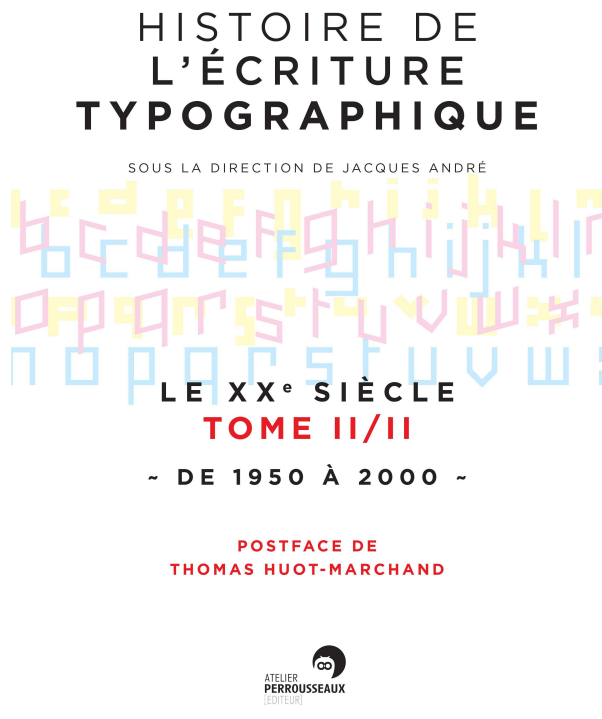


**Review and summaries: *The History of Typographic Writing — The 20th century Volume 2* (ch. 1–5), from 1950 to 2000**

Charles Bigelow

*Histoire de l'Écriture Typographique — le XXIème siècle*; tome II/II, de 1950 à 2000. Jacques André, editorial direction. Atelier Perrousseau, Gap, France, 2016, ISBN 978-2-36765-006-7, <http://tinyurl.com/ja-xxieme-ii>. 364 pp., 391 figures (illustrations, photos, diagrams, etc.), illustrated end papers. Also available as an ebook. The book is in French. Volume 1 (reviewed in *TUGboat* 38:1) covers the years 1900 to 1950.

Occasional commentary below by the reviewer is placed in square brackets; the main text summarizes the original writing.



End paper (fragment): Apple Chancery typeface and typography both by Kris Holmes.

Charles Bigelow

**Jacques André: Introduction**

This is the last volume in the series created by Yves Perrousseau, on the “History of Typographic Writing” from its beginning to the end of the 20th century.

In the 20th century, the powers of social and informational functions of writing, previously distinguished in part by their modes of production — for example, public inscriptions and signage, book and news publishing, and personal handwriting — were expanded by technological advances. Commercial, governmental, political, and educational institutions used typographic media to ever-greater extent and effect, although individual expression remained, for a time, limited to handwriting and typewriting. By the end of the century, however, new technologies of typography vastly enhanced the power, extent, and graphical range of personal written expression.

This second volume of the history of 20th century typography is intended for general readers interested in the history, art, and technology of the century, as well for specialists and students in the field. It has been written by ten different authors and thus reflects as many different perspectives and styles. In addition to text and copious illustrations, it includes an extensive bibliography.

**1. Alice Savoie: Typography transformed: the era of photocomposition** (*La typographie en pleine mutation: l'ère de la photocompositions*)

“Photocomposition before 1945: false starts and early experiments.”

In the early decades of the 20th century, several inventions applied photography to type setting. Despite clever mechanisms and novel names, the Bawtree, Photoline, Rotofoto, Thothomic, and Uher-type proto-phototypesetters proved less efficient, less economical, and lower in quality than established hot-metal composing machines and hence failed to become commercially successful. This first phase of photocomposition was followed by the so-called “first generation” photocomposers — the Intertype Fotosetter and the Monophoto, which adapted hot-metal machines by replacing the casting unit with a photo unit. These machines produced commercially adequate output, but were not widely used.

“Second generation” photo-electronic systems, especially the pioneering Lumitype invented in France in the 1940s by Moyroud and Higonnet but developed in the U.S. as the Photon (sold in France as the Lumitype), revolutionized text composition in the 1960s and 1970s. Third generation phototypesetters were based on cathode ray tube (CRT) imaging and computer control, and fourth-generation machines were based on laser imaging.

