VISIBLE LANGUAGE
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Guest editors: **Charles Bigelow and Lynn Ruggles**

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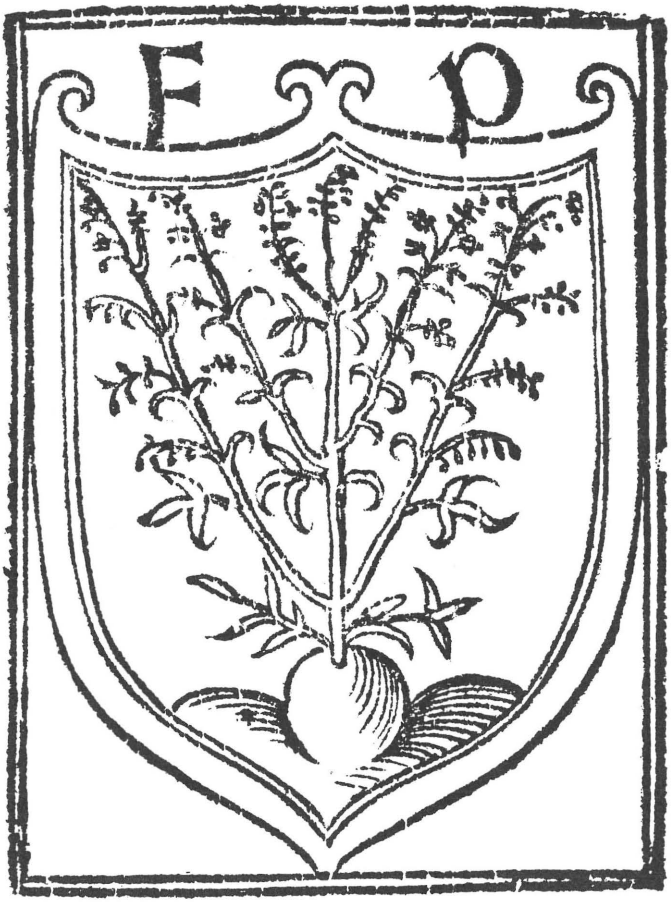


The printer's mark of Friedrich Peypus. Nuremberg, active 1512–1534.

Reproductions of the printer's marks shown were taken from the collection at the Stanford Museum of Art, Stanford University (Alice Meyer Buck Fund).

Introduction

This is the first of two Visible Language special issues that constitute the Proceedings of the seminar "The Computer and the Hand in Type Design" held at Stanford University from July 31 to August 7, 1983. It was the fifth Working Seminar in Letterform Education and Research held under the auspices of the Association Typographique Internationale (ATypI).

The papers in this volume and its companion represent diverse views of a complex subject. The views come from artists who design and use type, and from scientists who design and build computer systems for producing type, but the subject here is more than 'typography', which in its traditional sense narrowly connotes an industrial craft now obsolescent. The explicit purpose of the seminar was to bring together artists and scientists for inter-disciplinary discussions of technical and aesthetic problems in the creation of digital type, but an implicit result was a study of literacy from a modern scribal perspective.

These Proceedings are not a textbook of digital typography, but are instead a collection of penetrating insights from designers and researchers exploring the field. Rather than an aerial map of a known territory, these are snapshots of an obscure landscape intermittently illuminated by flashes of lightning, in which we glimpse scenes of where we are heading, where we have been, and where we might be if we choose a different path.

Typography is *writing* in the industrial era. Computer typography may be less than two decades old, but we are the literate heirs to a scribal tradition that began with cuneiform writing five millennia ago in the Sumerian city-states of Mesopotamia. Computer literacy and its problems can best be understood in the context of writing.

Writing is the material expression of language, linking abstract ideas to concrete visual images. When we read text, the linkage is symbolic: meanings are represented by forms. When we study the writing itself, the linkage is indexical: material shapes point to the concepts of their construction. The history of civilization and the history of writing are inextricably linked. Our records of the past, whether from yesterday or five thousand years ago, are composed in glyphs, letters and characters produced in a rich array of forms with a variety of tools and techniques: stylus and clay tablet; chisel and stone; reed pen and papyrus; brush and paper;

The word for 'five' in ten languages and scripts from ten different branches of the Indo-European language family, 1800 B.C. to A.D. 1600. Written out by Kris Holmes.

quill and parchment; metal pen and paper; printing type and paper. The use of computers to write with cathode-ray-tube and laser is merely the latest development in scribal technology. To understand the significance of digital typography, we must study both its material technology and its fundamental concepts.

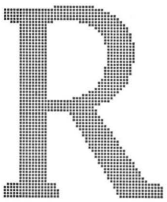
This is not a novel undertaking. Each major development in scribal technology has required re-analysis of the nature of writing. The shapes of letters interact with the technique of their production. To achieve optimum legibility in a new medium, scribes (including typographers and engineers) have adapted either the letter image or the marking technology, or both. Analysis of writing principles during periods of technical and conceptual transition can be seen throughout the history of writing: in Greek inscriptions that experimented with the two-dimensional sequence of letterforms; in Renaissance treatises on geometric letter construction; in modern computer journal articles on algorithms and data structures for font representation.

In these Proceedings and elsewhere in typographic and calligraphic literature, analyses of the relationship between letter forms and writing technology are frequently (though covertly) framed in a dualistic philosophy of the ideal *versus* the material. The idealist maintains that letter shapes exist independently of technology: a capital 'R' could be the same design, whether written with a pen, carved in stone, hand-cut on a steel punch, exposed on film, or tessellated as a mosaic of glowing phosphors on the screen of a cathode-ray-tube. In opposition, the materialist holds that the letter image is the material and cannot be separated from it: a letter made of a different substance is a different letter. These familiar themes appear again and again in discussions of the relative merits of calligraphy *vs.* type; of hand-cut punches *vs.* mechanically engraved matrices; of metal type *vs.* photo-type; of digital raster images produced by algorithmic scan-conversion of cubic spline contours *vs.* hand-constructed bit-maps; of a single type design for linear scaling to all output sizes *vs.* multiple different type designs, one for each output size.

The philosophical focus of occidental discussions of typography is most often *tekhnē,* which in Greek means craft or art. Tekhne appears in terms such as technology and technique, but its more ancient Indo-European root meant weaving, appearing in Latin as *textus,* from which are derived the words textile and text (a weaving together of

letters and words). Hence there is a venerable association of the arts of writing and fabrication appropriate to a study of letterforms as artificial or cultural products.

In contrast, oriental literature on calligraphy frequently focuses on the spirit of writing. Hsieh Ho's first canon of Chinese painting and calligraphy (c. A.D. 500) names *ch'i,* breath or spirit, as the source of life and movement in art. Qadi Ahmad's treatise on calligraphy, *The Rose Garden of Art* (c. A.D. 1600), states that writing ravishes the soul, clears the sight, and brightens the heart; that the pen is a cypress in the garden of understanding. In these traditions, letterforms are natural or transcendental phenomena.



The role of the creative spirit (though overlooked in technical discussions) has been a powerful force in the modern revival of calligraphy and innovative type design. Literacy requires continuity of letter forms to be effective. But does continuity mean slavish copying of traditional designs, or does it mean the use of past forms as inspiration for innovative solutions to modern typographic problems? The importance of the spirit of the craftsman and the need for freedom of thought in the creation of worthwhile artifacts was passionately expounded in the 19th century by the eloquent art historian John Ruskin and by his admirer and follower, the artist William Morris. Through the Arts & Crafts movement which they founded, and the work of its principal calligrapher, Edward Johnston, their ideas have influenced the majority of 20th century lettering artists.

The force of those ideas is remarkable. The material product of lettering may be seen in books, but the motions, inspirations, and ideas which create letters are more often directly transmitted from scribe to student. It is difficult to adequately express the crucial importance which the shapes of letters can have for the lettering artist, without reference to the character of those who teach the art and its ideas. Among those influenced by the Arts and Crafts movement and the associated ideas of the Hammersmith Socialists was Lloyd Reynolds, the late Calligrapher Laureate of Oregon. Of Ruskin and Morris I can say little beyond what is in their writings, but I can speak about Lloyd Reynolds because I knew him, and he was unforgettable.

Calligraphy literally means 'beautiful writing'. It became an art form distinct from the traditional craft of the scribe during the 16th century, when the printing press supplanted the pen in the mass-production of books, leaving an eco-

Lloyd Reynolds

nomic niche for the skilled writing master in the creation of special manuscripts. As a scribe, Reynolds was dedicated to the transmission of knowledge; as a writing master he was committed to the teaching of calligraphy as a way for the common person to gain control of, and make beautiful, a fundamental aspect of civilized culture, and in so doing receive an understanding of beauty, history, literature, and philosophy beyond the narrow concerns of everyday literacy. In his youth a radical progressive dedicated to social change, and in his later years interested in the transcendental philosophies of Buddhism and Taoism, Reynolds always retained the open, plain-spoken ways of his western boyhood. His forceful, courageous commitment to truth influenced two generations of scholars, poets, and artists, and he survived political persecution during the McCarthy era, his values and his college teaching position intact, to see his favorite script, italic handwriting, adopted as a standard teaching alphabet for children in Oregon schools.

Many participants at the Stanford ATypI Seminar, including its organizer and its logo designer, were either students of Reynolds or students of his students. His ideas, which he claimed only to be passing on from previous and greater authorities, are so much a part of the thinking of his former students that sometimes when confronted with a lettering problem, a design question,or a new alphabet we ask ourselves, "Lloyd, what would you have thought of this?" But even more than answers, he left us with questions, many of which still resonate today with undiminished energy. I relate below one of his extemporary antinomies which raises the question of ideas, matter and spirit in letters. It has been puzzling me for nearly twenty years. I think of the Stanford ATypI Seminar recorded in these Proceedings as just one step toward an answer.

In a series of masterful lectures and demonstrations, Reynolds had taught us the technique of writing the Uncial hand, which is one of the Christian book hands in the progression of scripts from Roman capitals to Carolingian minuscule. Reynolds gave Uncial special attention, claiming that it appealed to novices. From the same progression of scripts, he had also demonstrated related hands called Quarter-uncial and Half-uncial. As he was assigning us the task of writing out a text in 'uncial', one of the students interrupted with the question, "Which uncial?" "What?" growled Reynolds, who hadn't heard it clearly. The student, intimidated by Lloyd's rough reply, repeated in a quieter voice, "Which uncial?" "What?" barked Reynolds. "Which

uncial?" asked the student again in a quavery but louder voice that Reynolds finally heard. "What do you mean, 'Which uncial'," retorted Reynolds, "There's only ONE *Uncial!*" Then he paused in the ensuing silence as we began to digest this wisdom, and he looked at us, and a gleam came into his eye, and he grinned and said, "And no two of them are alike!"

Charles Bigelow
Past-President, ATypI Committee on Letterform Education and Research
Organizer, Fifth ATypI Working Seminar
"The Computer & The Hand in Type Design"

John Dreyfus and Charles Peignot in Vienna during the signing of the treaty for the international protection of typefaces.

Setting up a page of type with Photon. Standing by (left to right) are L.M. Moyroud and R.A. Higonnet, inventors of the machine, and S.H. Caldwell and W.W. Garth of the Graphic Arts Research Foundation, where the Photon was developed.

A Turning Point in Type Design

John Dreyfus

This is the second turning point in type design that I have reached during my fifty years of chronic addiction to this basic element in typography. The first one occurred in 1957. At that time I might easily have overlooked it if it had not been pointed out to me by Charles Peignot, one of my oldest and dearest friends. He saw it so clearly that he quickly convinced me that I ought to help him to create ATypI. It was entirely his idea to form the Association Typographique Internationale; and because its creation was the direct result of his ability to perceive that earlier turning point in type design, I want to explain how he faced up to the particular problems which he saw at that point, before I suggest how we must now deal with the new situation which has brought us to a second turning point in type design – and one which again requires a collective effort by members of ATypI.

Charles Peignot's father was a distinguished Parisian typefounder whose career was cut short when he died fighting for his country during the First World War. His three brothers were also killed during that conflict, and all four brothers are commemorated by a street in Paris that was named after them (it is called La Rue des Quatre Frères Peignot). Charles was twenty-one when the war ended and he went into the family foundry with an acute consciousness of the responsibilities that had fallen upon him. The Peignot foundry had become successors to the great Didot family, and had also acquired the punches of the gifted Gillé family; but like his father, Charles commissioned new types drawn by his contemporaries and

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proved himself to be very much a man of his own time. He also displayed a remarkably wide interest in the other graphic arts – such as poster design and photography. In 1927 he founded and edited an enterprising new review called *Arts et Métiers Graphiques*, through which he came to be known and respected throughout Europe and the United States. He developed a breadth of vision which opened his eyes to the importance of filmsetting as a technique for creating and copying type designs.

During the Second World War, a new and fast method of filmsetting was invented by two French telephone engineers. The French economy at the end of the war was in such dire straits that money could not be raised over there to exploit the new filmsetter. So Peignot came to this country and helped to persuade a consortium, largely made up of men with newspaper interests, to build the new filmsetter. In France it had been known as the Lumitype, but over here it was renamed the Photon, and was first shown to the public in 1949 at a trade convention in Boston.

Peignot quickly grasped the fact that the advent of fast filmsetters for text composition and display meant the end of typefounding as an industry. He therefore secured the right to distribute the Photon machine in France, and undertook to apply his own expertise to designing and manufacturing a suitable wide range of text and display types for the new filmsetter. During the mid-nineteen fifties, the leading makers of hot-metal composing machines such as Linotype, Monotype and Intertype all came onto the market with filmsetting machines. Those early models were later superseded by others of far more sophisticated design; but as early as 1956, Peignot saw what others only appreciated many years later – namely that a turning point had been reached which indicated not only the end of typefounding as an industry, but also an end to the age of hot-metal mechanical typesetting machines.

The French have a gift for inventing slogans. About the time that ATypI was conceived, the French typographical fraternity kept on repeating 'Gutenberg is dead.' Of course he had been dead since 1468. What the slogan meant to dramatize was the fact that printing from moveable type as invented by Gutenberg was fast becoming obsolete. And what Peignot perceived was that the art of typography was now rapidly passing into the hands of entrepreneurs, electronic engineers, lens makers and computer experts who had a totally inadequate understanding of type design. He also foresaw that unauthorized copies of type designs would be made photographically at far greater speed and at

substantially lower costs than had ever been possible when copying a fount of type that was to be cast in metal.

Furthermore, Peignot realized that the new techniques of filmsetting needed new types designed by people who would be capable of combining a knowledge of the traditional skills which had been developed during more than five centuries of printing from moveable type, with a readiness to exploit the new opportunities created by the greater flexibility of the new filmsetting equipment. Clearly it was desirable to create new type designs for the new technology. And as Peignot knew from long experience as a typefounder, with an international market, how quickly unauthorized copies of type designs had been produced between the wars, he was well aware of the need to obtain effective new international legislation to protect type designs.

With this impending revolution so clearly understood, Peignot also saw the need to educate the public in typographical matters, because buyers and readers of printed matter can play a vital part by influencing the acceptance or refusal of new standards in type designs. Furthermore, new international legislation to protect type designs was unlikely to command effective support unless the importance of the subject was properly understood by a broad segment of the public.

It also became clear to Peignot that the design of typefaces was bound to move away from typefounders and composing machine manufacturers, and that it would pass into the hands of independent designers. The correctness of that view has since been proved by the establishment in this country of the enterprising International Typeface Corporation, and by several freelance designers working independently, or in partnerships.

Over the last twenty-five years. ATypI has often provided a forum for a variety of typographical problems to be debated at international congresses held in various European countries, including some within the Eastern bloc. A committee for those members concerned with education in letter forms was set up in 1972, and during the last ten years a high proportion of ATypI's funds have been allocated to educational activities. These activities are taking place just at the time that we have reached a second turning point in type design. This one opens up so many new roads that we greatly need to discuss which new directions are the right ones for us to take, and how we can prepare ourselves to travel with confidence and success along those directions that we choose. There have been so many changes in the past ten years that we can easily

spend a great deal of time examining the best ways of exploiting the present situation of type design, without devoting any time to what may or may not happen in the closing years of our century.

Sometimes we worry too much about the distant future, and forget that many problems in fact disappear or are solved by completely unexpected discoveries. Let me give you one example. Just about one hundred years ago, a lot of Londoners were getting seriously worried about the problem of removing the ever-increasing quantity of horse dung on the streets. How could it all be swept up, and where could it be dumped? A few years later the first horseless carriage appeared on the streets of London and the problem of dung removal disappeared.

When ATypI was founded in 1957, nobody could have predicted that the laser would be invented three years later, or that this invention would lead to the digitisation of type designs. Nor was it easy to predict the scale on which office machinery would become a substitute for the services hitherto provided by printers. The first IBM typewriter equipped with a golf ball head only appeared on the market in 1961, four years after the foundation of ATypI, and in that same year, the first ruboff letter transfer sheet was sold by Letraset in Europe. The now much-used term 'word processing' only entered the English language in 1964, and the first video cassettes only appeared on the market seven years later in 1971.

I realize that some people have lived their entire lives in a world that always contained golf ball typewriters and dry letter transfer sheets – let alone communication satellites, which like ATypI date back to 1957. I know about six other members of ATypI who were born like me in 1918 – or even earlier. So I realize there is not simply a generation gap between members of ATypI but a gap of two generations: some members may have grandparents who are my age. But I am not worried that these gaps may lead to difficulties between us when we turn our minds to the problems created by the speed at which conditions affecting type design have changed. I take the view that the longer you live, the greater becomes your experience of change, and therefore the greater should be your capacity to cope with change. By now I have reached an age which, to borrow Oscar Wilde's phrase 'I'm old enough to know worse.' All the same, I rejoice that I can now choose between a wider range of options than were open to me when I was younger.

Whenever you have to make a choice, you would do well to ask yourself first the right questions and then to try to

find the appropriate answers. That is what I hope will happen. I would now like to suggest two very broad questions which I think ought to be aired. First, 'What kinds of type designs are needed now?' and second, 'How ought we to approach the problems of designing new types, taking into account the technical changes of recent years and the altered structure of the services which now create printed matter?'

The first question contains an implication with which some people might disagree. For the question implies that we really do need more type designs than we already have. Well, I know a number of printers, and quite a few readers as well, who are both puzzled and irritated by what they regard as a plethora of existing type designs. The word plethora means 'an over-abundance, or fulness to the point of excess.' Now it cannot be denied that tens of thousands of type faces have been created during the five centuries since Gutenberg produced the first fount of black letter type. But many of those typefaces have since become obsolete, not only through changes in fashion but through political intervention. For example, the decline of black letter was hastened in 1941 by an edict that designated roman as the standard type to be used in Germany. At least this did not cut off the German people from its cultural roots, which alas happened in Turkey after 1928, when an edict prohibited the printing of books in Arabic, and made the adoption of roman compulsory.

Though some of us may regret the disappearance of a few handsome roman types that were popular in the past, we must remember that many of them were created for religious, political or commercial reasons that are no longer valid. The religious origins of some types are indicated by size names – such as canon or small missal. Others such as the *romains du roi* indicate that they were intended for royal use, while a name like *caractère de finance* shows it was intended for commercial work – though long before the advent of computers.

Conditions prevailing in 1983 are very different from those under which type designs were made and sold in the past. Formerly type designs were either made to meet the specific requirements of some important user, or they were made to conform to what a typefounder believed were the needs of enough customers to show him a profit, preferably in cash or at least to his reputation. The typefounder's market was limited by the distances over which he could deliver. During the nineteenth century, better communications by railway and steamship extended the typefounder's markets; but some of his customers were lost

near the end of the century to the composing machine manufacturers who were soon to become serious rivals. These manufacturers developed larger and more international markets, so their ranges of types had to be broad enough to serve a wide variety of typographical tastes and needs.

Composing machine makers sold type designs in the form of matrices; and for many years sales of matrices were regarded merely as adjuncts to the more valuable sales of machines. Only in the twenties did the idea progressively gain ground that machine sales could be enhanced by offering a better range of type designs than your competitors could provide. A few discriminating publishers, advertisers and printers also cottoned onto the idea that a distinctive array of good type designs was likely to attract new customers, and also to improve the reputations of those who could provide them.

As the typefounding trade contracted, the founders gradually came to terms with the composing machine makers: mutually advantageous deals were concluded between them, whereby the same type designs became available for both hand setting and machine composition. During this period typographical designers found little difficulty in deciding which type designs to specify because at that time comprehensive type specimens were available from all the different suppliers, and it was not difficult to locate a printer who could provide or obtain the specified types. Those convenient conditions change drastically with the advent of filmsetting. A great many types no longer exist for practical purposes because they are simply unavailable to the clients who would like to use them. A further aggravation is that even if a particular type is known to be available, it is often very hard to obtain adequate specimens of the entire range that can be generated on filmsetting equipment.

A quickening in the pace of life has brought about other problems. A great deal of printing – probably most of our printing – is now needed in a hurry. I have noticed that the printing services which have grown up around office copying machines – (to which so many people now turn for their printing) – are called 'instant printers.' You will often find them on the main street next to the 'quick cleaners.' This being an age of hurry and pressure, the only types that can be considered as existing for practical purposes are those which are *instantly* available and *cheaply* available. If you accept this view, then you will find that far from there being a plethora of type designs, there is now a dearth. Only the unhurried customer with a fairly elastic budget can

expect to find a supplier who can provide him with the type design he wants to use – and the customer may have to scour the world to find that supplier.

Under the circumstances I have just described, I am convinced that we have reached a turning point at which a great quantity and a great variety of new type designs are needed. In a moment I will explain what kinds of text types I believe we need; but first let me deal with display types in which diversity of design is of paramount importance. Extreme novelty is out of place except in display types. However, it is as hard to predict which kind of display type will become popular as it is for a book-publisher to pick out the best-seller from among the stack of manuscripts which thud unsolicited onto his desk. The only certainty is that nothing will ever deter writers from writing, any more than it will deter designers from drawing display types. If you want to understand what makes them do it, I suggest you try to catch the next revival of a film which Alfred Hitchcock based on John Buchan's novel, *The Thirty-Nine Steps*. In the screenplay written in part by Hitchcock's wife, the title became the code-word for a spy ring that is uncovered by Buchan's hero. The climax is reached when a music-hall performer called Mr. Memory (based on a real performer who answered almost any factual question put to him by the audience) is asked during his act by Buchan's hero 'What are the Thirty-Nine Steps?' Even though Mr. Memory is aware that his spymaster is in the theatre with a gun trained on him, and knows that he will be shot if he reveals that the Thirty-Nine Steps is the spy-ring for which he is working, he still gives the right answer. He is shot, but before he dies, he manages with his dying breath to give the police the exact wording of a secret document that he memorized for his spymaster. I tell you this story because it strikes me that Mr. Memory has this in common with many designers of display types. Not even the risk of death will deflect them from their professional compulsion to exercise a skill in which they take pride. My remark is meant as a compliment, not criticism; but I have sometimes wished that type designers could be as self-critical as the late James Thurber after he had written a play. 'It had only one fault,' he said, 'it was kind of lousy.'

Turning now to text types – by which I mean those designed for continuous reading – here the criteria are of two kinds, functional and stylistic. Of course the second is closely related to the first if you agree with the old dictum that form follows function. The functions which a text type must perform are partly human and partly mechanical. The human eye must be able to read a text type without

difficulty or distraction, but at the same time the human mind must derive some degree of conscious or unconscious pleasure from the impression which the design creates. When we evaluate a text type, we have to take into account the many differences which exist between readers of various countries, as well as differences of age, intelligence and reading habits. The only continuous texts read by millions of people in the developed countries of this world are read in newspapers, not in books. Consequently, the type designs which those millions find easiest to read are (through sheer force of habit) newspaper types in small size and set to a narrow measure. It is regrettable that so many newspapers are still set in types designed to be printed from hot metal even though a high proportion of newspapers are now printed from filmset text and offset plates. Furthermore, the lighting conditions under which we read newspapers are generally far brighter now than they were during the century before fluorescent lighting was introduced.

It may surprise some of you if I now raise the question whether we should give equal importance to stylistic as distinct from functional criteria when judging the merit of a text type. Many of you may be convinced that functional criteria are paramount. But from reading reports on a great many investigations into the legibility of type, I would suggest that stylistic criteria may be of greater importance. The outcome of many experiments indicates there is no statistically significant difference between the legibility of a wide variety of text types, even between seriffed and unseriffed types. On the other hand, differences of real statistical significance were detected when readers were asked which styles of type they preferred. The fact that they were capable of reading a great many different styles of type with virtually no degree of difficulty did not prevent them from giving very firm opinions about the types which they *preferred* to read. This finding ought to be studied by those who decide in what types to compose the vast amount of printed matter that is intended to attract or to persuade, but which nobody is *obliged* to read. For it clearly matters quite a lot whether the right type is chosen to appeal to a potential buyer or voter – or to anyone else who becomes a target for persuasive as distinct from obligatory printed matter (like airline schedules or railway timetables which we all have to read from time to time). The truth revealed by careful experiments is that our remarkably adaptable nervous system is quite capable of decoding most typefaces without difficulty, but that it also leads us to develop quite strong personal preferences for a few particular types.

These conclusions rejoice my heart. If so many readers have expressed statistically significant preferences for particular styles of type that are unrelated to the functional efficiency of those types, I am reassured that human beings are not robots, nor consistent, and that they are (to me) exhilaratingly unpredictable. This may of course dismay all those who prudently try to avoid financial risks by carrying out systematic market research. When it comes to type designs, many potential consumers will say they can only tell you what they like when they see it, and that there is nothing they like better than a nice change.

Never before have readers been exposed to so much change in the kinds of letter forms confronting them. In our daily lives we have become accustomed to substantially different forms of letter and numerals adapted to the present limitations on the design of pocket calculators, wrist watches, or (on a larger scale) video displays and airport flight information boards. Many people now have to spend a great part of their working lives reading data on a visual display unit, while others make increasing use at home of various kinds of teletext. I naturally hope that the quality of letter forms at present used on these kinds of apparatus will improve greatly in the near future. But whether or not that happens, I maintain that our frequent exposure to so many radically different letter forms must affect our readiness to accept a faster rate of change in the design of our text types – change that will in any event come about for various functional and stylistic reasons.

I admit to having one anxiety about the likely trend of change in text types. Most of the best type designs of the past were skilful adaptations of letter forms that had been created for handwriting or for inscriptions. These forms were then adapted by trained and skilled craftsmen working in the actual size of the types needed. Today we tend to use a keyboard more often than a pen or pencil. Moreover, there is virtually no characteristic handwriting or inscriptional work of our own period from which type designers can take their inspiration. If any new trend in type design is to take a firm enough direction for it to be followed by the emergence of a distinctive new style in type design, I believe a great deal will depend upon the quality of type designers to develop their innate creativity through acquiring a deep understanding of past typographical achievements. In this way they will also build up their confidence to branch out in new directions, secure in their knowledge of traditional typographical practice.

'Tradition' is a word that has wrongly become tainted in recent years with overtones implying that it is the opposite of innovation. The literal meaning of the word is 'handing over,' and tradition ought to command respect and confidence if it relates to practices that deserve to be handed over from one generation to the next. Indeed, I could argue that if you believe in democracy, you ought also to believe in tradition, because the English author G.K. Chesterton once wrote, with the insight of a poet that 'tradition is the democracy of the dead.' That aspect of tradition is reflected in the ringing phrase 'time-honoured' coined by William Shakespeare. But there are some designers who believe that to create anything that is different is bound to be better than to create a thing in the traditional way. They ought to heed a remark made by the Hollywood producer Arthur Freed to Alan Jay Lerner, who wrote the book of *My Fair Lady*. Freed once said to Lerner: 'Don't try to be different. You don't have to be different to be good. To be good is different enough.'

Unlike display types, the qualities to be looked for in a text type are the absence of any marked peculiarities in the letters, and the ease with which the complete set of letters combine into words. I doubt whether many people would contest that view, but a very different opinion was held by that eighteenth century male chauvinist, Sir Anthony Absolute. In a comedy called *The Rivals*, a friend reminds him that his late wife was fond of books. Sir Anthony replies: 'Aye – and sufficient injury they were to her, Madam. But were I to choose another helpmate, the extent of her erudition should consist in her knowing her simple letters, without their mischievous combinations.'

The combinations which type designers need to take into account today are more mischievous than ever. So many countries throughout the world now use the roman alphabet for a dazzling variety of languages. Some require an alarming quantity of accents above and below the simple letters, not to mention a few letters that are severely mutilated so as to make their special meaning immediately recognizable. Furthermore, the potential uses to which a roman text type may be put are now so vast that no designer can possibly anticipate all the functional criteria by which his design may be judged. Of course his task is made easier if he is asked to create a new type for a specific purpose – such as a newspaper, a magazine or a telephone directory – always provided that he is given enough information about the readership, conditions of use, and methods of printing. What is far harder is to create a new text type for general use.

The market for such types is not likely to be quickly enlarged by recent newcomers to the ranks of text-composing systems, including those who market word-processors and office machines. Quite understandably most newcomers use copies of types that have already proved to be popular. Just the same thing happened earlier in this century when hot-metal composing-machine makers copied the types made popular by the typefounders. History teaches us that new composing systems rarely lead to new text types until the new systems have become firmly established.

But the outlook for the future is by no means one of unrestricted gloom for the design of new text types. Costs of manufacturing or generating a typeface have dropped far below the former costs that were involved in creating several sizes in hot metal. So the chances are improving that more design-conscious firms will commission new text types for their own proprietary use. And contrary to what you might expect, a type that is designed for the limited needs of a particular user may turn out to be very well suited to much wider use. Even the naming of Times New Roman after a London newspaper in no way hampered it from becoming widely popular. It is impossible to prove how much the success of a type may be affected by its name, though to name it after its designer may make it easier to obtain trade mark protection. But I can tell you of one case where the name given to a type neatly matched one job for which it was used. Some years ago the French tax authorities decided it was time to redesign the annual tax-return form on which all earnings are meant to be declared. Now the French are notoriously forgetful when it comes to filling up these forms. So it was not perhaps altogether accidental that the redesigned form cunningly reminded at least the type-conscious French of their duty, by using a type whose name (in French) means remember or recall – that type called Souvenir.

I wonder what names will be found for the large number of new types which ought to be designed specifically for the new equipment that proliferates around us as we enter the new Information Age. For our greatest need now is not so much new types for printing as new types for print-out. We have already reached a point where there is virtually no limit to the amount of information that can be stored and processed; and the speed at which that information can be generated and transmitted has been accelerated by the rate at which cable and satellite are being linked to increasingly sophisticated microcomputers. However, we must always remember – and point out to others – that the rate at which

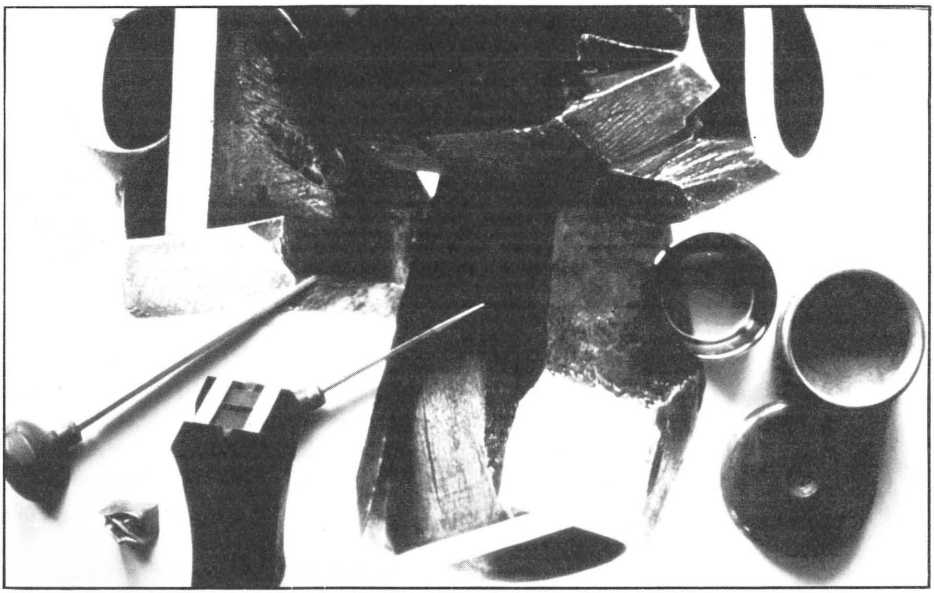
we can comprehend this electronically transmitted knowledge will continue to depend upon the ease with which we can decode and absorb the alphanumerical output given to us in the form of type designs. Of course, a great deal of knowledge can also be transmitted in audiovisual form; but only the alphabet allows each of us to read and verify the information transmitted at a speed which suits our individual capacities. Varying levels of intelligence and differing degrees of familiarity with the language spelt out in letters will affect the speed at which we can absorb the knowledge transmitted by type designs. So a great deal of attention ought to be paid to the peculiar problems of devising type designs tailored to the changed conditions under which so much knowledge is now transmitted.

The invitation to attend the ATypI seminar made it clear that one of its purposes was to bring together engineers and designers for future cooperation in type design. I expect that this cooperation will continue far into the future because of two shared convictions – first, that computers can be used to advance type design; and second, that the hand – not to mention the head and the heart – will continue to play a decisive part during the tremendously exciting period in our lives that I have called 'a turning point in type design.'

Future Tendencies in Type Design: The Scientific Approach to Letterforms

Hermann Zapf

For more than forty years I have been associated with type design. During this time I have had the unusual opportunity to observe the dramatic technological changes which have taken place, especially in the last twenty five years. These changes, particularly in computerized design, have affected my own approach and thinking about type design.



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I kept hitting my thumb with the sharp engraving tool while learning to cut some letters by hand under the guidance of the master punchcutter August Rosenberger of the Stempel Typefoundry in Frankfurt, Germany. I did this in order to learn the technique of punchcutting, and to understand the basic principles before starting my first type design, a Fraktur alphabet called Gilgengart. This was in 1939 and it was then that I developed a high respect for the work of the punchcutters and for their precision and skill.

As I became more involved in type design, I made alphabets not only for hand composition use but also for machine composition, specifically for the Linoptype. Later in the sixties, some of my faces had to be transferred to photocomposition for use on the Linofilm system, which used an 18 unit grid.

The first problems with the new technology started with Palatino, which had been designed originally for letterpress printing, but was used very often in offset printing. The same problems were also encountered with Melior. With Optima, I encountered many difficulties when this face was stored digitally. I will go into more detail about this later.

But first, I want to ask this question: Should we transfer all old metal typeface designs into the new technology of digitized typesetting using the CRT tube or even the laser beam? Here we touch a fundamental question. I believe we should have more respect for the work of the past centuries, and not copy every masterpiece of the past. In George Santayana's words: 'Those who cannot remember the past are condemned to repeat it'.

I think we are going about it wrongly if we take a classic face like the Janson roman and italic and make this alphabet available in a digitized font. How can you capture the spirit of Totfalusi Kis, the punchcutter of the Janson — the human touch let me call it — in the abstract and simplified bitmap of a digitized alphabet?

If you study Janson carefully, you will discover that each size of the roman and the italic varies from point size to point size. There is no basic character pattern; there are many irregularities of which some are accidental; others have developed over three hundred years, from their casting through recutting of punches. For example, the tail of the cap 'Q' is different in each size, as is the 'K' and the 'f'. You

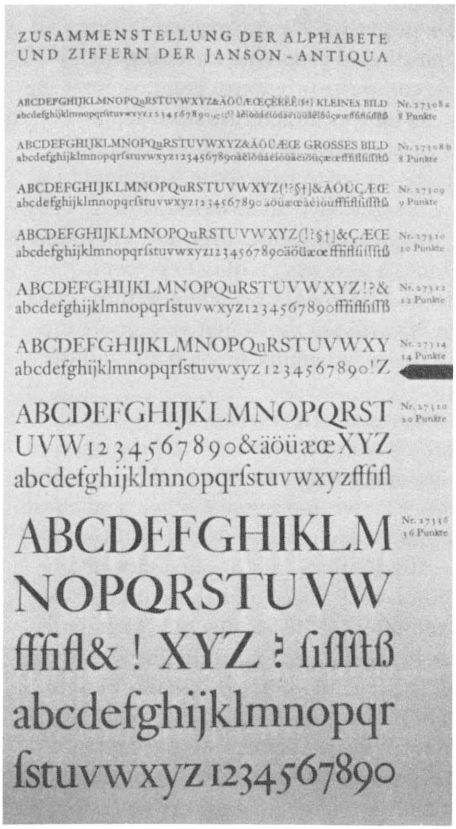
will also find the same problems in the italic, and in addition, some characters even have a different slant or slope. In letterpress printing we may like this personal and lively design of some of the characters, but I am not sure how Janson would like if it were refined, polished up, and made consistent. It would probably be impersonal and cool. Perhaps someone will expand the Janson designs and even add a semi-bold or a version in different weights and with all kinds of modification — for example a larger x-height and alternate characters — as was done recently with Garamond.

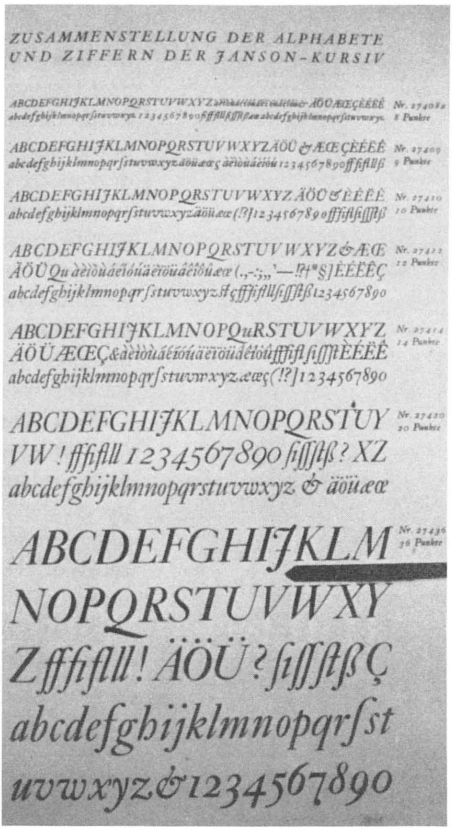
Janson is a typical seventeenth century typeface and should be respected as an original design of this historic period in the Netherlands. It was created out of the spirit and artistic background of that time. The Janson is, in my opinion, not at all an expression of the alphabet in the twentieth century. But I think Hunt Roman, the face which was used as a display face for the Stanford seminar, is in the style of Janson. It is possible to design something new within the structure of the Janson, but we should leave the foundry design alone and create a new Janson, not just make an ersatz design.

If we look with a critical eye at the Janson roman and italic, we will see several characters which do not fit into the overall design. We know that recuts of broken punches have been done in the typefoundry, not by the master punchcutter, but by less skilful punchcutters or apprentices. Look at the German sharp 's' in the roman which does not match the other characters and was never done by Kis at all. This character was done much later, perhaps in Leipzig by someone else. By the way, the 24 point and 48 point executed in 1956 have nothing to do with the original Janson. Both sizes are based on my drawings for the Linotype version of the Janson roman and italic and were added by the Stempel type foundry of Frankfurt to complete the range of type sizes for casting.

Let me give you some more background information about this Janson addition. The discussion first took place with the German Linotype Company to use the Janson designs which had been produced some years earlier by Nils Larson for the American Mergenthaler Linotype Company. I was against this idea because in my opinion it was not a good re-design. In addition, the Stempel foundry in Frankfurt, the manufacturer of Linotype matrices for the European market, owned some of the original Janson matrices and therefore had no reason to take over a second class design just to save money.

The typical Janson 'J' in the italic (the beautiful Dutch calligraphic J-form) was changed in the American re-design into the regular slanted 'J' of the roman. I picked the Janson as an example because it is a very good demonstration of the problems of adapting an historic and classic face to the technology of the twentieth century.





The same would also happen, I am sure, with other great faces cut by hand, such as Fleischmann, Fournier, Didot, etc., and with several of Rudolf Koch's designs like Marathon or some of Frederic W. Goudy's designs which were created by him for letterpress printing. Giovanni Mardersteig refused to allow his alphabets to be adapted for phototype-setting. I understood fully his decision after we had a long discussion about this fundamental question in the early seventies at the Officina Bodoni in Verona.

The cutting of the punches by hand has given some of our classics an outline which never can be copied by mechanical, photographic or digital devices. I strongly believe therefore, that we should respect some classic designs. Sadly, all these old masters have no protection. Even ATypI, unfortunately, has done very little in the past to protect the pre-war type designs or even those made after the war, as I myself am one of the victims of this rampant typographic piracy. Also, more protection for creative work is needed these days for sophisticated programs including menu-based typographic computer programs. Here we have the same conditions. As long as designs are seen as pure objects of business and not as creative works, and successful designs are willingly copied to help some firms build up a reputation, new designs have no economic future. Why should a young designer invest skill, time and the research of many months into a new design only to be copied in seconds by smart 'businessmen' who will give him or her no compensation but will sell the design and ignore the designer's name? This is like publishing a book without the author's name.

We as alphabet designers are missing the opportunity of promoting, through ATypI, new faces to printers, typesetters, ad agencies, and publishers. We need to teach these people the difference between original designs, and cheap, often inferior, copies. Many printers would not want bad recuts of old faces, translations into negatives for phototypesetting machines, or digitized alphabets, if they were better educated and informed as to why new techniques require new ideas in the design. I am sure this would lead to a stronger feeling for contemporary alphabet design.

The first years of phototypesetting machines offered designs which in most instances were simple copies of alphabets originally drawn for metal. Yes, some firms took the same master enlargements they used before cutting the metal type punches. One of the excuses given was that the customer wanted familiar designs and, in addition, some salesmen of the new phototypesetting systems told their clients the foolish story that they could mix metal and phototype. If the new machine broke down they could easily put a fire under the lead pot of their good old Linotype machine, and be back in business.

As was done at the beginning of phototypesetting, it looks now as though we are making the same fundamental mistakes in the digitizing of some old alphabets. This even includes companies with electronic printing systems, the so-called 'printing on demand' installations. We still have

all the technical information on hand about the art of punch cutting with the different engravers and the counter-punches and we know why metal faces have such an unusual crispness which is hard to describe, yet is readily noticeable. You can study the techniques of the punch cutting machines and the matrix engraving machines, invented by L. B. Benton about eighty years ago, which developed their own specific language and had a strong impact on the design of type in the past decades. But all this was for metal type. Today we have to find new solutions.

The additive effect of letterpress printing, which was taken into account by all the skilled punchcutters and craftsmen, was completely ignored in the designs or, let us better say, in the early adaptions of existing alphabets for phototypesetting. But it was not always realized that using negatives to shoot the characters onto film resulted in a substractive effect which was completely different from metal type. The text produced by a phototypsetting machine was used for offset printing, in which there is no inkspread as in letterpress, and the result was that the majority of those alphabets looked oversharpened, weak and vigorless.

Today offset printing and electrostatic processes offer some new possibilities in the transfer of letterforms to paper and may automatically require new design solutions. Digitized alphabets therefore should be designed for the bitmap.

As an example, digitizing my Optima roman presented many difficulties. The well-balanced shape of the stems is contrary to the digital principle, especially in low resolutions, some of which go down to 300 lines per inch. The design must be reduced to a heart-breaking compromise. The answer to this problem is that Optima was never designed for digital storage. If I had been asked, I would have done a new design, used another principle and another name, but would have tailored it to the needs and limitations of today's equipment.

Let us look at a few examples to show interpretations in contemporary designs. Study Times Roman, designed in England by Stanley Morison in 1932. It is a great design executed by Victor Lardent for the British Monotype Corporation based on historic type faces by Christophe Plantin of the sixteenth century without copying the old designs.

Caledonia, designed in 1939 by William A. Dwiggins for Mergenthaler and in Europe known as Cornelia, is a modern design based on Scottish types produced by William Martin of Glasgow in 1790. This design is not just

a warmed-up historic example, Caledonia shows Dwiggins' hand in every detail and is his idea of how a type should look if it were designed for the twentieth century. We could include in our list, of course, other examples of new alphabets based on letterforms of the past — designs by Eric Gill, Georg Trump, Matthew Carter, and Ed Benguiat. All have made contributions to contemporary type design, in the spirit of our time, the time in which we live.

Type design is a reflection of the cultural progress of mankind. We should not talk about the good old days of type designs. As Shakespeare wrote in the Tempest: 'the good old times — all times, when old, are good'.

In alphabet design — I do not want to use the term type design anymore, for type design to me means metal, and is associated with Gutenberg's invention for casting type — we should take advantage of today's possibilities and needs, using the new tools like Ikarus and Metafont. We should create designs that fit within the structured pattern of the digital principle.

We should try to understand why it is an anachronism to squeeze a design like my example of the Janson roman and Janson italic into a bitmap, copying seventeenth century details into the storage of a modern computer.

There was a note in a Frankfurt newspaper a few weeks ago of a new electronic sewing machine by the German company, Pfaff. This fully electronic sewing machine has a built-in program to make irregularities in the stitching process so that it will look like it was done by hand, not the abstract perfection that everybody wanted in the past years.

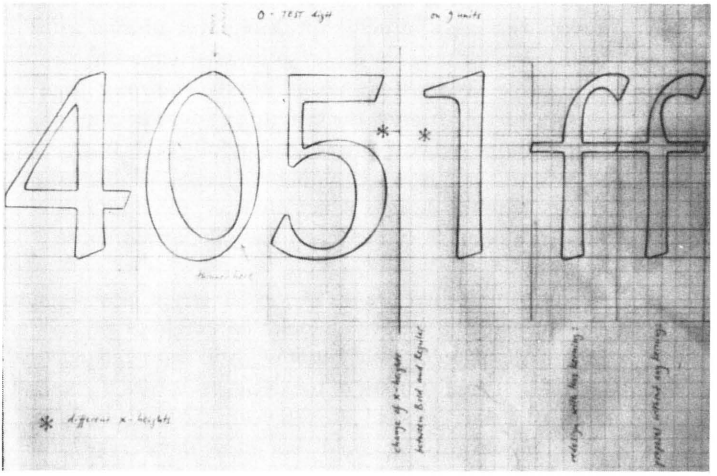
I would not be surprised if somebody were to translate this into alphabet design. This would mean we could build into some of our future designs the irregularities of the hand of a designer. This would be foolish, somewhat like trying to copy the spirit of past centuries in alphabet design, and of course I would not recommend this. We should try to make better designs with the help of the electronic equipment now on hand, but the designs should follow the rules of good industrial design: they should be clear and functional for our age of electronics. Fewer designs — there is no need at all for a 'Garamond version no.99' — fewer designs, but better designs.

By a reduction in the overall production of new alphabets, I should explain that I am talking here about text faces — not about display faces. In display faces there will always be a need for new expressions and unusual letterforms, and for more or less experimental achievements. But in text faces we must get away from the warming-up of historic forms, to show the thinking of our generation in a medium which expresses so carefully and clearly science and progress, like alphabet designs. We have the chance to make designs which are really different from existing alphabets, rather than look-alike or 'similar to' versions.

Some think there are smart ways to create 'new' designs. You may change the overall look, the weight of a typeface, and manipulate it a little, but it will still show the personal details that are the mark of the designer. It is as if you had married a slim girl, and after 20 years she is a lady, let us say in our terms, 'semi-bold': but inside there is the same personality as when she was slim and nice looking. The basic character has not changed at all. This we should know if somebody wants to sell us a copy as if it were a new design.

In the past as in the present the cultural and scientific expression of a time is reflected in the arts, in architecture and in type design. We no longer build Gothic cathedrals like St. Patrick's in New York City, or erect new offices in state capitals in the style of Greek temples, like the Supreme Court building in Washington, D. C. What would you think if you found baroque ornaments with cherubs on your computer equipment like on printing presses built in the nineteenth century? The progress in society should also be seen in our alphabet designs, for we are all observers of the electronic age. What a poor society this must be if it is unable to express itself and is only able to copy the past.

In the future, science and computerized text processing will probably influence our thinking about design solutions just as industrial progress did in the past. This means letter design will be very strongly affected; legibility, aesthetics, and high speed generation will be dominant. The simplified simulation of characters on our VDTs today can only be a first step. In the near future, we will want to see the real image of the characters prior to actually setting the type; we will want to see the inter-character spacing precisely because this is so important for readability. We will want to see the precise shape of a Souvenir or Tiffany. The next generation of VDTs may look very different from the screens now used everywhere.

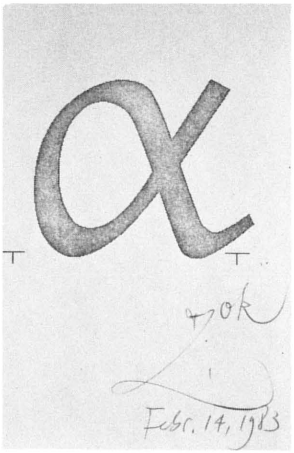


Many of us, and I mean the users of electronic character generation, have lost the feeling for good letterforms or for legible letterforms. Too many poor designs have been done within the limited dot matrix of 5 x 7 or 6 x 9 that engineers take for granted.

Take a look at the various videotex systems. It is not easy at all to catch a message on your cable TV in these primitive letterforms. Scientists and designers must find better solutions. It is not the bright colors on the screen of your TV set that are important; instead, one must easily identify the characters or understand the message clearly and quickly. The main purpose of typography or character generation is the same today as it was when Gutenberg invented type casting: to transfer a message in the best economic and visual way to the reader.

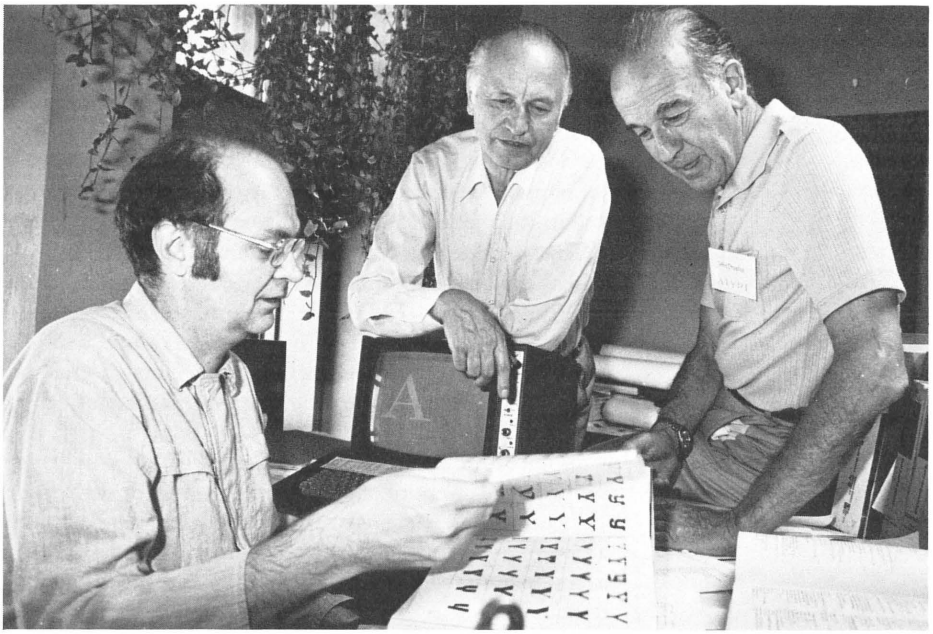
Scientific considerations are much more involved in our designs now as compared to the past. As an example, I want to mention here the AMS-Euler, a design I did for the American Mathematical Society, with Donald Knuth at Stanford using his Metafont system. AMS-Euler is a complete family of several hundred characters and symbols worked out in collaboration with mathematical experts from universities all over the United States. This design project, which has run over several years, includes designs for a special roman, an upright script, Fraktur and Greek with bold and italic.

In the future, special designs will be needed everywhere, but they must be designed within the new scientific approach. An analog design by a designer, scanned automatically, will show only pixels (picture elements) on a VDT, in a precise arrangement generated in the form of a bitmap via the VDT. The designer will make his corrections perhaps with an electronic pencil. Using an interactive process and a display screen, the designer will work out the best solution or the best compromise between the original idea and the image of the generated letter.



The type designer was always confronted with compromises. The Linotype principle did not allow kerned characters. The high speed electrostatic technology in resolutions of 300, or even 600 point per inch (as used nowadays), sometimes has the effect of melting away parts of serifs, just to mention one of the problems facing an alphabet designer.

In the future most of our letterforms will be completely stored in the memory of a computer: on tape or on a disc. They can then be generated via a cathode ray tube onto a screen, paper or film as an analog image to be recognized again by human eyes. And we should never forget that the human eye is still the best critic and judge. Our eyes are not different at all from the eyes of five hundred years ago, of Gutenberg's time.



From left: Donald Knuth, Hermann Zapf, and John Dreyfus

Lessons Learned from Metafont

Donald E. Knuth

Type designers today face an important problem, the problem of constructing digitized patterns for printing. The central question is, "What is the right way to create such patterns?" Or, rather, "What *will be* the right way?"—since we are concerned primarily with long term issues that are different from the problems of meeting today's deadlines. In this paper, I shall try to convey some of my excitement about exploratory research that has been going on here at Stanford, since I think we have found a small part of the answer.

Let me state at the outset that I do not foresee the problem ever becoming simple. Indeed, when I ponder what lessons I have learned so far, the main lesson turns out to be that the problem is quite difficult! In a way, this is not surprising. For more than thirty years, computers have been oversold by salesmen who claim that computing machines are easy to use, while the truth is quite the opposite: Computer programming requires more attention to detail than anything else that human beings have ever done. Moreover, the problems of letterform design are extremely subtle, much more complex than most people think, because our machines and our eyes interact with the shapes in complicated ways. I am convinced that digital alphabet design is an extremely challenging problem, and that it is significant enough to deserve the attention of our best scientific minds and our best artistic skills and sensitivities. Furthermore, I believe that the world will be a better place to live in after we learn more about the subject.

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There is also another point I want to make before getting into the details of my work: I am a mathematician, well aware that I am no artist. I do not believe that mathematical methods will resolve all the problems of digital typography; but I do believe that mathematics will help. Indeed, it is almost inconceivable that more than 2000 years of accumulated knowledge about geometry and curves will prove to be irrelevant to alphabet design. Yet mathematics is a threat to people whose love for letters is partly due to their hatred of (or, let us say, lack of attraction to) algebra. I am sorry that "math anxiety" exists, but I know that it is widespread. I am well aware that the injection of mathematics into a previously untainted area can be considered unfair to the leaders of that discipline, since they suddenly have to learn an enormous amount of new material in order to stay on top of their subject. However, I do not think there is really cause for alarm; it is not unusual for a subject to be so complex that no one person can understand it all. The most fascinating thing about recent developments in typography is, in fact, the emerging collaboration between scientists and artists: the bridges that are being built between C. P. Snow's "two cultures." I am not proposing that letter designers suddenly abandon their traditional ways and learn all about computer programming; I am proposing that they team up with computer scientists the way they used to collaborate with punch cutters. On the other hand, I am also pleased to see students growing up with feet solidly grounded in both worlds.

But what specifically is it that I think is so interesting? During the past few years I have been developing a computer system called METAFONT, which has three somewhat unusual characteristics:

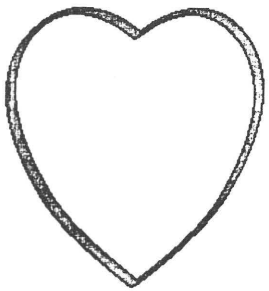


Figure 1

1 It is based on a language for drawing shapes with simulated *pens* that have *thicknesses*. For example, consider Figure 1, which shows a valentine-like curve traced by a slightly broad-edged pen. METAFONT drew this figure with ease, given only eight points on the "spine" of the curve; the actual edge of the curve is quite complex and difficult to describe, but the pen motion is quite simple.

2 The METAFONT language also encourages the construction of designs with explicit *parameters*, so that a large family of shapes can be described, rather than a single shape. For example, Figure 2 shows two of the

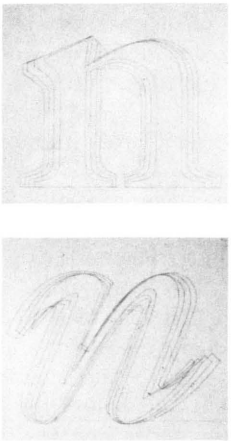


Figure 2

sketches that Matthew Carter made when he was developing *Galliard*; METAFONT aims to facilitate the incorporation of variations into a design. This, in fact, accounts for the prefix "meta-" in METAFONT; the approach is "meta-" in the sense that it deals with fonts from outside, at a higher level, somewhat as "metamathematics" is the theory of mathematical proof techniques. Meta-concepts are proliferating these days: For example, I recently learned of a new game called "metagame" [7] in which the first move is to choose a game to play. (An interesting problem arises when the first player says, "Let's play metagame!")

I have written elsewhere about the concept of a *meta-font* [6], which is a high-level description that transcends any of the individual fonts it describes. This concept is to be distinguished from the METAFONT system itself, which is merely one way to describe meta-fonts. Figure 3 (due to Scott Kim) illustrates some of the parameter variations possible in an early version of a meta-font called Computer Modern; each of the parameters has been pushed to extremes for the sake of example. Figure 3a shows changes in the slant of characters, and Figure 3b shows changes in the width; in both cases the pens stay the same but the path is different, hence the changes in image could not be done by optical transformations. Figure 3c shows what happens when the pen motion stays almost unchanged but the pen size varies. The lengths of serifs can be varied too (Figure 3d). A more unusual transformation is shown in Figure 3e, where alterations are made in the "constant" that is used to compute curves; this changes the bowl shapes. Figure 3f shows several parameters changing simultaneously to keep the letters readable as the type size changes; this is one of the main reasons for having parameters in a design. (The letters have been scaled here so that the x-heights are the same, thereby making the other changes more evident.) In each case the letters have been generated from an identical METAFONT description; the changes were caused only by changing parameters that apply to a font as a whole.

3 In order to support characteristics 1 and 2, METAFONT descriptions of letterforms are given as *programs*. For example, Figure 4 shows two of the programs in an early version of a meta-font called CHEL, developed by Tom Hickey in 1982. Sample letters produced by these programs, for various settings of the

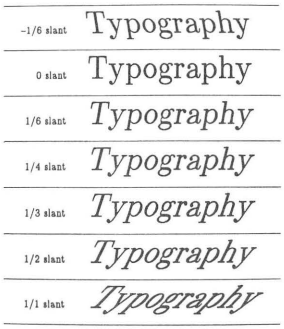


Figure 3a

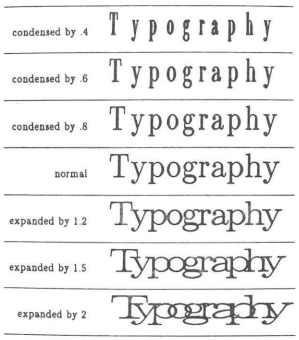


Figure 3b

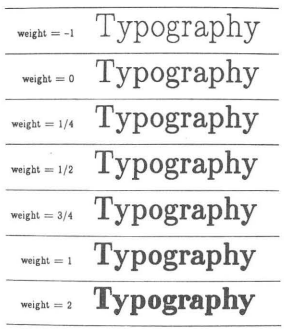


Figure 3c

parameters, appear at the top of the figure. The program for 'b' is quite short because most of the work is done by a *subroutine*, i.e., by an auxiliary program that is used to construct parts of several different letters. In this case, Hickey devised a subroutine to draw a small bowl, and he used the same subroutine also in the 'd' and 'p', etc.

METAFONT programs are quite different from ordinary computer programs because they are largely "declarative" rather than "imperative." In other words, they state relationships that are supposed to hold; they do not tell the computer how to satisfy those conditions. For example, a METAFONT description might declare that the left edge of a stem line should occur one unit from the left; the program does not need to state that the center of the pen should be positioned one unit from the left, plus half of the stem width, because the computer can figure that out. Similarly, it is possible to state that a certain point lies on the intersection of two lines; it is not necessary to specify how to compute the intersection point. Most of the mathematical complexities can therefore be handled by the computer, behind the scenes.

Since METAFONT programs include all of the information about how to draw each letter in a wide variety of circumstances, the programs are able to record the "intelligence" that lies behind a design. I believe that this aspect of METAFONT—its ability to capture the designer's intentions rather than just the drawings that result from those intentions—will prove to be much more important than anything else. The ability to draw infinitely many alphabets by the variation of parameters is not usually an important goal by itself; but the ability to explain a design in precise terms is highly instructive both to the designer and to those who read his or her programs. The computer can enforce a discipline that helps its users to clarify their own knowledge; this educational experience is really the rewarding thing.

Now to return to my main theme, of lessons that I have learned so far. I think it is best to start in the summer of 1977, when I began this work; at that time I had no idea that I would ever be designing a language for letterforms, much less ever getting to know artists and typographers. I had been unable to get good drawings of the outlines of the letters that I wanted to typeset, so I was virtually forced to develop computer techniques for alphabet design, starting from

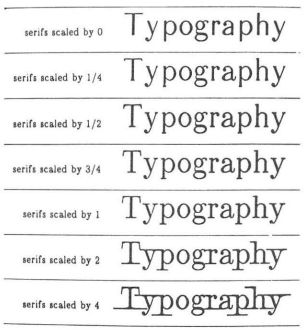


Figure 3d

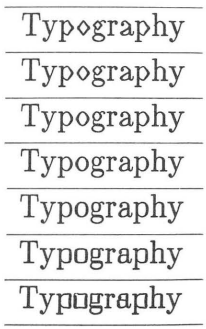


Figure 3e

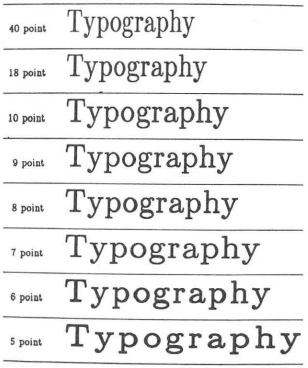


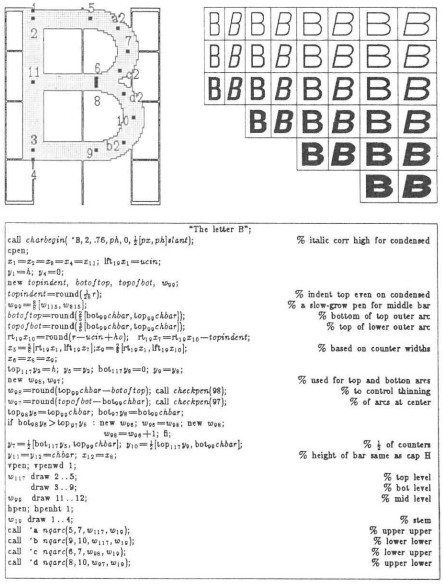
Figure 3f

scratch. My publishers supplied me with high quality letterpress proof pages that had been used to make the plates for the first printing of my book, but otherwise I had to work with extremely primitive equipment. Experiments with television cameras hooked up to computers proved to be a total failure, since the TV lenses caused considerable distortion when they were used to magnify a small image, and since a slight change in the brightness of the studio lighting caused enormous changes in the televised shapes. The best results I could get were obtained by making 35 mm slides of the letterpress proofs, and by projecting them about 8 meters onto a wall in my house, where I could make pencil sketches of somewhat blurry images about 5 *cm* high.

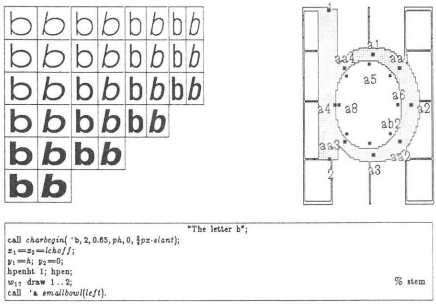
The three P's of METAFONT—drawing with *pens* and *parameters* via *programs*—popped into my mind within an hour or so after I had started to make those sketches. It suddenly dawned on me that I should not simply try to copy the shapes. A human being had originally drawn them, so I really wanted to learn as much as possible about what was in that person's mind at the time, and I wanted to incorporate that knowledge into a computer program.

The programs I wrote in 1977 were done in a traditional "imperative" programming language called SAIL, which is very much like an international computer language called ALGOL. Every time I changed anything in the program for any letter, I would have to recompile the changes into the machine's language; the idea of a declarative, interpretable language like METAFONT did not occur to me until it was suggested by Robert Filman a few months later. But the lack of such a language was not actually a bottleneck in 1977; the main problem was my ignorance about how to represent shapes in a decent way.

To illustrate these early difficulties, I have decided to show you something that I have never dared to show anyone else before: the very first results that I had in 1977 when I began to attempt drawing Arabic numerals. After I had translated my first rough sketches into a computer program, the machine presented me with Figure 5, in which each column represents a different setting of the main parameters (normal, bold, small-caps, sans-serif, and typewriter, respectively). The digit '8' had a special problem that—mercifully—prevented its appearance in all but one style; but my initial errors in the '2', '5', '6', and '7' were repeated



```
"The letter B";
call charbegin('B,2,.75,ph,0,½[px,ph]slant);                    % italic corr high for condensed
cpen;
x1=x2=x3=x4=x11; lft10x1=ucrn;
y1=h; y4=0;
new topindent, botofbot, topofbot, w96;
topindent=round(1/8 r);                                         % indent top even on condensed
w93=⅝[w113,w818];                                               % a slow-grow pen for middle bar
botofbot=round(⅝[bot96chbar,top93chbar]);                       % bottom of top outer arc
topofbot=round(⅝[bot96chbar,top93chbar]);                       % top of lower outer arc
rt10x10=round(r-ucrn+hk); rt9x9=x10x10-topindent;
x5=½[rt10x5,lft10x7]; x9=⅝[rt10x5,lft10x5];                     % based on counter widths
x6=x5=x9;
top11y5=h; y5=y7; bot11y8=0; y9=y6;
new w95, w97;                                                   % used for top and botton arcs
w95=round(top96chbar-botofbot); call checkpen(98);              % to control thinning
w97=round(topofbot-bot96chbar); call checkpen(97);              % of arcs at center
top98y8=top93chbar; bot97y8=bot93chbar;
if bot98y8>top91y8 : new w98; w98=w98; new w98;
                     w98=w98+1; fi;
y7=½[bot11y5,top98chbar]; y10=½[top11y8,bot96chbar];            % ½ of counters
y11=y12=chbar; x12=x6;                                          % height of bar same as cap H
vpen; vpenwd 1;
w11: draw 2..5;                                                 % top level
     draw 3..9;                                                 % bot level
w98: draw 11..12;                                               % mid level
hpen; hpenht 1;
w13: draw 1..4;                                                 % stem
call 'a nqarc(5,7,w11,w10);                                     % upper upper
call 'b nqarc(9,10,w11,w12);                                    % lower lower
call 'c nqarc(6,7,w95,w14);                                     % lower upper
call 'd nqarc(8,10,w97,w16);                                    % upper lower
```



```
"The letter b";
call charbegin('b,2,0.85,ph,0,½[px·slant);
x1=x2=ichoff;
y1=h; y2=0;
hpenht 1; hpen;
w13: draw 1..2;                                                 % stem
call 'a smallbowl(left).
```

Figure 4

fivefold. I am showing these early results because similar problems can be expected even with today's METAFONT; it is not easy to describe the essence of shapes to a machine.

Figure 5 is obviously riddled with errors, and it is instructive to look at them more closely. In a few cases I simply blundered: For example, I forgot to use a thick enough pen when starting the diagonal of the '2'. The strange glitch in the third '2' was due to a bad specification of the angle at the bottom; I had specified the same angle for small caps as for the normal size, even though a smaller figure was being drawn. Another bad angle occurs at the top of the bowl in each '5'. But other errors were more serious: The difficulties at the bottoms of the '5's are exhibited more severely at the tops of the '6's, where the bulbs are too high and they are joined badly to the rest of the shape. Even worse things occur at the bottoms of the '6's, where my whole approach was completely mistaken and had to be redone several times in subsequent experiments. The top of the rightmost '7' exhibits a problem that I did not resolve adequately until five years later, when I finally realized that this part of '7' (and the bottom of '2') could be regarded as an "arm," analogous to parts of a letter like 'T' or 'E'.

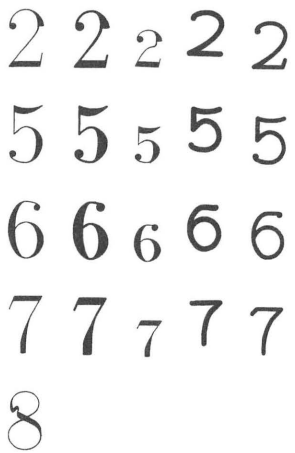


Figure 5

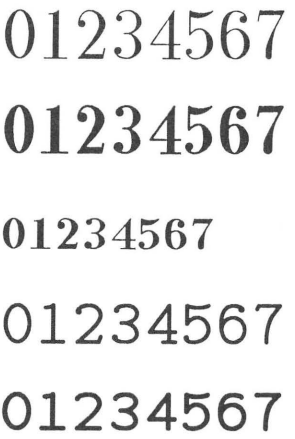


Figure 6

By the end of 1977, the numerals in my experimental meta-font had evolved to the point shown in Figure 6. I was satisfied with them at the time, so I spent most of 1978 working on the TEX typesetting system and doing other sorts of computer science research. In 1979 I decided to design a symbolic language for letterforms that would reflect at a higher level what I had been thinking about when writing my ALGOL programs in 1977; this new language became the original METAFONT system [4]. Considerable work was necessary in 1980 to hook up the output of METAFONT with a high-resolution phototypesetter; during this time I was preoccupied with software problems and unable to do much with the font designs. Then finally I reached the goal that I had hoped to achieve two years earlier: I completed the second edition of my book *Seminumerical Algorithms* [5], a 700-page work in which everything but the illustrations had been done entirely by new computer methods. Altogether 35 fonts were used in that book—seven sizes of roman, six of italic, and three each of bold and slanted and typewriter styles, with each size drawn separately; there were six versions of sans-serif, and seven pi fonts for math symbols. All of these were created with the first METAFONT, and the sheets looked mighty good to me when they came out of the typesetter.

But I cannot adequately describe the enormous letdown I had when *Seminumerical Algorithms* finally appeared in print at the beginning of 1981. That was the first time I had seen the result of the entire process, including printing and binding; up to then I had been working almost entirely with low resolution equipment, and of course the high resolution output was much nicer, so I was eagerly anticipating a beautiful book. When I received the first copy and opened the covers, I burned with disappointment: Everything looked wrong! The main shock was due to the fact that I now was seeing the fonts as they looked after printing and—just as important—after binding the pages in buff covers just as the first edition had been bound. The fact that the new format was encased in the old context exaggerated the deficiencies of the new format. Sure, the new text was readable, and I could console myself a little with the thought that it was not as bad as some other books that were being printed at the time; but it was not at all what I was hoping to achieve. The sans-serif was totally wrong; the weights of roman vs. italic vs. numerals were not quite right;

and the high resolution revealed unsuspected deficiencies in many individual characters. I developed a strong antipathy for the shapes of the numerals, especially the '2' and '6'. When using the book for reference or teaching, I was forced to look at the numbers on each page, and this would distract my thoughts; I wanted to think about elegant mathematics, but it was impossible to ignore the ugly typography.

However, my profound disappointment was not completely discouraging. For one thing, I had been reading a lot of biographies, and I knew about mid-life crises; since I was 40 years old in 1978, I had sort of been expecting to make at least one big mistake. My idea had always been to follow my intuition but to be ready for failure. I knew that METAFONT was quite different from what anybody else had done or was doing, and it certainly occurred to me that all of my ideas might simply be stupid: No wonder nobody else had tried them! On the other hand, it still seemed to me that the basic ideas of pens, parameters, and programs were still valid; the deficiencies in my published book were due to my faulty execution, but the ideas themselves seemed right. So I decided to persevere.

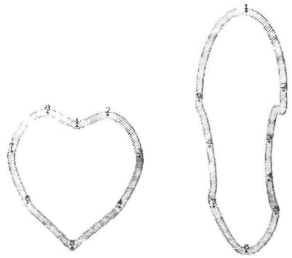


Figure 7a

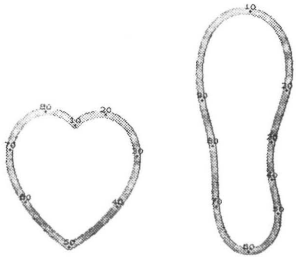


Figure 7b

Two more years have gone by since then; in the meantime my colleagues and I have accumulated a lot of experience with the first METAFONT. I plan to spend the next year making a completely new system, starting over from scratch, based on this experience; the new system should therefore remove many of the deficiencies of the old. Since the new language will be ready in 1984 we are wondering if we should follow George Orwell and call it NEWSPEAK. