As an alternate form of zero, this glyph has no address of its own in Unicode.)

Ø

numeral sign See *octothorp.*

obelisk Also *obelus* (plural, *obeli*). Synonym for *dagger.*

octothorp Otherwise known as the numeral sign. It has also been used as a symbol for the pound avoirdupois, but this usage is now archaic. In cartography, it is a traditional symbol for *village*: eight fields around a central square. That is the source of its name. *Octothorp* means eight fields. [U+0023]

#36

ogonek A diacritic used with vowels – ą ę į ǫ ų – in Lithuanian, Navajo, Polish and other languages. Also called a *nasal hook.* Not to be confused with the cedilla, which is used with consonants and curves the other way. *Ogonek* is a Polish diminutive, meaning 'little tail.' It is also the Polish name for the stem of an apple. Vowels with ogonek are known as *tailed vowels.* A *reversed ogonek* is used in the Bashkir consonant ҙ. [U+0328]

ą

ordinal a, ordinal o See *letters.*

overdot A diacritic used with consonants – ċ ġ ṁ ṅ ż – in Maltese, Polish, old Gaelic and romanized Sanskrit, and with vowels – ė and İ – in Lithuanian and Turkish. In phonetics, it is widely employed as a sign of palatalization. Often known by its Polish name, *kropka*. See also *dotless i and dotted I*. [U+0307]

palatal hook A diacritic used in the Czech and Slovak alphabets to mark the so-called soft or palatal consonants. It usually looks like an apostrophe or single close quote but is differently fitted (cut closer on the left). In some fonts it also differs slightly from the apostrophe in shape and size. It combines with ascending lowercase consonants (ď, ľ, ť) and one capital (Ľ). The uppercase forms of ď and ť are Ď and Ť (and Ľ is an alternate form of Ľ). The caron form is used for both the caps and lower case of non-ascending letters (Č, č, Ř, ř). In Czech, both these forms of the diacritic are known as *háček*, "hook." Also sometimes called the *apostrophe accent*. See also *undercomma*. [U+030C]

paragraph See *pilcrow*.

parentheses These are used as phrase markers in grammar and in mathematics, and sometimes to isolate figures or letters in a numerical or alphabetical list. [U+0028, +0029]

per cent Parts per hundred. Not to be confused with the symbol c/o, 'in care of,' which is also sometimes cut as a single character. [U+0025]

per mille Parts per thousand (61‰ = 6.1%). Though it is very rarely needed in text typography, this sign has been given a place in the standard ISO Latin character set. [U+2030]

period The normal sign for the end of a sentence in all the languages of Europe. But it is also a letter of the alphabet in Tlingit, pronounced as a glottal stop, and in phonetics it is the sign of a syllable boundary. Also called *full point* or *full stop*. [U+002E]

phonomark The copyright symbol used for sound recordings. Also sometimes known, oddly, as the *publish* symbol. [U+2117]

pilcrow An old scribal mark used at the beginning of a paragraph or main text section. It is still used by typographers for that very

purpose, and occasionally as a reference mark. Well-designed faces offer pilcrows with some character – ¶ ¶ ¶ ¶ ¶ ¶ ¶ – in preference to the overused, bland standard, ¶. [U+00B6]

pipe Despite its importance to computer programmers and its presence on the standard ASCII keyboard, the pipe has no function in typography. This is another key, and another slot in the font, that begs to be reassigned to something typographically useful. Also called a *broken bar* or *parted rule.* [U+00A6]

prime An abbreviation for feet (1′ = 12″) and for minutes of arc (60′ = 1°). Single and double primes should not be confused with apostrophes, dumb quotes or genuine quotation marks, though in some faces (frakturs especially) these glyphs may all have a similar shape and a pleasant slope. See also *apostrophe, double prime, dumb quotes* and *quotation marks.* [U+2032]

question In Spanish, the inverted question mark is used at the beginning of the phrase, in addition to the upright question mark at the end. [U+003F, +00BF]

quotation marks A standard ISO font includes four forms of guillemet and six forms of Anglo-Germanic quotation mark: ‘ ’ ‚ „ “ ”. One of these is also the apostrophe. Another is graphically identical to the comma but separately encloded. In English and Spanish, common usage is ‘thus’ and “thus”; in German, it is ‚thus‘ and „thus“. This parallels the difference in usage of guillemets. In the Romance languages, guillemets point outward; in German they normally point in: in French, “comme ça” *et* «comme ça»; in German, „auf diese Weise“ *und* »diese Weise«. See also *double prime, dumb quotes* and *prime.* [U+2018—201F]

radical sign The sign of the square root, normally used in conjunction with the *vinculum*: $\sqrt{10} = 3.16227766\ldots$. [U+221A]

registered trademark This is properly a superscript, though the otherwise similar copyright symbol is not. [U+00AE]

reversed apostrophe(s) Mutant forms of the single and double open quote. They appear in several American advertising and text faces cut in the first years of the twentieth century and in some made at the end of that century as well. [U+201B, +201F]

ring Also called *kroužek*. A diacritic used in Arikara, Cheyenne, Czech, Danish, Norwegian, Swedish and other languages. The Scandanavian *round* A (å, Å = IPA ɔ) is present on ISO text fonts, but ů and Ů (*u* with *kroužek*), just as common in Czech, must be found on an East European or pan-European font, or built from component parts. In Arikara and Cheyenne, the ring marks devoiced letters. Uppercase or small cap round A or A-*ring* is the symbol for ångström units (10^{-4} Å = 1 μm). [U+030A]

å ů

schwa A rotated *e*, representing a short, bland vowel (in the jargon of phonetics, a mid central unrounded vowel). It occurs in many African and Native American alphabets. Two uppercase forms are current in Africa: Ǝ and ə. Note that the first of these is horizontally *mirrored* instead of rotated. [U+018E, +01DD, +0259.]

ə

section A scribal form of double *s*, now used chiefly with reference to legal codes and statutes, when citing particular sections for reference. (The plural abbreviation, meaning sections, is written by doubling the symbol: §§.) [U+00A7]

§

semicolon A grammatical marker, hybrid between colon and comma, derived from European scribal practice. In Greek, however, the same symbol is used as a question mark. [U+003B]

a;

slashed o This is a basic letter of the alphabet in Norwegian and Danish, generally corresponding to the Swedish *ö*. The lowercase form is also part of the IPA. Henrik Ibsen's last play, for example, was *Når vi døde vågner*, and one of his first was *Fru Inger til Østråt*. The letter is sometimes needed in English too, for setting names such as Jørgen Moe and Søren Kierkegaard. [U+00D8, +00F8]

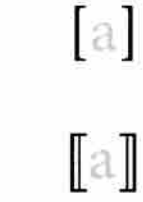
ø Ø

solidus The fraction bar. Used with superior and inferior numbers to construct ad hoc fractions. The solidus was a Roman imperial coin introduced by Constantine in AD 309. There were 72 solidi to the libra, the Roman pound, and 25 denarii to the solidus. The British based their own imperial coinage and its symbols – £/s/d, for pounds, shillings and pence – on the Roman model, and *solidus* became in due course not only a byword for shilling but also the name of the slash mark with which shillings and pence were written. (Given the design and fitting of the characters on most modern type fonts, the solidus is now best used for fractions alone. An italic virgule is usually the best character for setting

5/9

references to British imperial money.) See also *virgule*, which is a separate character. [U+2044]

sputnik See *louse*.



square brackets These essentials of text typography are used for interpolations into quoted matter and as a secondary and inner set of parentheses. In the editing of classical texts, square brackets normally mark editorial *restorations* while angle brackets mark editorial and conjectural insertions, and braces mark deletions. Double square brackets (rarely to be found except on technical fonts) are used by textual scholars to mark deletions made not by the editor but by the original author or scribe. In editing manuscripts and papyri, square brackets also mark hiatuses caused by physical damage. [U+005B, +005D]

swung dash A rare character in text but important in logic and mathematics as the sign of similarity ($a \sim b$) and in lexicography as a sign of repetition. The same sign has been used in symbolic logic to indicate negation, but to avoid confusion, the angular negation sign or *logical not* (¬) is preferred. In the eyes of ISO and Unicode, the swung dash found on computer keyboards is an *ascii tilde* – a character of use to computer programmers but meaningless to typographers. Most fonts actually carry a swung dash, not a tilde, in this position. To Unicode, the true swung dash has a different address, though not a different graphic form. The true tilde is different in every respect and functions only as a diacritic. [U+007E; +2053, +223C]

thorn A basic letter of the alphabet in Anglo-Saxon and Middle English, as well as in Icelandic: *Þótt þu langförull legðir....* Its sound is that of IPA θ: voiceless *th*, as in English *thorn*. Not to be confused with *wynn*. [U+00DE, +00FE]

tilde A diacritic used on vowels – ã ẽ ɛ̃ ĩ õ ɔ̃ ũ ỹ – in many languages (Estonian, Kikuyu, Portuguese, Twi, Vietnamese...) and on at least one consonant (ñ) in many more. Ã, ã, Ñ, ñ, Õ, õ are found on standard ISO text fonts. Pan-European fonts include the old Greenlandic vowels Ĩ, ĩ, Ũ, ũ as well. [U+0303]

trademark This is a superscript, found on most text fonts but useless except for commercial work. [U+2122]

turned undercomma This diacritic is a variant of the undercomma, used in the lowercase form of the Latvian soft g (ģ). The uppercase form of this letter is Ģ. (The *g* is the only palatalized Latvian letter that happens to have a descender.) See also *undercomma.* [U+0326, used in U+0123]

umlaut See *diaeresis.*

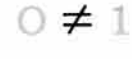
undercomma This is a variant form of the cedilla, popularized in the early twentieth century through the use of typewriters which lacked a real cedilla subscript. Through long habituation, it is now preferred to the cedilla by many writers and some typographers working in Latvian and Romanian. In these languages it is used to mark the soft (palatal) consonants: ļ ņ ŗ ş ţ and their uppercase counterparts. It has become, in other words, a variant form of the *palatal hook.*

Because of its descender, Latvian lowercase palatal *g* (ģ) is marked with a raised and inverted form of this diacritic, the *turned undercomma.* [U+0326]

underdot A diacritic used with consonants – ḍ ḥ ḷ ḹ ṛ ṝ ṣ ṭ ẓ – in romanized Arabic, Hebrew and Sanskrit, and primarily with vowels in Igbo, Yoruba, Twi, and many other African alphabets. In Vietnamese, it is a tonemark signifying low glottalized vowels (ạ ặ ậ ệ ị ợ ự &c). Editors of inscriptions and papyri routinely use the underdot to mark all letters whose reading is uncertain. Its typographic nickname, *nang,* is a simplified form of its Vietnamese name, *nặng.* It is missing from most Latin text fonts. Like the period, it can take many shapes, but in African scripts, a squarish or elongated dot is often preferred. [U+0323]

underscore A diacritic required for many African and Native American languages, and useful for some purposes in English. It is also used as an alternative to the underdot in setting romanized Arabic and Hebrew. To clear descenders, a repositioned version of the character is required. See also *lowline.* [U+0332]

unequal A useful symbol missing from most ISO text fonts. It is essential in setting mathematics and, on occasion, important in general text. [U+2260]



vertical rule See *bar.*

vinculum An overbar or overline, used in mathematics ($\sqrt{10}$) and in the sciences ($\overline{AB}$) to signify the unity of a group. The name is Latin for *bond* or *chain*. [U+203E]

virgule An oblique stroke, used by medieval scribes and many later writers as a form of comma. It is also used to build *level* fractions (e.g., $\pi/3$), to represent a linebreak when verse is set as prose, and in dates, addresses and elsewhere as a sign of separation. In writing the Khoisan languages of western Africa, it is sometimes used to represent dental or lateral clicks. Also called *slash* or *front slash* (to distinguish it from the *backslash*). It is poorly positioned on many fonts and consequently needs some subtle editing. Compare *solidus*. [U+002F]

wedge Another name for the *caron*.

wynn This is an archaic English predecessor of the modern letter *w*. It appears only in specialized fonts designed for medievalists, and it is all too easy to confuse with *thorn*, but out of faithfulness to the manuscript tradition, it is occasionally used in printing Middle English texts. [U+01BF, +01F7]

yen See *currency symbols*.

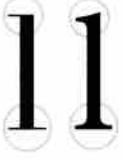
yogh This is an archaic Western European form of *y*, sometimes still used in Old and Middle English texts. The twelfth-century English poet Layamon, for example, wrote at a time when the English alphabet included aesc, eth, thorn and yogh, and the letter yogh appeared where we now put a *y* in Layamon's name: Laȝamon. The pronunciation varies with context between the sound of *y* in English *layer* and that of *g* in German *sagen*. Yogh is very rarely found on text fonts. The numeral 3 is not an adequate substitute. [U+021C, +021D]

NOTE: A number of reference works (including the first three editions of *The Unicode Standard*, both editions of Pullum & Ladusaw's *Phonetic Symbol Guide*, and the first two editions of *The Elements of Typographic Style*) fail to distinguish *yogh* from *ezh*. The two characters *can* be graphically identical and therefore can be realized by one in the same glyph, but they are different in origin and sound – and also different now in Unicode.

Names of individual characters and diacritics (circumflex, dyet, midpoint, virgule, etc) are not in this glossary. Look for them in appendix B. For summary definitions of historical categories (Renaissance, Baroque, etc), see chapter 7.

10/12 × 18 Ten on twelve by eighteen, which is to say, ten-point (10 pt) type set with 12 pt leading (2 pt extra lead, in addition to the body size of 10 pt, for a total of 12 pt from baseline to baseline) on a measure of 18 picas.

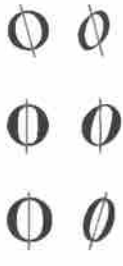
Abrupt and *Adnate* Serifs are either *abrupt* – meaning they break from the stem suddenly at an angle – or they are *adnate*, meaning that they flow smoothly into or out of the stem. In the older typographic literature, adnate serifs are generally described as bracketed.



Aldine Relating to the publishing house operated in Venice by Aldus Manutius between 1494 and 1515. Most of Aldus's type – which included roman, italic and Greek – was cut by Francesco Griffo of Bologna. Type that resembles Griffo's, like typography that resembles Aldus's, is called Aldine. Monotype Poliphilus and Bembo roman are Aldine revivals, though their companion italics are not. No Aldine italics or Aldine Greeks are in circulation at the present time.

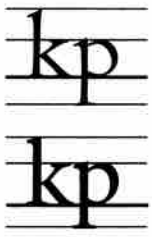
Analphabetic A typographic symbol used with the alphabet but lacking a place in the alphabetical order. Diacritics such as the acute, umlaut, circumflex and caron are analphabetics. So are the asterisk, dagger, pilcrow, comma and parentheses.

Aperture The openings of letters such as C, c, S, s, a and e. Humanist faces such as Bembo and Centaur have large apertures, while Romantic faces such as Bodoni and Realist faces such as Helvetica have small apertures. Very large apertures occur in archaic Greek inscriptions and in typefaces such as Lithos, which are derived from them.



Axis In typography, the axis of a letter generally means the axis of the stroke, which in turn reveals the axis of the pen or other tool used to make the letter. If a letter has thick strokes and thin ones, find the thick strokes and extend them into lines. These lines reveal the axis (or *axes*; there may be several) of the letter. Not to be confused with *slope*.

Ball Terminal A circular form at the end of the arm, leg or brow in letters such as a, c, f, j, r and y. Ball terminals are found in many romans and italics of the Romantic period, some Realist faces, and in many recent faces built on Romantic lines. Examples: Bodoni, Scotch Roman and Haas Clarendon. See also *beak terminal* and *teardrop terminal.*



Baseline Whether written by hand or set into type, the Latin lowercase alphabet implies an invisible staff consisting of at least four lines: topline, midline, baseline and beardline. The topline is the line reached by ascenders in letters like b, d, h, k, l. The midline marks the top of letters like a, c, e, m, x, and the top of the torso of letters like b, d, h. The baseline is the line on which all these letters rest. The beardline is the line reached by descenders in letters like p and q. The cap line, marking the top of uppercase letters like H, does not necessarily coincide with the topline of the lower case.

Round letters like e and o normally dent the baseline. Pointed letters like v and w normally pierce it, while the foot serifs of letters like h and m usually rest precisely upon it.

Bastarda A class of *blackletter* types. See page 266.

Beak Terminal A sharp spur, found particularly on the f, and also often on a, c, j, r and y, in many twentieth-century romans and, to a lesser degree, italics. Examples: Apollo, Berling, Calisto, Méridien, Perpetua, Pontifex, Veljović.

Bicameral A bicameral alphabet is two alphabets joined. The modern Latin alphabet, which you are reading, is an example. It has an upper and a lower case, as closely linked and yet as easy to distinguish as the Senate and the House of Representatives. Unicameral alphabets (the Arabic, Hebrew and Devanagari alphabets, for example) have only one case. Tricameral alphabets have three – and a normal font of roman type is tricameral, if it includes an upper case, a lower case and small caps.

Bilateral Extending to both sides. Bilateral serifs, which are always *reflexive*, are typical of roman faces, while unilateral serifs are typical of romans, Carolingians and italics.

Bitmap A digital image in unintelligent form. A letterform can be described morphologically, as a series of reference points and trajectories that mimic its perimeter, or embryologically, as the series of penstrokes that produce the form. Such descriptions are partially independent of size and position. The same image can also be described quite accurately but

superficially as the addresses of all the dots (or *bits*) in its digital representation. This sort of description, a bitmap, ties the image to one orientation and size.

Blackletter Blackletter is to typography what Gothic is to architecture: a general name for a wide variety of forms that stem predominantly from the north of Europe. Like Gothic buildings, blackletter types can be massive or light. They are often tall and pointed, but sometimes round instead. Compare *whiteletter*. The categories of blackletter include bastarda, fraktur, quadrata, rotunda and textura. See page 266.

Bleed As a verb, to bleed means to reach to the edge of the printed page. As a noun, it means printed matter with no margin. If an image is printed so that it reaches beyond the trim line, it will bleed when the page is trimmed. Photographs, rules, solids and background screens or patterns are often allowed to bleed. Type can rarely do so.

Blind In letterpress work, printing blind means printing without ink, producing a colorless impression.

Blind Folio A page which is counted in the numbering sequence but carries no visible number.

Block Quotation A quotation set off from the main text, forming a paragraph of its own, often indented or set in a different face or smaller size than the main text. A *run-in quotation*, on the other hand, is run in with the main text and usually enclosed in quotation marks.

Body (1) In reference to foundry type: the actual block of type-metal from which the sculpted mirror-image of the printed letter protrudes. (2) In reference to phototype or digital type: the rectangular face of the metal block that the letter would be mounted on *if it were* three-dimensional metal instead of a two-dimensional image or bitmap. Retained as a fiction for use in sizing and spacing the type.

Body Size In graphic terms, the *height* of the *face* of the type, which in letterpress terms is the *depth* of the *body* of the type. Originally, this was the height of the face of the metal block on which each individual letter was cast. In digital type, it is the height of its imaginary equivalent, the rectangle defining the space owned by a given letter, and not the dimension of the letter itself. Body sizes are usually given in points – but European type sizes are often given in Didot points, which are 7% larger than the points used in Britain and North America.

Bowl The generally round or elliptical forms which are the basic bodyshape of letters such as C, G, O in the upper case, and b, c, e, o, p in the lower case. Also called *eye*.

Cap Height The distance from baseline to cap line of an alphabet, which is the approximate height of the uppercase letters. It is often less, but sometimes greater, than the height of the ascending lowercase letters. See also *baseline* and *x-height*.

Chancery A class of cursive letterforms, generally featuring extra ligatures and lengthened and curved extenders. Many, but not all, chancery letterforms are also *swash* forms.

Cicero A unit of measure equal to 12 Didot points. This is the continental European counterpart to the British and American *pica*, but the cicero is slightly larger than the pica. It is equivalent to 4.52 mm or 0.178 inch. See *point*.

Color The darkness of the type as set in mass, which is not the same as the *weight* of the face itself. The spacing of words and letters, the leading of lines, and the incidence of capitals, not to mention the properties of the ink and of the paper it is printed on, all affect the color of the type.

Contrast In the analysis of letterforms, this usually refers to the degree of contrast between the thick strokes and thin strokes of a given letter. In Romantic faces such as Bulmer and Bodoni, the contrast is high. In unmodulated faces such as Gill Sans and Futura, contrast is low or nonexistent.

Counter The white space enclosed by a letterform, whether wholly enclosed, as in *d* or *o*, or partially, as in *c* or *m*.

Crosshead A heading or subhead centered over the text. Compare *sidehead*.

Cursive Flowing. Often used as a synonym for *italic*.

Dingbat A typographic glyph or symbol subject to scorn because it has no apparent relation to the alphabet. Many dingbats are pictograms – tiny pictures of churches, airplanes, skiers, telephones, and the like, used in the tourist industry. Others are more abstract symbols – check marks, crosses, cartographic symbols, the emblems of the suits of playing cards, and so on. Compare *fleuron* and *hedera*.

Dot Leader A row of evenly spaced periods or midpoints, occasionally used to link flush-left text with flush-right numerals in a table of contents or similar context. (There are none in this book.)

DPI Dots per inch. The usual measure of output *resolution* in digital typography and in laser printing.

Drop Cap A large initial capital or *versal* mortised into the text. (See page 64 for examples.) Compare *elevated cap.*

Drop Folio A folio (page number) dropped to the foot of the page when the folios on other pages are carried near the top. Drop folios are often used on chapter openings.

Dropline Paragraph A paragraph marked by dropping directly down one line space from the end of the previous paragraph, without going back to the left margin. (See page 40 for an example.)

Elevated Cap A large initial capital or versal rising up from the beginning of the text instead of nested down into it.

Em In linear measure, a distance equal to the type size, and in square measure, the square of the type size. Thus an em is 12 pt (or a 12 pt square) in 12 pt type, and 11 pt (or an 11 pt square) in 11 pt type. Also called *mutton.*

En Half an em. To avoid misunderstanding when instructions are given orally, typographers often speak of ems as *muttons* and ens as *nuts.*

Extenders Descenders and ascenders; i.e., any parts of the letterform that extend below the baseline, as in p and q, or above the midline, as in b, d and f.

Eye Synonym for *bowl* in the lower case. *Large eye* means large *x-height,* while *open eye* means large *aperture.*

FL Flush left, which means set with an even left margin. By implication, the right margin is ragged. To be more precise, one could write FL/RR, meaning flush left, ragged right.

FL&R Flush left and right, which is to say *justified.*

Fleuron A horticultural dingbat. That is to say, a typographic ornament ordinarily in the shape of a flower or leaf. Some fleurons are designed to be set in bulk and in combinations, to produce what amounts to typographic wallpaper.

Flush and Hung Set with the first line FL and subsequent lines indented, like the entries in this glossary.

Folio In bibliography, a page or leaf; but in typography, a folio is normally a typeset page *number,* not the page itself.

Font A set of sorts or glyphs. In the world of metal type, this means a given alphabet, with all its accessory characters, in a given size. In relation to phototype, it usually means the assortment of standard patterns forming the glyph palette, without regard to size, or the actual filmstrip or wheel on which these patterns are stored. In the world of digital type, the font is the glyph palette itself or the digital information

encoding it. (The older British spelling, *fount*, has not only the same meaning but also the same pronunciation.)

Fore-edge The outside edge or margin of a book page; i.e., the edge or margin opposite the spine.

FR Flush right. With an even right margin. By implication, the left margin is ragged. The sidehead on this page is an example.

Fraktur A class of *blackletter* types. See page 266.

Glyph An incarnation of a character. See *sort*.

Gutter The blank column between two columns of type or the margins at the spine between two facing textblocks.

Hanging Figures Text figures.

Hair Space Normally M/24 *or* the width of a slip of paper.

Hard Space A word space that will not translate into a line-break. Also called *no-break space*.

Hint The letterforms that make up a digital font are usually defined mathematically in terms of outlines or templates, which can be freely scaled, rotated and moved about. When pages are composed, these outlines are given specific locations and sizes. They must then be *rasterized*: converted into solid forms made up of dots at the resolution of the output device. If the size is very small or the resolution low, the raster or grid will be coarse, and the dots will fill the mathematical template very imperfectly. Hints are *the rules of compromise* applied in this process of rasterization. At large sizes and high resolutions, they are irrelevant. At smaller sizes and lower resolutions, where distortion is inevitable, they are crucial. *Hinted* fonts include hints as integral parts of the font definition. See also *bitmap*.

Humanist Humanist letterforms originated among the humanists of the Italian Renaissance and persist to the present day. They are of two primary kinds: roman and italic, both of which derive from Roman capitals and Carolingian minuscules. Humanist letterforms show the clear trace of a broadnib pen held by a right-handed scribe. They have a *modulated* stroke and a *humanist axis*.

Humanist Axis An oblique stroke axis reflecting the natural inclination of the writing hand. See pp 12–15.

Inline A letter in which the inner portions of the main strokes have been carved away, leaving the edges more or less intact. Inline faces lighten the color while preserving the shapes and proportions of the original face. *Outline* letters, on the other hand, are produced by drawing a line around the outsides of

the letters and removing the entire original form. Outline letters, in consequence, are fatter than the originals and have less definition. Castellar, Smaragd and Romulus Open Kapitalen are examples of inline faces.

IPA International Phonetic Association and its alphabet. The organization was founded in 1886. The alphabet is a set of phonetic letters, diacritics and tonemarks, widely used but – like any scientific system – subject to constant refinement and modification. (See page 299.)

ISO International Organization for Standardization, headquartered in Geneva. An agency for international cooperation on industrial and scientific standards. Its membership consists of the national standards organizations of more than one hundred countries.

Italic A class of letterforms more cursive than roman but less cursive than script, developed from the Carolingian hand in fifteenth-century Italy. In most italics, the separate letters are implicitly connected by their *transitive* serifs.

Justify To adjust the length of the line so that it is flush left and right on the measure. Type in the Latin alphabet is commonly set either justified or FL/RR (flush left, ragged right).

Kern (1) Part of a letter that extends into the space of another. In many alphabets, the roman *f* has a kern to the right, the roman *j* a kern to the left, and the italic *f* one of each. (2) As a verb, to kern means to alter the fit of certain letter combinations – *To* or *VA*, for example – so that the limb of one projects over or under the body or limb of the other.

Lachrymal Terminal See *teardrop terminal.*

Lead [rhyming with *red*] Originally a strip of soft metal (typemetal or brass) used for vertical spacing between lines of type. Now meaning the vertical distance from the baseline of one line to the baseline of the next. Also called *leading.*

Lettrine Literally, 'a large letter.' Synonym for *versal.*

Ligature Two or more letters tied into a single character. The sequence ffi, for example, forms a ligature in most Latin text faces.

Lining Figures Figures of even height. Usually synonymous with *titling figures*, but some lining figures are smaller and lighter than the uppercase letters.

Logogram A specific typographic form tied to a certain word. Example: the nonstandard capitalizations in the names e.e. cummings, ПараГраф, TrueType and WordPerfect.

Lowercase Figures Synonym for *text figures* or old-style figures.

M/3 A third of an em: e.g., 4 pt in 12 pt type; 8 pt in 24 pt type.

Measure The standard length of the line; i.e., column width or width of the overall textblock, usually measured in picas.

Mid Space A space measuring M/4, a fourth of an em.

Modulation In relation to typography, modulation means a variation – usually cyclical and predictable – in the width of the stroke. In monochrome (unmodulated) letterforms such as Frutiger, the stroke is always fundamentally the same width. In a face such as Bembo or Centaur, the stroke is based on the trace of a broadnib pen, which makes thin cross strokes and thicker pull strokes. When letters are written with such an instrument, regular modulation automatically occurs.

Monotonic Modern Greek retains only one of the old tonic accent marks, the ὀξεῖα (*oxeia*) or acute. (Greek has often, in fact, been written and sometimes set this way, but the practice did not become official until 1982.) Fonts designed for setting Greek this way are known as monotonic. Their acute (renamed the *tonos*) is usually vertical. Compare *polytonic.*

Mutton An *em.* Also called mutton quad.

Negative Leading Leading – that is to say, line space – smaller than the body size. Type set 16/14, for example, is set with negative leading.

Neohumanist Recent letterforms that revive and reassert *humanist* principles are called neohumanist.

Nut An *en.*

Old-Style Figures (OSF) A common synonym for *text figures.*

Orthotic A class of Greek scripts and types that flourished in Western Europe between 1200 and 1520, revived in the early twentieth century. Orthotic Greeks are noncursive and usually bicameral. In other words, they are analogous to the roman form of Latin script. Both caps and lower case are usually upright. Serifs, when present, are usually short, abrupt and unilateral. The geometric figures of circle, line and triangle are usually prominent in their underlying structure. Victor Scholderer's New Hellenic is an example.

Pi Font A font of assorted mathematical or other symbols, designed to be used as an adjunct to one or more text fonts.

Pica A unit of measure equal to 12 *points.* Two different picas are in common use. (1) In traditional printers' measure, the pica is 4.22 mm or 0.166 inch: close to, but not exactly, one sixth of an inch. This is the customary British and American

unit for measuring the length of the line and the depth of the textblock. (2) The PostScript pica is precisely one sixth of an inch: 0.166666…". The difference between these units is roughly 0.03%. (Note: the continental European counterpart to the pica is the *cicero*, which is 7% larger.)

Piece Fraction A fraction (such as 5⁄64) that is not included in the font and must therefore be made on demand from separate components.

Point (1) In traditional British and American measure, a point is a twelfth of a *pica*, which makes it 0.3515 mm, or 0.01383 inch. In round numbers, there are 72 points per inch, or 28.5 points per centimeter. (2) In continental Europe a larger point, the Didot point, is used. The Didot point (one twelfth of a *cicero*) is 0.38 mm or 0.01483 inch. In round numbers, there are 26.5 Didot points per centimeter, or 67.5 per inch. (3) Nearly all digital typesetting devices, like the PostScript and TrueType languages they employ, make the point precisely 1⁄72 inch and the pica precisely one sixth of an inch.

Polytonic Classical Greek has been set since the fifteenth century with an array of tonic accents and other diacritics inherited from the Alexandrian scribes. These diacritics – *oxeia* (acute), *bareia* (grave), *perispomene* (circumflex), *psili* (smooth breathing), *daseia* (rough breathing), diaeresis and iota subscript – are used singly and in many combinations. Modern Greek retains only the acute (reinterpreted to a vertical mark called the *tonos*) and an occasional diaeresis. Greek fonts equipped with the full set of accents are accordingly known as polytonic Greeks, and modern Greek fonts as *monotonic*.

ᾧ

Quad An *em*. Also called *mutton quad*.

Quaint An antiquated sort or glyph, used to recreate the typographic flavor of a bygone age. The *ct*, *ſp* and *ſt* ligatures, and the long s and its ligatures, are examples.

ct

Ranging Figures Synonymous with *lining figures*.

Raster Digital grid. See *hint*.

Rationalist Axis Vertical axis, typical of Neoclassical and Romantic letterforms. See pp 12–13. Compare *humanist axis*.

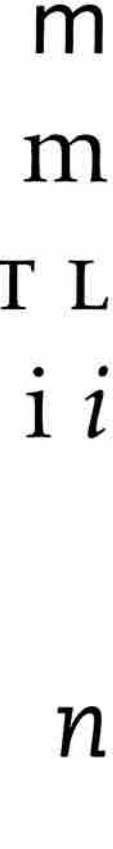
Reflexive A type of *serif* that concludes the stroke of the pen by drawing back upon itself. Reflexive serifs are typical of roman faces, including the face in which these words are set. They always involve a sudden, small stoppage and reversal of the pen's direction, and more often than not they are *bilateral*. See also *transitive*.

m

Resolution In digital typography, resolution is the fineness of the grain of the typeset image. It is usually measured in dots per inch (dpi). Laser printers, for example, generally have a resolution between 300 and 1200 dpi, and platemakers or typesetting machines a resolution significantly greater than 1200 dpi. The resolution of the conventional television screen is only about 50 dpi, and the resolution of most computer screens is also very low: between 72 and 133 dpi. But other factors besides resolution affect the apparent roughness or fineness of the typeset image. These factors include the inherent design of the characters, the skill with which they are digitized, the *hinting* technology used to compensate for coarse *rasterization*, and the nature of the surface on which they are reproduced.

Rotunda A class of *blackletter* types. See page 266.

RR Ragged right, which is to say unjustified.



Sanserif From the earlier English forms *sans serif* and *sans surryphs*, without serifs: synonymous with *unserifed*.

Serif A stroke added to the beginning or end of one of the main strokes of a letter. In the roman alphabet, serifs are usually *reflexive* finishing strokes, forming unilateral or bilateral stops. (They are unilateral if they project only to one side of the main stroke, like the serifs at the head of T and the foot of L, and bilateral if they project to both sides, like the serifs at the foot of T and the head of L.) *Transitive* serifs – smooth entry or exit strokes – are usual in italic.

There are many descriptive terms for serifs, especially as they have developed in roman faces. They may be not only unilateral or bilateral, but also long or short, thick or thin, pointed or blunt, abrupt or adnate, horizontal or vertical or oblique, tapered, triangular, and so on. In texturas and some frakturs, they are usually *scutulate* (diamond-shaped), and in some architectural scripts, such as Eaglefeather and Tekton, the serifs are virtually round.

Sidehead A heading or subhead set flush left (more rarely, flush right) or slightly indented. Compare *crosshead*.

Slab Serif An abrupt or adnate serif of the same thickness as the main stroke. Slab serifs are a hallmark of the so-called egyptian and clarendon types: two groups of Realist faces produced in substantial numbers since the early nineteenth century. Memphis, Rockwell and Serifa are examples. A more recent example is PMN Caecilia.

Slope The angle of inclination of the stems and extenders of letters. Most (but not all!) italics slope to the right at something between 2° and 20°. Not to be confused with *axis*.

Solid Set without additional *lead*, or with the line space equivalent to the type size. Type set 11/11 or 12/12, for example, is set solid.

Sort A single piece of metal type; thus a letter or other character in one particular style and size. In the world of digital type, where letters have no physical existence until printed, the word *sort* has been largely displaced by the word *glyph*. A glyph is a version – a conceptual, not material, incarnation – of the abstract symbol called a character. Thus, *z* and *z* are alternate glyphs (in the same face) for the same character.

Stem A main stroke that is more or less straight, not part of a bowl. The letter *o* has no stem; the letter *l* consists of stem and serifs alone.

Swash A letterform reveling in luxury. Some swash letters carry extra flourishes; others simply occupy an extra helping of space. Swash letters are usually cursive and swash typefaces therefore usually italic. True italic capitals (as distinct from sloped roman capitals) are usually swash. (*The Caps in this Sentence are Examples.*) Hermann Zapf's Zapf Renaissance italic and Robert Slimbach's Poetica are faces in which the swash can be extended to the lower case.

Teardrop Terminal A swelling, like a teardrop, at the end of the arm in letters such as a, c, f, g, j, r and y. This feature is typical of typefaces from the Late Renaissance, Baroque and Neoclassical periods, and is present in many recent faces built on Baroque or Neoclassical lines. Examples: Jannon, Van Dijck, Kis, Caslon, Fournier, Baskerville, Bell, Walbaum, Zapf International, Galliard. Also called *lachrymal terminal*. See also *ball terminal* and *beak terminal*.

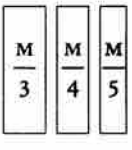
Textblock The part of the page normally occupied by text.

Text Figures Figures – 1 2 3 4 5 6 – designed to match the lowercase letters in size and color. Most text figures are ascending and descending forms. Also called *oldstyle figures*. Compare *lining figures*, *ranging figures* and *titling figures*.

Textura A class of *blackletter* types. See page 266.

Thick Space A space usually measuring M/3, a third of an em.

Thin Space In letterpress work, a space measuring M/5, a fifth of an em. In computer typesetting, sometimes understood as M/6 or M/8. Compare *hair space*, *mid space* and *thick space*.



Three-to-em One-third em. Also written M/3. See also *thick.*

Titling Figures Figures – 123456 – designed to match the uppercase letters in size and color. Compare *text figures.*

Transitive A type of serif which flows directly into or out of the main stroke without stopping to reverse direction, typical of many italics. Transitive serifs are usually unilateral: they extend only to one side of the stem. See also *reflexive.*

Type Size See *body size.*

U&lc Upper and lower case: the normal form for setting text in the Latin, Greek and Cyrillic alphabets, all of which are now *bicameral.*

Unicameral Having only one case – like the Arabic, Hebrew, Thai and Tibetan scripts, and many roman titling faces. Compare *bicameral.*

Unicode A scheme, begun in 1988, for standardized encoding of all the characters in all the world's scripts. See page 181.

Versal A large initial capital, either elevated or dropped. Also called *lettrine.*

Weight The darkness (blackness) of a typeface, independent of its size. See also *color.*

Whiteletter The generally light roman letterforms favored by humanist scribes and typographers in Italy in the fifteenth and sixteenth centuries, as distinct from the generally darker *blackletter* script and type used for ecclesiastical and legal texts. Whiteletter is the typographic counterpart to Romanesque in architecture, as blackletter is the counterpart to Gothic.

White Line A line space.

Word Space The space between words. When type is set FL/RR, the word space may be of fixed size. When the type is *justified,* the word space is usually elastic.

x-height The distance between the baseline and the midline of an alphabet, which is normally the approximate height of the unextended lowercase letters – a, c, e, m, n, o, r, s, u, v, w, x, z – and of the torso of b, d, h, k, p, q, y. The relation of x-height to cap height is an important characteristic of any *bicameral* Latin typeface, and the relation of x-height to *extender* length is a crucial property of any Latin or Greek lower case. See also *baseline, cap height* and *eye.*

APPENDIX D: TYPE DESIGNERS

A biographical index of designers important to typographic history, and of all those doing important work in the present day, would be a book in itself. The following list is little more than a cross-reference to important designers whose work is mentioned elsewhere in this book.

LUDOVICO DEGLI ARRIGHI (*c.* 1480–1527) Italian calligrapher and designer of at least six chancery italic fonts. Frederic Warde's Vicenza and Arrighi (the italic companion to Centaur) are based on one of his faces. Monotype Blado (the italic companion to Poliphilus) is a rough approximation of another.

ANTOINE AUGEREAU (*c.* 1490–1534) Parisian punchcutter and printer. Author of several text romans and at least one Greek. Along with his contemporary Simon de Colines, Augereau defined the style of French typography later identified with the name of his most famous apprentice, Claude Garamond. This activity came to an end when he was hanged and his corpse was publicly burnt, on Christmas Eve of 1534, for printing a psalm without permission.

RICHARD AUSTIN (*c.* 1765–1830) English punchcutter producing Neoclassical and Romantic faces. He cut the original Bell type, the first Scotch Roman, and the original version of Porson Greek. W. A. Dwiggins's Caledonia is based primarily on Austin's work.

JOHN BASKERVILLE (1706–1775) English calligrapher, printer and businessman. Designer of a series of Neoclassical romans, italics and one Greek. Most of the faces sold in his name are based on his work and some resemble it closely. His punches are now at the University Library, Cambridge, and the St Bride Printing Library, London. A set of original matrices, formerly in Paris, is now in the Frutiger Foundry, Münchenstein, Switzerland.

LUCIAN BERNHARD (1885–1972) German immigrant to the USA. Painter, poet, industrial designer and typographer. Author of a large number of roman faces, distinguished by their long extenders. These were cut and cast primarily by ATF and Bauer.

CHARLES BIGELOW (1945–) American typographer and scholar. Codesigner, with Kris Holmes, of the Lucida family.

ARCHIBALD BINNEY (1762–1838) Scottish immigrant to the USA. He was trained as a punchcutter in Edinburgh. With James Ronaldson, another Scottish immigrant, he established the Binney & Ronaldson Foundry in Philadelphia, where he cut Baroque, Neoclassical and Romantic type.

FRANK BLOKLAND (1959–) Dutch type designer and founder of the Dutch Type Library in 's-Hertogenbosch. His faces include Berenice and Documenta. His historical revivals include DTL Van den Keere and its companion, Guyot italic.

GIAMBATTISTA BODONI (1740–1813) Italian punchcutter, printer and prolific designer of type, working at Rome and Parma. Bodoni is best known for his dark and razor-sharp Romantic romans, italics and sometimes wildly ornamental Greeks, but he also designed and cut a large number of Neoclassical fonts. Bauer Bodoni, Berthold Bodoni, and some of the other faces now sold in his name are based on his work. His punches are in the Museo Bodoniano, Parma.

LUDOLF BORCHTORP (*c.* 1470–*c.* 1510) Polish mathematician and engraver. Author of the first fonts of Cyrillic type, which he evidently cut in Kraków about 1490, for the printer Szwajpolt Fiol.

CHRIS BRAND (1921–1999) Dutch calligrapher, the designer of the Albertina family. Some of his finest work – including the Hebrew face Zippora, the Elsschot family and the Denise italic – has yet to be released.

DAN CARR (1951–) American punchcutter, poet, typographer and printer. Proprietor, with Julia Ferrari, of the Golgonooza Letter Foundry, Ashuelot, New Hampshire. Carr is one of the few active punchcutters now living. Designer and cutter of Regulus foundry roman and Parmenides foundry Greek; designer of the digital family Chêneau.

MATTHEW CARTER (1937–) English-born American type designer, punchcutter and scholar, based in Cambridge, Massachusetts. His text faces include Auriga, Charter, Galliard and Manutius; his titling faces include Mantinia and Sophia. His historical revivals include Wilson Greek.

WILLIAM CASLON (1692–1766) English engraver, punchcutter and typefounder; author of many Baroque romans, italics, Greeks and other non-Latin faces. ATF Caslon, Monotype Caslon, and Carol Twombly's Adobe Caslon are closely based

on his work. A collection of his punches is now in the St Bride Printing Library, London.

WARREN CHAPPELL (1904–1991) American book artist, trained in Germany, where he studied with Rudolf Koch. His typefaces include Trajanus, Lydian and the still unmanufactured Eichenauer.

SIMON DE COLINES (*c.* 1480–1547) French master printer, typographer and punchcutter. Author of a dozen or more roman fonts, several italics, several blackletters and a fine cursive Greek. Colines as much as any single person appears to be responsible for creating the typographic style of the French golden age. Garamond and Augereau were part of the same circle. None of Colines's faces has evidently yet been translated to digital form.

CARL DAIR (1912–1967) Canadian book designer and typographer, working chiefly in Toronto. Designer of the Cartier family, which was left incomplete at Dair's death and later improved and completed by Rod McDonald.

GERARD DANIËLS (1966–) Dutch type designer and typographer, trained under Gerrit Noordzij in The Hague. Designer of Caspari.

ISMAR DAVID (1910–1996) German-born American book designer, architect, graphic artist and type designer. His faces include David Hebrew, released by Intertype in 1954, and a number of photolettering faces still awaiting digital revival.

GIOVANNI DEFACCIO (1966–) Italian calligrapher. With Lui Karner, he is codesigner of the Rialto family, produced by their digital foundry *df*Type.

FRANÇOIS-AMBROISE DIDOT (1730–1804) Parisian printer and publisher. Designer of several Neoclassical romans and italics, cut under his supervision by Pierre-Louis Vafflard. Father of Firmin Didot and founder of the Didot dynasty in printing and typography.

FIRMIN DIDOT (1764–1836) Parisian printer and punchcutter; son of F.-A. Didot and student of Pierre-Louis Vafflard; father of Ambroise Firmin-Didot. Author of several Neoclassical faces as well as the Romantic fonts for which he is posthumously known. Monotype Didot and Linotype's digital Didot (drawn by Adrian Frutiger) are based on his work.

BRAM DE DOES (1934–) Dutch typographer, formerly chief designer at Joh. Enschedé en Zonen, Haarlem. Designer of the Trinité and Lexicon families.

WILLIAM ADDISON DWIGGINS (1880–1956) American designer and typographer. Dwiggins designed typefaces exclusively for the Linotype machine. In the 1930s and 1940s, he also created the typographic house style at Alfred Knopf, New York. His serifed faces include Caledonia, Eldorado, Electra and Falcon. His only completed sanserif is Metro. His one uncial face is Winchester. Many of his type drawings are now in the Boston Public Library.

ALFRED FAIRBANK (1895–1982) English calligrapher and designer of Fairbank italic.

AMBROISE FIRMIN-DIDOT (1790–1876) French scholar, typecutter and printer. He was the son of Firmin Didot (whose full name he took as his own surname) and grandson of François-Ambroise Didot. Author of the first Didot Greek fonts.

JOHANN MICHAEL FLEISCHMAN (1701–1768) German-born punchcutter and founder working in the Netherlands. A prolific and skilled cutter of romans, italics and ornamental blackletters. Also the author of several Arabic and Greek fonts. His early romans and italics are Baroque, but in the 1730s he cut a series of text fonts idiosyncratic and self-conscious enough to be called Rococo. Most of his surviving material is now at the Enschedé Museum in Haarlem.

KARL-ERIK FORSBERG (1914–1995) Swedish calligrapher and typographer, designer of the Berling text roman. His titling faces include Carolus, Ericus and Lunda.

PIERRE SIMON FOURNIER (1712–1768) French printer and punchcutter. Author of many French Neoclassical fonts and typographic ornaments. Nearly all of his original material has been damaged or lost. Monotype Fournier and Barbou are based on his work, and W. A. Dwiggins's Electra owes much to the study of it.

HENRI FRIEDLAENDER (1904–1996) Israeli book and type designer, born in France of a Dutch father and English mother, and trained primarily in Germany. In 1950, after twenty years on the drawing table, a trial casting of his Hadassah Hebrew family was made by the Amsterdam Foundry. After further revision, working versions were issued beginning in 1958.

ADRIAN FRUTIGER (1928–) Swiss immigrant to France. A prolific and versatile designer of type and signage. He was involved in the early transition from metal type to phototype. His serifed faces include Apollo, Breughel, Glypha, Iridium and Méridien. His sanserifs include Avenir, Frutiger, and

Univers. His titling and script types include Herculanum, Ondine, Pompeijana and Rusticana.

CLAUDE GARAMOND (*c.* 1490–1561) French punchcutter, working chiefly in Paris. Author of many roman fonts, at least two italics, and a full set of chancery Greeks. His surviving punches and matrices are now at the Plantin-Moretus Museum in Antwerp and at the Imprimerie Nationale, Paris. Stempel Garamond roman *and* italic, Linotype Granjon roman, Günter Gerhard Lange's Berthold Garamond roman, Robert Slimbach's Adobe Garamond roman, and Ronald Arnholm's Legacy *italic* are all based on his designs. Monotype Garamond is not. (See also pp 230–32.)

The spelling *Garamont* is now customary in France. The English spelling *Garamond* is derived from the Latin *Garamondius*, often used by Garamont himself.

ERIC GILL (1882–1940) English engraver and stonecutter, working in England and Wales. His serifed faces include Joanna, Perpetua and Pilgrim. His one unserifed face is Gill Sans. Perpetua Greek is also his, but Gill Sans Greek is by other hands. Gill's type drawings are now in the St Bride Library, London. Some of the matrices and punches for his types are now at the University Library, Cambridge; others are in the Clark Library, Los Angeles – but none of these punches were cut by Gill himself.

FREDERIC GOUDY (1865–1947) American type designer and founder. His serifed faces include University of California Old Style (later adapted for machine composition as Californian), Deepdene, Italian Old Style, Kaatskill, Kennerley, Village N° 1 and Village N° 2. His blackletters include Franciscan, Goudy Text and Goudy Thirty. His titling faces include Forum, Goudy Old Style and Hadriano. Goudy Sans is his only unserifed face. His only uncial is Friar. Most of Goudy's original material was destroyed by fire in 1939. What survives is at the Rochester Institute of Technology.

ROBERT GRANJON (*c.* 1513–1590) French typecutter working at Paris, Lyon, Antwerp, Frankfurt and Rome. Author of many Renaissance and Mannerist romans, italics, scripts, several Greeks, a Cyrillic, some Hebrews, and the first successful fonts of Arabic type. Some of his punches and matrices survive at the Plantin-Moretus Museum, Antwerp and the Nordiska Museet, Stockholm. Matthew Carter's Galliard is based primarily on Granjon's Ascendonica roman and italic.

FRANCESCO GRIFFO (*c.* 1450–1518) Bolognese punchcutter, working in Venice, Bologna and elsewhere in Italy. Author of at least seven romans, three italics, four Greeks and a He-

brew. None of Griffo's actual punches or matrices are known to survive, and the house of Aldus Manutius in Venice, where he did most of his work, has vanished. (The site is now occupied by a bank.) Griffo's letterforms have nonetheless been patiently reconstructed from the printed books in which his type appears. Giovanni Mardersteig's Griffo type is an exacting replica of one of Griffo's fonts. Monotype Bembo roman is based more loosely on the same font. Monotype Poliphilus is a rough reproduction of the same lower case with different caps. Mardersteig's Dante roman and italic are also based on a close study of Griffo's work. The italics, overall, have received far less attention than the romans.

Giovanni Mardersteig's postscript to Pietro Bembo, *De Aetna* (Verona: Officina Bodoni, 1969) gives a good introduction to Griffo's roman types and their derivatives. More important still is the series of essays collected in Mardersteig's *Scritti* (1988).

ARNALDO GUILLÉN DE BROCAR (*c.* 1460–1524) Spanish master printer and typographer working at Alcalá de Henares, which is now a suburb of Madrid. Author of several romans and at least two Greek fonts. The most notable of these is the Complutensian Greek type, cut about 1510.

Complutensian means 'from Complutum,' which is the old Roman name for Alcalá.

FRANÇOIS GUYOT (*c.* 1510–1570) Punchcutter and typefounder, born at Paris. He moved to Antwerp in the 1530s and spent most of the rest of his life there, cutting type for the printer Christophe Plantin and others.

VICTOR HAMMER (1882–1967) Austrian-born printer working chiefly in Italy and the USA. All of Hammer's types are uncials. These include American Uncial, Andromache, Hammer Uncial, Pindar and Samson. His type drawings and punches are now at the University of Kentucky, Lexington.

JONATHAN HOEFLER (1970–) American type designer and digital founder. He established the Hoefler Type Foundry, New York, in 1989. Designer of Hoefler Text, Hoefler Titling, Gestalt, the Requiem family, and other faces.

KRIS HOLMES (1950–) American calligrapher. Designer of Isadora and Sierra; codesigner with Janice Fishman of Shannon, and with Charles Bigelow of the Lucida family.

JOHN HUDSON (1968–) English/Canadian type designer and expert in multilingual digital encoding. Designer of Aeneas and Manticore. Cofounder, with Ross Mills, of Tiro Typeworks in Vancouver.

MARK JAMRA (1956–) American typographer and graphic artist, trained in Switzerland. Designer of several artful postmodern faces, including Jamille, Latienne and Kinesis.

JEAN JANNON (1580–1658) French punchcutter and printer. His romans and italics, cut at Paris and Sedan, appear to be the

first Baroque types ever made. Much of his material survives at the Imprimerie Nationale, Paris, where his type is known as the *caractères de l'université*. Monotype 'Garamond,' Linotype 'Garamond' 3, ATF 'Garamond,' Lanston 'Garamont' and Simoncini 'Garamond' are based on his work. (See pp 230–32.)

NICOLAS JENSON (*c.* 1420–1480) French punchcutter and printer, working in Venice. Author of at least one roman, one Greek and five rotundas. Jenson's punches and matrices have long vanished, but his type has often been copied from his printed books. Bruce Rogers's Centaur, Ronald Arnholm's Legacy roman and Robert Slimbach's Adobe Jenson roman are based on his. Karlgeorg Hoefer's San Marco is based in large part on Jenson's rotundas.

In addition to his 16 pt roman, Jenson cut at least the caps for a 12 pt font. In addition to his five rotundas (ranging from 12 to 21 pt), he also cut at least the lower case for a sixth and smaller font.

GEORGE WILLIAM JONES (1860–1942) English printer and type designer. Author of Linotype Estienne, Linotype Granjon, and the Venezia roman, which was later mated with an italic by Frederic Goudy. All Jones's faces are historical reconstructions. Linotype Granjon was the first commercial adaptation of a Garamond roman, mated with a Granjon italic.

LUI KARNER (1948–) Austrian typographer and letterpress printer. Codesigner, with Giovanni DeFaccio, of the Rialto family and partner in the digital foundry *df*Type.

MIKLÓS TÓTFALUSI KIS (1650–1702) Hungarian scholar, printer and typecutter. Kis was trained in Amsterdam and worked there and in Kolozsvár (now Cluj, Romania). Stempel Janson is struck and cast primarily from his surviving punches. Linotype Janson Text (both the metal and digital versions) and Monotype Erhardt are based on his work.

RUDOLF KOCH (1876–1934) German calligrapher and artist. His titling faces include Koch Antiqua and Neuland. His blackletters include Claudius, Jessen, Wallau and Wilhelm Klingspor Schrift. Kabel is his only sanserif. Much of his material, formerly in the Klingspor Archive, Offenbach, is now in the Haus für Industriekultur, Darmstadt.

HENK KRIJGER (1914–1979) Dutch typographer and visual artist, born and raised in Sumba, Indonesia. His Indonesian name is Senggih. Designer of several titling faces, the most important of which is Raffia.

JOOS LAMBRECHT (*c.* 1510–1556) Flemish punchcutter, typefounder and printer. Author of several fine romans, one italic and at least one textura. All of his original material has perished, but printed specimens survive.

VADIM VLADIMIROVICH LAZURSKI (1909–1994) Russian calligrapher and book designer. His Lazurski family includes both Cyrillic and Latin alphabets. The Cyrillic also exists in a proprietary foundry version known as Pushkin.

GUILLAUME LE BÉ *the elder* (1525–1598) French punchcutter working in Paris, Florence, Venice and Rome. Author of many Hebrew fonts, some fine romans and music types.

HENRIC PIETERSZOON LETTERSNIDER (*fl.* 1492–1511) Dutch punchcutter working at Gouda, Antwerp, Rotterdam and Delft. Author of a substantial number of blackletter types and fonts of large initials.

ZUZANA LIČKO (1961–) Slovakian immigrant to the USA. Cofounder of *Emigre* magazine and its offshoot, the Emigre digital foundry. Designer of Journal, Electrix, Modula and other faces. With John Downer, codesigner of Triplex.

RICHARD LIPTON (1953–) American graphic artist. Designer of Arrus. Codesigner, with Jacqueline Sakwa, of the script face Cataneo.

MARTIN MAJOOR (1960–) Dutch graphic artist trained at the Arnhem Academy. Designer of the Scala and Seria families.

GIOVANNI MARDERSTEIG (1892–1977) German immigrant to Italy. A master printer, scholar, typographer and type designer. Author of Dante, Fontana, Griffo and Zeno. His material is at the Officina Bodoni, Verona.

GABRIEL MARTÍNEZ MEAVE (1972–) Mexican type designer, working near Mexico City. His faces include Organica, Integra, Neocodex and Mexica.

ROD MCDONALD (1947–) Canadian graphic artist and type designer working in Toronto and, since 2002, in Halifax. His work includes the Laurentian family and Cartier Book, a family of type begun by Carl Dair.

HANS EDUARD MEIER (1922–) Swiss typographer. Designer of Barbedor, Syndor and the several versions of Syntax.

JOSÉ MENDOZA Y ALMEIDA (1926–) French graphic artist and type designer, working in Paris. His faces include Mendoza, Photina, Pascal, Fidelio (a chancery script), Sully Jonquières (an upright italic) and Convention.

OLDŘICH MENHART (1897–1962) Czech type designer and calligrapher. His serifed Latin faces include Figural, Menhart and Parliament. His Manuscript family includes both Latin and Cyrillic faces. His titling faces include Czech Uncial and Monument.

WILLIAM ROSS MILLS (1970–) Canadian type designer. Co-founder with John Hudson of Tiro Typeworks in Vancouver. Author of the Plantagenet Novus family (Latin, Greek and Cherokee) and two families of Canadian Syllabic type, Uqammaq and Pigiarniq, for setting Inuktitut. His historical revivals include the 1520 Garamond Roman.

ANTONIO DI BARTOLOMEO MISCOMINI (*c.* 1445–*c.* 1495) Italian punchcutter and printer, probably born in Bologna. He did most of his work in Venice, Modena and Florence, where he printed during the early 1490s and brought his roman and orthotic Greek types to final form.

GERRIT NOORDZIJ (1950–) Dutch typographer and teacher. From 1960 to 1990 he was responsible for training type designers at KABK (Koninklijke Academie van Beeldende Kunsten: The Royal Academy of Fine Arts) in The Hague, and thereby profoundly affected the course of modern type design in the Netherlands and elsewhere. Only one of his own designs is publicly available at present: the Ruse family, issued in digital form by the Enschedé Font Foundry.

Noordzij's 'Ruse' was originally 'Rus-E:' version E of a face designed for a Russian bibliography. Specimens of five of his romans, four italics, two Greeks and one bastarda are included in Lommen & Verheul, *Haagse Letters* (1996).

PETER MATTHIAS NOORDZIJ (1961–) Dutch typographer and digital founder. Designer of PMN Caecilia and proprietor of the Enschedé Font Foundry.

FRIEDRICH PETER (1933–) Canadian calligrapher and visual artist, born in Dresden and trained in Berlin. Designer of the script faces Vivaldi and Magnificat.

ALEXANDER PHEMISTER (1829–1894) Scottish punchcutter. Author of the Old Style Antique issued by Miller & Richard, Edinburgh, beginning in 1858. In 1861 he moved to Boston where he worked for the Dickenson Foundry.

FRIEDRICH POPPL (1923–1982) German calligrapher. His serifed faces include Pontifex and Poppl Antiqua. His sanserif is Laudatio. His titling faces include Nero and Saladin. His script types include Poppl Exquisit and Residenz.

JEAN-FRANÇOIS PORCHEZ (1964–) French type designer; founder and proprietor of Porchez Typofonderie in Malakoff, near Paris. Designer of Angie, Apolline, Parisine, and the extensive Le Monde family, created for the Paris newspaper *Le Monde*.

RICHARD PORSON (1759–1808) English classical scholar. He designed the original Porson Greek, which was cut in steel by Richard Austin. Monotype Porson and the digital GFS Porson are based closely on his work.

EUDALD PRADELL (1721–1788) Catalan punchcutter and typefounder, working in Barcelona and Madrid. Some of the best eighteenth-century Spanish books are printed in his types.

VOJTĚCH PREISSIG (1873–1944) Czech artist, typographer and teacher, working in Czechoslovakia and in New York City. Preissig designed several text and titling faces, including the one that bears his name. His surviving drawings are in the Strahov Abbey, Prague.

ERHARD RATDOLT (1447–1528) German punchcutter and printer working at Augsburg and Venice. Author of at least ten blackletters, three romans and one Greek. In 1486 he issued the first known type specimen. (The one surviving copy is in the Munich State Library.)

IMRE REINER (1900–1987) Hungarian artist and designer working in Germany, the USA and Switzerland. He was a skilled wood engraver and book illustrator. Author of several Expressionist script faces.

PAUL RENNER (1878–1956) German typographer, type designer and teacher. Designer of Futura, Renner Antiqua, Renner Grotesk and the blackletter Ballade. His drawings for Futura are now in the Fundición Tipográfica Bauer, Barcelona.

JIM RIMMER (1934–) Canadian punchcutter and type designer. He has produced digital revivals of several of Frederic Goudy's faces and made new text faces – notably Amethyst and Albertan – in similar spirit. His titling faces include Credo, a revival of Robert Foster's Pericles.

BRUCE ROGERS (1870–1957) American typographer, working chiefly in Boston, London and Oxford. Designer of Montaigne and Centaur. The original drawings for Centaur are now in the Newberry Library, Chicago.

SJOERD HENDRIK DE ROOS (1877–1962) Dutch designer, typographer and printer. Author of the uncials Libra and Simplex, the Nobel sanserif, and De Roos roman and italic.

RUDOLPH RŮŽIČKA (1883–1978) Czech-born American typographer. Designer of Linotype Fairfield and Primer.

JACQUES DE SANLECQUE *the elder* (1558–1648) French punchcutter, student of Guillaume Le Bé the elder. Author of several fine romans and italics, music type, and a number of non-Latin faces, including Armenian, Samaritan and Syriac.

JACQUES DE SANLECQUE *the younger* (1613–1659) Son of the preceding. French punchcutter and founder revered for his technical finesse in cutting small sizes.

VICTOR SCHOLDERER (1880–1971) English classical scholar and librarian. Designer of the New Hellenic Greek.

FRANTSYSK HEORHII SKARYNA (*c.* 1488–*c.* 1540) Belarusian physician, translator and printer, educated at Kraków and Padova. Author of several fonts of Cyrillic type, with which he printed at Prague and Vilnius.

ROBERT SLIMBACH (1956–) American type designer, on staff at Adobe since 1987. His faces include Cronos, Adobe Garamond, Giovanni, Minion, Poetica, Slimbach, Utopia, Kepler and Warnock. His script faces include Sanvito and Caflisch. The Myriad family is a joint design by Slimbach and Carol Twombly.

FRED SMEIJERS (1961–) Dutch typographer and type designer. Author of the Quadraat family, Reynard, and the useful book *Counterpunch*.

ERIK SPIEKERMANN (1947–) German graphic artist and one of the founders of the FontShop digital foundry. Designer of the Meta and Officina families.

SUMNER STONE (1945–) American type designer and first director of the type department at Adobe Systems. Author of Silica, Cycles, Stone Print, and of the Stone typeface family, which includes serifed, unserifed and 'informal' series.

KONRAD SWEYNHEYM (*c.* 1415–1477) German monk and letterpress printer, working in central Italy. He is probably the author of the two romans and one Greek which he and his partner Arnold Pannartz used at Subiaco and Rome between 1464 and 1473.

GIOVANANTONIO TAGLIENTE (*fl.* 1500–1525) Italian calligrapher and designer of at least one chancery italic type. Monotype Bembo italic is derived from this font.

AMEET TAVERNIER (*c.* 1522–1570) Flemish typecutter and printer working primarily at Antwerp. Author of many romans, italics, blackletters and civilité script types.

GEORG TRUMP (1896–1985) German artist and type designer, initially a pupil of Ernst Schneidler. His serifed text faces include Mauritius, Schadow and Trump Mediäval. His blackletters include Trump Deutsch. His titling faces and scripts include Codex, Delphin, Jaguar and Time.

JAN TSCHICHOLD (1902–1974) German immigrant to Switzerland. Designer of the Sabon family and the Saskia script. Several of Tschichold's unproduced phototype designs were destroyed in the Second World War.

CAROL TWOMBLY (1959–) American type designer and visual artist. From 1988 to 1999 she was one of two type designers on staff at Adobe Systems. Her work includes the text family Chaparral and the titling faces Charlemagne, Lithos, Nueva, Trajan and Viva. Adobe Caslon is her digital revival of the work of William Caslon. With Robert Slimbach, she is the codesigner of the Myriad family.

GERARD UNGER (1942–) Dutch type designer and teacher. His serifed faces include Amerigo, Demos, Hollander, Oranda, Paradox and Swift. His unserifed faces include Argo, Flora and Praxis.

HENDRIK VAN DEN KEERE (*c.* 1540–1580) Belgian typecutter, working at Ghent and Antwerp. He cut many romans and blackletters, at least one script type (a civilité) and several fonts of music type. DTL Van den Keere roman is based on his work.

CHRISTOFFEL VAN DIJCK (1606–1669) Dutch punchcutter. Author of several Baroque romans, italics and blackletters. Monotype Van Dijck and DTL Elzevir are based on his work. Jan van Krimpen's Romanée and Gerard Unger's Hollander echo it in various ways. Most of Van Dijck's material has perished. The few surviving punches and matrices are at the Enschedé Museum, Haarlem.

JAN VAN KRIMPEN (1892–1958) Dutch typographer, for many years chief designer at Joh. Enschedé en Zonen, Haarlem. His type designs include Lutetia, Romanée, Romulus, Sheldon, Spectrum, Haarlemmer, Cancelleresca Bastarda (a chancery italic), Romulus Sans, Antigone Greek, Double Augustin Open Capitals, Lutetia Open Capitals and Romulus Open Capitals. Except for Haarlemmer and Sheldon, all these faces were first cut at Enschedé by Paul Helmuth Rädisch. Much of his work is still awaiting digital revival.

JOVICA VELJOVIĆ (1954–) Calligrapher and type designer born in Kosovo, trained in Belgrade, now working in Germany. His types include Gamma, Esprit, Ex Ponto, Silentium and Veljović.

JUSTUS ERICH WALBAUM (1768–1837) German typefounder and printer, author of several Neoclassical and Romantic faces. Both Berthold Walbaum and Monotype Walbaum are based on his surviving punches and matrices.

FREDERIC WARDE (1894–1939) American typographer, working chiefly in France, Italy and England. Designer of the

Vicenza and Arrighi italics. Some of Warde's drawings are in the Newberry Library, Chicago. Punches and matrices for the early (handcut) Arrighi are now at the Rochester Institute of Technology.

EMIL RUDOLF WEISS (1875–1942) German poet, painter, calligrapher and type designer. Author of a fraktur, a textura (Weiss Gotisch), a rotunda (Weiss Rundgotisch), Weiss Antiqua roman and italic, a suite of typographic ornaments, and three series of titling caps or initials. All these were cut by Louis Hoell and issued by the Bauer Foundry, Frankfurt.

Type Designers

ALEXANDER WILSON (1714–1786) Scottish punchcutter, typefounder and astronomer, working at Camlachie, near Glasgow. Author of the best romans, italics and Greeks produced in the Scottish Enlightenment.

BERTHOLD WOLPE (1905–1989) German calligrapher and typographer who spent his later life in England. Pegasus is his text face. His titling faces include Albertus and Hyperion.

HERMANN ZAPF (1918–) German master calligrapher, type designer, artist and teacher. His types include the roman and italic faces Aldus, Comenius, Euler, Hunt Roman, Marconi, Melior, Optima, Orion, Palatino, Zapf Book and Zapf Renaissance; the blackletters Gilgengart, Winchester and Stratford; the titling faces Kompakt, Michelangelo, Sistina and Zapf International; the Greeks Attika, Euler, Heraklit, Optima, Palatino Greek and Phidias; and the script faces Venture, Zapf Chancery, Zapf Civilité and Zapfino.

GUDRUN ZAPF-VON HESSE (1918–) German calligrapher and book artist. Her text and titling faces include Alcuin, Carmina, Diotima, Nofret, Ariadne and Smaragd.

APPENDIX E: TYPEFOUNDRIES

A reliable encyclopedia of the world's typefoundries – metal, photographic and digital; present and past – would be a very useful document. It would also be a thick one. This brief list is limited to metal and digital foundries and matrix engravers that have issued or preserved original designs that seem to me of lasting value for setting text in Latin, Greek or Cyrillic.

Many of the type designers listed in appendix D (Robert Granjon, William Caslon, Hendrik van den Keere, for instance) also cast and sold their own type. Their foundries are listed again here only if (1) the foundries outlived their founders and developed into independent entities or (2) they are currently active.

The phone numbers, fax numbers and physical locations of foundries are subject to frequent change. Under present conditions, so is their financial health and consequent legal status. Current information is obtainable through the internet and the trade press. Other useful references include the consolidated catalogues of vendors such as Precision Type, in Commack, New York, and FontShop in Berlin, and the websites of on-line retailers such as MyFonts and Identifont.

Adobe Systems, San Jose, Calif. Fundamentally a software company, founded in 1982 by John Warnock and Charles Geschke. Adobe was the original developer of the PostScript computer language – one of the foundation stones of digital typography. It is also, with Microsoft, co-creator of the OpenType font format. In the early 1980s it established a digital foundry and an ambitious type development program directed by Sumner Stone. Adobe has issued digital versions of many historical types as well as original designs by Robert Slimbach, Carol Twombly, Jovica Veljović and many others.

Agfa, Wilmington, Mass. In 1988 Agfa-Gevaert absorbed the Compugraphic Corporation, a manufacturer of photosetting machines and film matrices. A digital foundry known as Agfa-Compugraphic was then formed and passed from hand to hand (e.g., it was for a time part of the Bayer Corporation). In 1997, Agfa acquired the remains of Monotype, and in 1998 a new firm, Agfa Monotype, was formed. Agfa per se issued new designs by Otl Aicher, David Siegel and others.

Amsterdam Foundry, Amsterdam. A metal foundry established in Rotterdam in 1851 by Nicolaas Tetterode with stock from the Broese Foundry in Breda. The firm moved to Amsterdam in 1856 and in 1892 changed its name from Lettergieterij N. Tetterode to Lettergieterij Amsterdam. Typecasting operations waned in the 1970s and ceased altogether in 1988. During the twentieth century it issued new designs by Sjoerd de Roos and Dick Dooijes. The surviving matrices and other materials are now at the library of the University of Amsterdam.

ATF (*American Type Founders*), Elizabeth, New Jersey. This was the largest metal typefoundry in North America, formed in 1892 by amalgamating a number of smaller firms. In its best days, it issued original designs by M.F. Benton, Lucian Bernhard, Frederic Goudy and many others. Though the company began to falter in the 1920s, it clung to life until 1993. Its library is now at Columbia University, New York. Much of the older typographic material is in the Smithsonian Institution, Washington, DC.

Bauer Foundry, Frankfurt. A metal foundry established in 1837 by Johann Christian Bauer. It expanded into an international network toward the end of the nineteenth century. The Bauer Foundry as such ceased to exist in 1972, but one branch of the old empire – the Fundición Tipografica Bauer (FTB) in Barcelona – has survived. (It is separately described in this list.) Bauer issued original faces by its founder and later by Lucian Bernhard, Imre Reiner, Paul Renner, Emil Rudolf Weiss and others. The surviving punches and matrices are now at FTB in Barcelona and at WMD in Leipzig.

Berlingska Stilgjuteriet, Lund, Sweden. A metal typefoundry and printing house important for its castings, during the twentieth century, of original faces by Karl-Erik Forsberg.

H. Berthold, Berlin. Hermann Berthold's metalworks entered the typefounding business in 1893. It acquired the original punches and matrices of J. E. Walbaum and later issued original faces by Günter Gerhard Lange, Herbert Post, Imre Reiner and others. Berthold was involved in the creation of phototype as early as 1935. It ceased casting metal type in 1978 and turned to producing digital fonts in the 1980s. This activity all but ceased in 1993, but the company has resumed selling its own digital fonts. The foundry's collection of punches and matrices is now in the care of the Museum für Verkehr und Technik, Berlin.

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Bitstream, Cambridge, Mass. A digital foundry established in 1981 by Matthew Carter and Mike Parker, both of whom later left the company. Bitstream has issued digital revivals of many earlier faces and new designs by Carter, John Downer, Richard Lipton, Gerard Unger, Gudrun Zapf-von Hesse and others.

Carter & Cone, Cambridge, Mass. A digital foundry established in 1992 by Matthew Carter and Cherie Cone. It issues original designs and historical revivals by Carter.

Caslon Foundry, London. A metal typefoundry established by William Caslon about 1723 and maintained as a family business for four generations. It survived as the firm of H.W. [Henry William] Caslon until 1936. Most of the older surviving punches are now in the St Bride Printing Library, London. The newer material passed to Stephenson, Blake. In 1998, Justin Howes acquired rights to the name H.W. Caslon & Co. Under this name, his digital foundry in Northamptonshire issues the series known as Founder's Caslon.

Deberny & Peignot, Paris. Joseph Gaspard Gillé the elder, one of Fournier's apprentices, opened his own foundry in Paris in 1748 and left the business to his son in 1789. In 1827, the novelist Honoré de Balzac acquired this foundry as part of his intended writing, printing and publishing empire. The scheme failed at once, but the foundry was rescued by its manager and bought by Alexandre de Berny.

Gustave Peignot entered separately into the typefounding business in 1865. His own foundry entered its first creative phase under his son and grandson Georges and Charles Peignot, who issued historical revivals of the work of Jean Jannon and created a series of types based on the lettering of the eighteenth-century engraver Nicolas Cochin.

The De Berny and Peignot foundries merged in 1923. Under the guidance of Charles Peignot, the enlarged firm issued new designs by Adolphe Cassandre, Adrian Frutiger and others. When D&P ceased production in 1975, the type drawings and company library went to the Bibliothèque Forney, Paris, and most of the typographic material – including a set of original Baskerville matrices – to the Haas (now Fruttiger) Foundry, Münchenstein. Baskerville's punches, also formerly held by D&P, are now at the University Library, Cambridge.

df Type, Texing, Austria. A digital foundry established in 1999 by the Venetian calligrapher Giovanni DeFaccio and the Austrian printer-typographer Lui Karner. The foundry issues

the Rialto family and other text and titling faces, rooted in DeFaccio's calligraphy.

DTL (*Dutch Type Library*), 's-Hertogenbosch, Netherlands. A digital foundry established by Frank Blokland in 1990. It has issued original faces by Blokland, Chris Brand, Gerard Daniëls, Sjoerd de Roos, Gerard Unger and others, and historical revivals of types by Christoffel van Dijck, Jan van Krimpen, J.M. Fleischman and Hendrik van den Keere.

EETS (Εταιρεία Ελληνικών Τυπογραφικών Στοιχείων). Listed here under its English name, GFS: *Greek Font Society*.

Elsner & Flake, Hamburg. A digital foundry established in 1989 by Günther Flake and Veronika Elsner. The firm has produced a large number of digital revivals and made the original digital versions of a number of ITC faces.

Emigre, Sacramento. A digital foundry established in Berkeley in 1985 by Rudy VanderLans and Zuzana Ličko. In 1992, the office moved to Sacramento. The firm issues original faces by Ličko, VanderLans, John Downer and others.

Joh. Enschedé en Zonen (Johann Enschedé & Sons), Haarlem, Netherlands. A printing plant and typefoundry operating from 1743 to 1990. In two and a half centuries of operation, the firm acquired material from many sources, including some of the punches and matrices of J.M. Fleischman and Christoffel van Dijck. During the early twentieth century, it issued in foundry form the types of its chief designer, Jan van Krimpen. In 1990, its stock of matrices and punches was transferred to the Enschedé Museum.

The Enschedé Font Foundry, Hurwenen, Netherlands. A digital foundry established in 1991 under the direction of Peter Matthias Noordzij. It has issued original designs by Bram de Does, Gerrit Noordzij, Christoph Noordzij, and Fred Smeijers.

Esselte Letraset, London. Letraset Ltd. was founded in 1959 as a manufacturer of dry transfer lettering. It was acquired by the Swiss firm Esselte in 1981 and a few years later began to issue its faces in digital form. The digital library now includes both historical revivals and original designs by Michael Gills, Michael Neugebauer and others.

Fann Street Foundry, London. A metal foundry established in 1802 by Robert Thorne. Its creative period came in the 1850s, when it was owned by Robert Besley and issued original designs cut by Benjamin Fox. The surviving material was acquired by Stephenson, Blake in 1905.

Font Bureau, Boston. A digital foundry established in 1989 by David Berlow and Roger Black. It has issued both historical revivals and original designs by John Downer, Tobias Frere-Jones, Richard Lipton, Greg Thompson and others.

FontShop International, Berlin. A digital foundry established in 1989 by Erik Spiekermann. It has issued original designs by Spiekermann, Erik van Blokland, Martin Majoor, Just van Rossum, Fred Smeijers and many others.

Walter Fruttiger, Münchenstein, Switzerland. The Fruttiger Foundry, operating under this name since 1989, traces its roots to an operation founded by Jean Exertier in 1580. For more than two centuries it was known as the Haas Foundry, after Johann Wilhelm Haas, who acquired the company in 1740. It now possesses little material from before the eighteenth century, and in its long life has not been the source of many original faces. In the first half of the twentieth century, however, Haas issued new designs by Walter Diethelm and, in 1951, the first versions of Max Miedinger's Helvetica. It does possess some original Baskerville matrices, acquired by Haas from D&P.

FTB (*Fundición Tipográfica Bauer*), Barcelona. A metal foundry established in 1885. It is the last surviving branch of the old Bauer network and now holds much of the Bauer Foundry's surviving typographic material. From 1922 to 1995 it was known as FTN, the Fundición Tipográfica Neufville – a name still used by the digital arm of the company.

Genzsch & Heyse, Hamburg. A metal foundry established in 1833 and absorbed by Linotype in 1963. It issued both blackletter and whiteletter types designed by Friedrich Bauer, Otto Hupp and others.

Golgonooza Letter Foundry, Ashuelot, New Hampshire. Established in 1980 by Dan Carr and Julia Ferrari, who cast type from Monotype matrices and issue Carr's own faces, some cut by hand in steel and others created in digital form.

Grafotechna, Prague. A metal typefoundry important for its castings of the work of Miloslav Fulín, Oldřich Menhart, Vojtěch Preissig and other Czech designers.

GFS (*Greek Font Society*), Athens. A digital foundry established in 1992. It has issued digital versions of historically important Greek types designed by Ambroise Firmin-Didot, Richard Porson and Victor Scholderer, as well as new Greek designs by Takis Katsoulides and George Matthiopoulos.

Haas Foundry. See *Walter Fruttiger.*

Hoefler & Frere-Jones, New York. Jonathan Hoefler established his own digital foundry in Manhatten in 1989. In 2004 the name was changed to reflect the increased role of his associate Tobias Frere-Jones. The firm has produced important designs by Hoefler and useful digital revivals of the Fell types.

Dr-Ing. Rudolf Hell. See *Linotype*.

Imprimerie Nationale, Paris. A printing house and foundry established by Louis XIII in 1640 as the Imprimerie Royale. With the French Revolution (1789), the Imprimerie Royale became first l'Imprimerie Nationale and then l'Imprimerie de la République. With the coronation of Napoleon I in 1804, it became l'Imprimerie Impériale. After the Restoration of 1815, it was again l'Imprimerie Royale. In 1848, after two more revolutions, it was l'Imprimerie Nationale once more. It has retained this name ever since – except for the hiatus, 1852–1870, under Napoleon III, when it reverted to l'Imprimerie Impériale. It owns the surviving punches and matrices of Jean Jannon (the source of most of the world's 'Garamonds') and a large quantity of historically important material for the typography of Asian languages. Over the years it has sponsored new designs by many hands, including Firmin Didot, Philippe Grandjean, Marcellin Legrand, Louis-René Luce and José Mendoza y Almeida. It is the one surviving institution with punchcutters on salary. *Typefoundries*

Intertype (International Typesetting Machine Co.), New York. When the basic Mergenthaler Linotype patents expired in 1912, a group of investors had assembled in New York, ready to build a competing, and very similar, machine. Its matrices included new adaptations of foundry faces designed by Dick Dooijes and S.H. de Roos. The firm was involved in phototypesetting as early as 1947. After a merger in the 1950s, it was known as the Harris Intertype Corporation and became a principal manufacturer of photographic matrices.

ITC (*International Typeface Corporation*), New York. Founded by Aaron Burns and Herb Lubalin in 1969 as a typeface licensing and distribution agency. The original domain was limited to phototype. In the 1980s, ITC began to license digital designs as well. Not until 1994 did it start to produce and market its faces directly. For more than a decade, there was a readily identifiable ITC style: a standardized large torso with interchangeable serifs that reduced the alphabet and its history to superficial costume. This Procrustean approach to type design

faded in the 1980s. Coincidentally, the company was bought in 1986 by Esselte Letraset. The list includes original designs by Ronald Arnholm, Matthew Carter, Erik Spiekermann, Hermann Zapf and many others.

Typefoundries

Klingspor Brothers, Offenbach. A metal foundry established in 1842 and operated under several different names before its acquisition in 1892 by Karl Klingspor. It issued original faces by Peter Behrens, Rudolf Koch and Walter Tiemann. After its closure in 1953, the library and drawings were transferred to the Klingspor Museum, Offenbach, and most of the matrices to the Stempel Foundry, Frankfurt.

Lanston Monotype Machine Co., Philadelphia. The Monotype machine as we know it was devised by John Sellers Bancroft of Philadelphia in 1900. It grew, however, from a series of earlier machines invented by Tolbert Lanston of Washington, DC, beginning in 1887. The American company created to manufacture and sell these devices started slowly and was soon outdistanced by its English counterpart, formed a decade later with the same objective and almost the same name (see below: *The Monotype Corporation*). The American firm nevertheless remained in business, moving to Philadelphia in 1901 and pursuing on a smaller scale its own design agenda. This included cutting mats for historical revivals and original designs by Frederic Goudy, Sol Hess and others. The surviving material was dispersed in 1983.

Lanston Type Co., Mt Stewart, Prince Edward Island. In 1983 Gerald Giampa acquired a collection of patterns and drawings from the Lanston Monotype Company of Philadelphia. With this foundation, he established a digital foundry in Vancouver, moving to PEI in 1994. The library consists almost entirely of digitized versions of American Monotype faces, especially work by Frederic Goudy.

LetterPerfect, Seattle & New York. A digital foundry established in 1986 by Paul Shaw and Garret Boge. It has specialized in titling faces, including many with carefully researched inscriptional pedigrees.

Linotype Library, Bad Homburg. In Brooklyn in 1886, Ottmar Mergenthaler began to sell his newly invented Linotype machine. This led to the founding of the Mergenthaler Linotype Co., Brooklyn, and Mergenthaler Linotype & Machinery Ltd., Manchester, both in 1890. Their German ally, Mergenthaler Setzmaschinen-Fabrik, Berlin, was created in 1896. Many

of the early matrices were produced under contract by the Stempel Foundry, Frankfurt, from designs by artists such as Warren Chappell, Georg Trump and Hermann Zapf. Others were produced in England from the designs of George W. Jones, and in the USA from designs by W. A. Dwiggins, Rudolph Růžička and others.

Linotype began producing photosetting equipment in the 1950s, CRT (cathode ray tube) photosetters in the 1960s, and high-resolution laser setters in the 1980s. The German firm, which had relocated to Frankfurt in 1948, merged in 1990 with Dr.-Ing. Rudolf Hell GmbH of Kiel.

In 1997, Linotype's digital foundry was spun off under the name the Linotype Library, which relocated to Bad Homburg, north of Frankfurt, in 1998. It has issued many of the old Linotype faces in digital form, and new designs by Adrian Frutiger, Hermann Zapf and many others. A large collection of early material from the American branch of the company is now at the Rochester Institute of Technology, Rochester, New York, and the University of Kentucky, Lexington.

The Ludlow Typograph Co., Chicago. Washington Ludlow of Chicago began making typecasting machinery in 1906, but the Ludlow caster which his company sold throughout the early twentieth century was a later device, designed and built by William Reade in 1909. The machine casts slugs from handset proprietary matrices and was therefore used for little except display type, but several Ludlow faces have been successfully adapted for digital text composition. The company issued both historical revivals and original designs, chiefly by its director of typography, R. H. Middleton. It ceased operation in North America in 1986. The English arm, founded in the early 1970s, closed in 1990.

Ludwig & Mayer, Frankfurt. A metal foundry established circa 1920 and closed in 1985. The surviving material was transferred to FTB in Barcelona. During its heyday, the firm issued original designs by Jakob Erbar, Helmut Matheis, Ilse Schüle and others.

Mergenthaler. See *Linotype.*

Miller & Richard, Edinburgh. A metal foundry established in 1809 by George Miller, joined by Walter Richard in 1832. The foundry issued original designs by Richard Austin, Alexander Phemister and others. When it ceased operation in 1952, the surviving material went to Stephenson, Blake.

The Monotype Corporation, Redhill, Surrey, England. An entity called the Lanston Monotype *Company* was first formed in the USA in 1887. Another, called the Lanston Monotype *Corporation* (later simply the Monotype Corporation) was formed in England a decade later. For the American firm, see *Lanston Monotype.*

Typefoundries

The typographically creative phase of the English firm began in 1922 with the appointment of Stanley Morison as typographic advisor. Over the next few decades, English Monotype cut a number of meticulously researched historical revivals as well as new designs by Eric Gill, Giovanni Mardersteig, José Mendoza y Almeida, Victor Scholderer, Jan van Krimpen, Berthold Wolpe and others. The firm began producing photosetting equipment and photographic matrices in the 1950s, and laser typesetting machines in the 1970s.

In the early 1990s a new and smaller company, Monotype Typography, was spun off to produce and market digital type, including digital reincarnations of the faces originally cut in metal for the Monotype machine. This firm merged with Agfa in 1999, becoming Agfa Monotype. Metal matrices are still made on demand in England by the Monotype Trust.

Nebiolo Foundry, Torino. A metal typefoundry established in 1878 by Giovanni Nebiolo through the amalgamation of several older and smaller firms. It is important for its castings of original designs by Alessandro Butti and Aldo Novarese. Nebiolo ceased operation about 1990.

Neufville Foundry, Barcelona. See FTB.

Norstedt Foundry, Stockholm. A metal foundry, formerly supplied with matrices by Robert Granjon, François Guyot, Ameet Tavernier and others. The surviving material is now in the Nordiska Museet, Stockholm.

Fonderie Olive, Marseilles. A metal foundry which ceased operation in 1978. It issued a number of original designs by Roger Excoffon, François Ganeau and others. The surviving material is now at the Fruttiger Foundry, Münchenstein.

ParaType, Moscow. Successor (as of 1998) to the ParaGraph (or Parallel Graphics) digital foundry, which was founded in 1989. It issues original designs and historical revivals of Cyrillic, Latin, Georgian, Arabic, Hebrew and Greek faces.

Pie Tree Press & Foundry, New Westminster, British Columbia. Jim Rimmer's press and foundry, started in 1960, now produces both metal and digital type by Rimmer and others.

Plantin-Moretus Museum, Antwerp. The printing house and foundry established by Christophe Plantin about 1555 was conserved for nearly three centuries by descendants of Plantin's son-in-law, Jan Moretus. It was converted to a museum in 1877. It includes a rich collection of original material by Claude Garamond, Robert Granjon, Hendrik van den Keere, Ameet Tavernier and other early artists.

Polygraphmash (НПО Полиграфмаш), Moscow. The Institute for Machine Printing. Its drawing office, active from 1938 to 1992, issued type designs by Galina Bannikova, Nikolai Kudryashev, Pavel Kuzanyan, Vadim Lazurski, Anatoli Shchukin and others.

Scangraphic, Hamburg. Formerly Mannesmann Scangraphic, a manufacturer of photosetting equipment. In the 1980s it began to issue digital fonts. These were poorly finished but included one important design by Hermann Zapf.

Schelter & Giesecke, Leipzig. Johann Gottfried Schelter and Christian Friedrich Giesecke established this foundry in 1819. Many of the early faces were designed by Schelter himself. In 1946 the firm was nationalized as Typoart.

D. Stempel, Frankfurt. After its foundation by David Stempel in 1895, this firm absorbed the holdings of many other German foundries. It also issued many original faces by Hermann Zapf, Gudrun Zapf-von Hesse and others, and sold type cast from the original matrices of Miklós Kis. After the foundry closed in 1986, the typographic material was transferred to a museum known as the Haus für Industriekultur in Darmstadt. The tools of Stempel's last master punchcutter, August Rosenberger (who cut the original versions of Zapf's Palatino) are now in the Gutenberg Museum, Mainz.

Stephenson, Blake & Co., Sheffield, England. A metal foundry established in 1819 by John Stephenson, James Blake and William Garnet, using materials acquired chiefly from William Caslon IV. Over time, the firm has added further material from the Fann Street Foundry, the original Caslon Foundry, and other operations. Much of the inherited typographic material is now in the fledgling London Type Museum, though the company still casts and sells some type.

Stone Type Foundry, Palo Alto. A digital foundry established in 1991 by Sumner Stone. It issues Cycles, Silica and other faces designed by its proprietor.

Tetterode. See *Amsterdam Foundry.*

Tiro Typeworks, Vancouver. A digital foundry established in 1994 by John Hudson and William Ross Mills. It is named for Marcus Tullius Tiro, the Roman slave (freed in 53 BC) who served as Cicero's scribe. Tiro has developed extensive expertise in the design and encoding of non-Latin faces, especially those involving many contextual alternates.

Typefoundries

Typoart, Dresden & Leipzig. A metal foundry formed in 1946 by nationalizing the existing operations of Schelter & Giesecke and Schriftguss. From 1964 until 1995, when operations ceased, the head of design was Albert Kapr. The surviving typographic material is now at WMD, Leipzig.

URW (*Unternehmensberatung Karow Rubow Weber*), Hamburg. Established as a software firm in 1971, URW was diverted into digital typography by Peter Karow, a physicist excited by typography, who joined it in 1972. It was the original developer of the Ikarus system for digitizing type and of the HZ system for paragraph-based justification. It issued a large number of historical revivals as well as original faces by Hermann Zapf, Gudrun Zapf-von Hesse and others. The firm entered receivership in 1995. Its library has since been distributed by a corporate successor known as 'URW++.'

Johannes Wagner, Ingolstadt. Established at Leipzig in 1902 by Ludwig Wagner and relocated to Ingolstadt in 1949 by his son Johannes. It has acquired matrices from Berthold, Johns, Weber and other foundries, and continues to cast type.

C.E. Weber Foundry, Stuttgart. A metal foundry established in 1827. It issued original faces by Georg Trump and others before it closed in 1971. The surviving material was bought by the Stempel and by Wagner foundries.

WMD (*Werkstätten und Museum für Druckkunst*), Leipzig. A working typographic museum founded in 1994 by Eckehart Schumacher-Gebler. Its large stock of typographic material includes original punches and matrices by Johann Christian Bauer, Lucian Bernhard, Jakob Erbar, Albert Kapr, Paul Renner, Jacques Sabon and many others.

Y&Y, Carlisle, Mass. A digital foundry specializing in fonts and system software for the setting of mathematics and scientific texts. It has issued original designs by Charles Bigelow, Kris Holmes and Hermann Zapf.

INDEX

The names of typefaces are italicized in this index, but no distinction is made between generic names, such as *Garamond* or *Bodoni*, and specific ones, such as *Bembo* or *Aldus*.

This book was designed by Robert Bringhurst.
It was edited and set into type in Canada,
then printed and bound by C&C in Hong Kong.

The text face is Minion Pro, designed by Robert Slimbach.
This is an enlargement and revision of Slimbach's original Minion type
issued by Adobe Systems, Mountain View, California, in 1989.

The captions are set in Scala Sans, part of a family of type
designed in the Netherlands by Martin Majoor. The face was issued
by FontShop International, Berlin, and its affiliates in 1994.

The paper is Glatfelter Laid, made
at the Spring Grove Mill in Pennsylvania.
It is of archival quality and acid-free.