The phototypesetting revolution was not merely technical but also social. Fast typing abilities on QWERTY keyboards (AZERTY in France) coupled with quick learning of computer mark-up codes and commands replaced the mechanical skills learned from long apprenticeship in hot-metal type technology. “Photocomposition enabled the type-compositor to trade the blue collar laborer’s shirt and noisy, heavy machines, for the white collar office shirt and precision knives and photochemical processes.”

[CB: Thus began a trend toward higher education and social mobility for typographers, women and men, reflected academically, first in the awarding of Bachelor’s, then Master’s, and most recently, Ph.D. degrees in typography, supplanting the exclusively masculine apprenticeships of older generations of typographers.]

## 2. Alice Savoie: The creation of new typefaces for photocomposition (*Concevoir de nouveaux caractères pour la photocomposition*)

The designs of Adrian Frutiger and Ladislav Mandel.

Phototypesetting machines transformed not only the process of composing texts but also the process of making type. Type fonts ceased to be miniature metal sculptures and instead became abstract photographic images, requiring new techniques and often, new designers.

In 1953, Charles Peignot, director of the Deberny & Peignot foundry in Paris, hired a young Swiss designer, Adrian Frutiger, and assembled a team that included Ladislav Mandel and Lucette Girard, to produce high-quality photo fonts for the Lumitype photo-typesetter. The team first adapted popular metal faces like Garamond, Baskerville, and Times Roman to the strictures and distortions of high-speed optical imaging, but then Frutiger persuaded Peignot to support development of a totally new family of sans-serif types based on Frutiger’s student studies at the Zurich School of Arts and Crafts [where he was taught by Walter Käch and Alfred Willima].

The result in 1957 was the astonishing Univers family. In the metal type era, extensive font families like those of P.-S. Fournier and M.F. Benton had been cut incrementally in various sizes and styles over years or decades, but Univers burst forth from Deberny & Peignot all at once in 21 variations of weight, width, roman and italic, and all photographically scalable to many sizes. Typography would never be the same again.

[Univers was enthusiastically embraced by modernist graphic designers and over ensuing decades, its basic concepts were adopted by later generations

of type designers. There is hardly a new family of sans-serif types today that does not owe a debt to Univers, whether overt or unacknowledged.]

As phototype achieved commercial success in the 1960s and 1970s, more firms commissioned and developed original typefaces for photocomposition. At Monotype, John Dreyfus commissioned new photo text faces by Frutiger, Jose Mendoza, and Chris Brand. At Linotype, Mike Parker commissioned new script faces by Matthew Carter and Hermann Zapf, as well as new types for Arabic, Hindi, Hebrew, Greek, and other non-Latin alphabets.

Foreseeing typeface piracy in the photo era, Charles Peignot, with Stanley Morison, Jan van Krimpen, Hermann Zapf, and others, formed the International Typographic Association (l’Association Typographique Internationale, ATypI) to promote intellectual and artistic property protection for typeface designs. Several American photocomposing machine manufacturers prospered by developing cheaper and faster machines but plagiarizing typefaces, relying on lack of American copyright for type designs [still the case] as well as weak or absent protections in other countries.

Beginning in the 1970s, the International Typeface Corporation commissioned new types and modernized versions of traditional types for photocomposition. New ITC types by designers Ed Benguiat, Hermann Zapf, and others were licensed by many photo and digital composing machine manufacturers and found wide popularity, especially in advertising and display typography.

## Christian Laucou: First interlude: Classification of typefaces and cataloging of fonts (*Première pause: classification des caractères et catalogage des fontes*)

As typeface variations multiplied, type classification became a perennially fascinating intellectual exercise. Classification systems were proposed by, among others: Thibaudeau in 1921; Audin in 1929; Duvillé in 1931; Tschichold in 1951; Vox in 1952; Turner, Berry & Johnson in 1953; and the German DIN standard in 1962. Most of these shared, to varying degrees, a small set of core classes denoting text typefaces of historical eras, supplemented by stylistic variations mainly produced in the 19th century. Differences between classification systems were partly due to lumping or splitting of a few classes, like the gothic scripts, the numerous sans-serifs, and multitudinous “fantasy” display faces.

The Vox classification was adopted by ATypI in 1962 and remains widely used and useful, but new classifications continued to be proposed, in part

because increasing multiplicity of type forms rendered older classifications incomplete, and partly because perceived flaws in the logic or concepts of previous systems spurred new efforts. Bringham, in 1992 and later, utilized art historical nomenclature as well as biological taxonomy to articulate aesthetic-conceptual relationships of type forms. In commercial type sales, marketing and advertising, categories based on usage, context, and emotion have appeared in type catalogs, specimens, and web sites. Classification of non-Latin typefaces, such as Chinese or Arabic, posed additional difficulties because of cultural and historical distinctions not always shared with Latin typography.

[In the classification systems cited above, the number of different classes ranges between 5 and 22, with average and median both around 10. Because of the vast proliferation of type forms in the digital era and type usage by billions of computer and smart phone users, type classification has become a nexus of modern Internet culture, inviting further analyses of font features and classes, whether logical, semantic, or pragmatic.]

### 3: Jacques André: Office typography: typewriters, printers, and “strike-on” fonts (*Vers la typographie de bureau: machine à écrire, imprimantes et caractères à impact*)

Following their invention in the 19th century, typewriters proliferated in the 20th century. Keyboard layouts varied by manufacturer until standardization of a few layouts according to country or language, like QWERTY in the U.S. and AZERTY in France. For ease of use and mechanical simplicity, typewriter typography was graphically simplified. Most typewriters had monospaced fonts and a single type size. Only a few sizes were available.<sup>1</sup>

When a key was struck, a character image on a moving type bar impacted an ink-impregnated ribbon and squashed the character image onto paper.

Because of wear on type from the very high number of repeated impacts and coarsening of letter images from ribbon squash, typewriter typefaces were usually monoline and based on sturdy designs, particularly slab-serif faces. Typewriters became so

<sup>1</sup> [CB: Also called “fixed-pitch” or “fixed-width” fonts, as used in this footnote. All characters have identical widths, for example, the letter ‘i’ in its space has the same set width as the letter ‘m’ in its space. In the U.S., the most popular standard size was traditional English “pica”, with a height of six lines per inch when single spaced vertically, and 10 characters per inch horizontally. The smaller “elite” size set at 12 characters per inch but usually at the vertical “pica” line spacing.]

popular that traditional type foundries created printing typefaces to imitate the typewritten look. The popular Courier, designed for IBM electric typewriters at IBM in 1956 by Howard Kettler, was based on geometric slab-serif printing types. Sans-serif, italic, and all-capital typewriter faces were also produced.

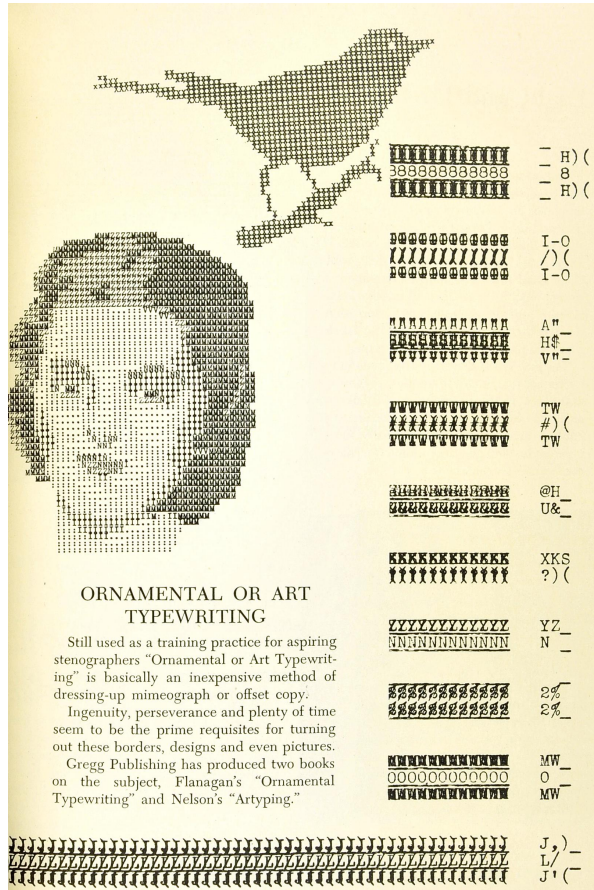
A deficiency of the typewriter was that it produced “one-off” documents that were not easily reproducible. A few carbon paper copies of lesser quality than the original could be made while typing, but mimeography, offset lithography, and photocopying were used to reproduce typewritten documents in greater quantities.

The ubiquity of the typewriter, its conceptual simplicity, its standardized keyboard, and its vast number of users led to adoption of typewriter-like input for other systems including Telex, Teletype, Varityper, and Justewriter, as well as computer input using paper tape perforated by keyboard typing. Computer output also predictably produced typewriter-like printing. When CRT monitors and keyboards began to be used for computer input, the dot-matrix characters displayed on screens resembled, more or less, monospaced and monoline typewriter fonts. Thus, the typewriter became one of the earliest, longest enduring, and most important paradigms in human-computer interaction.

Adoption of typewriter-like computer input also spurred standardizations of the numerical computer codes corresponding to letters and characters, resulting in ASCII (American Standard Code for Information Interchange), European ISO Latin, and IBM EBCDIC character encodings. Stringent technical limitations and typographic simplicity did not, however, totally suppress artistic ingenuity. Typewriter and “ASCII art”, made with monospaced typewriter or computerized typewriter-like characters, included a plethora of often playful and ingenious images and patterns.

### Christian Laucou: Second interlude: Games with letters (*Deuxième pause: Jouons avec les lettres*)

In the Latin, Hebrew, and Arabic writing traditions [Chinese and Japanese could be included], scribes often played with the arrangement and shaping of letters to make pictorial, ornamental, or scholarly arrangements of text. This tendency continued into European typography with the Hypnerotomachia Poliphili printed by Aldus (1499), an edition of Callimachus by Henri II Estienne (1577), and the polyglot Bible by Christophe Plantin (1572). Renditions of pictorial typography include the mouse’s tail



in Alice in Wonderland, poetry by Stéphane Mallarmé, Calligrammes by Guillaume Apollinaire, and avant-garde compositions in several “isms”, including Dadaism, Futurism (both Italian and Russian variations), and De Stijl.

These experiments in the early part of the 20th century were later followed by typo-pictorial compositions of poetry and prose under the banners of Lettrisme, “poésie sonore”, “poésie expérimental”.

[Similar manifestations appeared in works from OULIPO (Ouvroir de littérature potentielle), in international “concrete poetry”, in the playful “Typoésie” by Jérôme Peignot, in many typographic works by Robert Massin, and in compositions by Bruno Pfäffli and other students of Emil Ruder.]

Following the avant-gardists, playful renderings and distortions of letters for semantic as well as phonetic signification often appeared in commercial advertising. As mentioned in chapter 3, when computer typography was limited to single sizes of monospaced fonts in limited character sets, “ASCII art” (as above) was spontaneously generated in a kind of ad hoc computer pointillism and was often widely distributed because of the ease of text transmission.

#### 4. Thierry Gouttenègre: Transfer lettering (*La lettre transfer*)

Beginning in the 1960s and continuing for three more decades, transfer or “rub-off” lettering provided a handy and affordable means of typographic composition for graphic designers, architects, fashion designers, engineers, and others needing easy access to limited amounts of typography.

Transfer letters were based on the method of decalomania (“decal” for short, an image-transfer method invented in France and exploited in 19th century England for decorating pottery). The 20th century innovative rub-off letters of Letraset, Alfac, Mecanorma, and other firms were screen printed with an adhesive onto a substrate from which the letters could be hand-transferred onto paper or other surface by careful rubbing. Although rub-off letters began with selected traditional typefaces, the “fonts” quickly expanded into realms of bold faces, fantasy forms, shape distortions, radical expressions, and graphical explorations barely imaginable and commercially impractical in the previous, traditional metal type era.

The wild florescence of rub-off display faces began to fade at the end of the 1980s as digital typography increasingly provided more accessible, economical, and powerful means of typographic composition. It is unclear how many of the rub-off designs transitioned into the digital era.

#### 5. Jacques André: History of digital font technology (*Histoire technique des fontes numériques*)

In the 1950s, typography moved from metal type and photo-type to the abstractions of digital computing. Newly vectorized forms of letters, numbers, and diagrams began to be traced with computer-controlled electron beams on phosphorescent CRT screens.

Similar information was also used to draw images with electro-mechanical plotters on paper or other substrates. A noteworthy compilation of vector-defined fonts for early computer screens and plotters was published as “Calligraphy for Computers” by Allen Hershey. The Hershey fonts, which were polygonal because of the technology, had many forms and variations — linear, cursive, and gothic styles as well as mathematical, chemical, and other symbols.

In the late 1960s, typesetting machine manufacturers began to use rasterized letters — aggregations of pixel elements or run-length codes — to display text on CRT screens from which photographic film or paper could be exposed. The results were equivalent to analog phototypesetting but the digital typesetters ran much faster. Also in the 1960s and 1970s,

CRT monitors, which displayed simple dot-matrix characters, began to be widely used for computer data input and programming. When this screen technology was adopted for broad public usage in the French Minitel system in conjunction with the telephone service, tens of millions of customers began to read dot-matrix characters on screens.

The limitations of low resolution digital letter imaging prompted some designers, such as Wim Crowel, to devise rectilinear and polygonal letterforms adapted to the restrictions of then-current computer technology, but these novel experiments were soon supplanted by more traditional-looking letter forms as digital resolutions increased.

In the 1960s, in the fields of computer-aided design and manufacturing, there was pioneering research and development of mathematical descriptions and renderings of curves for computer graphics. In France, Pierre Bézier at Renault and Paul de Casteljau at Citroën adopted cubic splines for the description and rendering of curved lines and surfaces.

The decade of the 1970s was rich in exploration of digital letter forms. Peter Karow at the URW firm in Hamburg developed the Ikarus digital type system, which encoded contours of letters with cubic splines that could be output to computer plotters to cut photo-masks for photo-optical typesetters, and could be software scan-converted to rasters, run-lengths, and bitmaps for different kinds of digital typesetting equipment. Also in the 1970s, Philippe Coueignoux at MIT and Patrick Baudelaire at Xerox PARC independently used mathematical curves and splines to define letter contours for typography. At Stanford University, Donald Knuth developed his Metafont system for font creation and digitization, using cubic splines. Also in the 1970s and early 1980s, a few digital typesetting machines, especially for newspapers, used outline formats — some based on straight-line vectors and others on circular arcs — optimized for fast output.

Karow's Ikarus system gained commercial success among digital typesetting manufacturers and font developers. Moreover, URW itself digitized hundreds of very high resolution fonts in the Ikarus spline format, and those, along with fonts from manufacturers using Ikarus, became the basis for a substantial subset of the PostScript and TrueType fonts produced in the 1980s and 1990s by Adobe, Apple, and Microsoft for personal computers and laser printers.

The Xerox corporation played a major role in the development of digital typography in the 1970s. At the Xerox Palo Alto Research Center (PARC), bitmap fonts were developed for the screens of personal computers — the “Altos” — to display approx-

imations of some traditional typefaces, and spline-defined letterforms were developed by Patrick Baudelaire. The xerographic laser printer was invented at Xerox by Gary Starkweather in 1969 and was commercially developed for high-speed xerographic printing systems by 1977.

In the mid-1980s, Xerox's innovations were imitated and popularized in products like the Apple Macintosh computer and LaserWriter printer. Xerox had also developed software for computer interchange and output of type and pages on laser printers. Adobe Systems, founded by alumni of Xerox PARC, developed the PostScript page description language, which used outline fonts of cubic Bézier curves as part of a general imaging model, to solve the problem of device-independent page interchange and rendering. The first commercial PostScript printer was the Apple LaserWriter launched in 1985.

The spline-defined font outlines of Ikarus, PostScript, and similar systems had several advantages, including: economy in computer file size and memory utilization, scalability to arbitrary sizes, ease of rotation and modification. The raster scan-conversion of abstract mathematical outlines to arrays of discrete pixels on monitor screens or page bitmaps of laser printers raised difficult technical and aesthetic issues at low resolutions. Technical issues involved tracing pixels along the edges of characters and filling the edge-defined shapes, with the goals of increasing computational speed and efficiency. [These were mainly solved by improved rendering algorithms as well as by the increases in computing speed and memory described by Moore's Law.]

The aesthetic problems, however, proved more difficult because they involved aspects of human vision, mechanisms of reading, and expectations of the appearance of text, all less amenable to algorithmic analysis and hardware advances. At the laser printer resolutions of the 1980s, all below 600 dots per inch, simple scan conversion produced letterforms in which irregularities of stem weights, horizontal alignments, letter spacings, and traditional detailing produced texts that failed to conform to reader expectations. The outputs were accordingly judged inferior, and there was a scramble to ameliorate perceived type quality. Karow was the first to address this problem; in the late 1970s and early 1980s, the Ikarus system used software distortion of master outlines to conform to digital grids before scan-conversion. This was done off-line to produce bitmap fonts.

To its PostScript Type 1 fonts, Adobe added data to mark stems, curved bowls, vertical alignments, and other features, and those data were used to locally distort the outlines of characters prior to

rasterization in order to impose greater regularity when the characters were rasterized for the digital grids of printers. Adobe termed these declarative data “hints” but kept their implementations as trade secrets. Adobe’s advance over Ikarus was that PostScript hints were applied on-the-fly during rasterization in the printer, instead of off-line to produce fonts in bitmap and raster formats.

The success of PostScript and its fonts engendered competitors, of which the most successful was TrueType, invented at Apple and later licensed to Microsoft. TrueType used quadratic B-splines instead of cubic Bézier splines, and procedural instructions for fitting outline shapes to raster grids.

[The concept of procedural hinting had previously been developed in the late 1980s by the Folio corporation for its F3 font technology and disclosed to Apple early in the design of TrueType. Sun Microsystems acquired the Folio F3 technology but did not strive to promote it as a standard in competition to PostScript or, later, TrueType.]

In 1989, Microsoft licensed TrueType technology for its Windows operating system, igniting a years-long commercial battle popularly known as the “Font Wars”, in which the combatants made rival claims of technical and artistic superiority for their font technologies. A partial cease-fire in the Font Wars came in the 1990s when former combatants Microsoft and Adobe agreed on an expanded format named OpenType, in which character outlines could be implemented in either PostScript or TrueType form, and which included data to support alternative and context-sensitive forms and glyphs required in certain non-Latin writing systems like Arabic and the Indic scripts. OpenType, however, was promoted by the Adobe-Microsoft pair against a similar, earlier font technology, TrueType GX that had been previously released by Apple, so the font wars were not entirely over with the announcement of OpenType.

Between 1985 to 2000, some of the aesthetic problems of digital type were ameliorated in two ways. First, for computer screens, the algorithmic adjustment of pixel intensities along character edges, called “gray-scaling” or “anti-aliasing” reduced the perceptibility of jagged pixels along curves and diagonals. [This depended on the pixel resolutions of screens. At resolutions below (approximately) 120 pixels per inch, gray scaled edges looked smoother but blurrier and were not as acceptable as manufacturers hoped. Screen resolutions above 220 and 300 pixels per inch after the year 2000 effectively resolved the problem of jaggedness and irregularity of text on screen, obviating the need for hints.]

Second, for printers, doubling of resolutions from 300 to 600 dots per inch reduced the more egregious irregularities in text rendering, while techniques for decreasing intensity of laser beams along character edges to reduce apparent jaggedness of curves and diagonals, similar to anti-aliasing in which spot size was analogous to screen gray-scaling) made hinting less necessary or unnecessary. [Limitations on electrostatic printing limit the effective resolutions that can be achieved for mass-market devices.]

As computerized typography and document layout advanced, leaders in the computer document industry faced the problem of exchanging electronic documents across networks, computers, and devices, which required standardization of computer character encodings beyond the American ASCII and European ISO Latin standards. Begun by Xerox in the 1980s and supported by Apple, Microsoft, and other firms later in that decade or in the 1990s, a 16-bit character encoding standard called “Unicode” was developed with the goal of eventually encompassing all the world’s written languages. A similar encoding project was begun in Europe as the ISO-10646 standard. These parallel projects were merged in the early 1990s as the Unicode standard. Among many other benefits, Unicode brought computer character standardization to many of the non-Latin and non-European orthographies and writing systems that had encountered obstacles to efficient computerization, thus spurring development of computer-aided document production and distribution.

[CB: Because of the length needed for the above review of the information-packed Chapter 5 on digital fonts, the remaining chapters of the book will be covered in the third and final part of this review. For reference, the remaining titles and authors are:

- “The first commercial digital fonts”, by Frank Adebaiye;
- “Interlude: On the revival of typefaces”, by Franck Jalleau;
- “Everyday working fonts from 1985 to 2000”, by Olivier Jean;
- “Hybridization, (de-)construction, and quotation in typography from 1985 to 2000”, by Hervé Aracil;
- “Interlude: On the preservation of typographic heritage”, by Alan Marshall; and
- “Postface — the metamorphosis of typography”, by Thomas Huot-Marchand.

Ending with an extensive bibliography and index.]

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<http://lucidafonts.com>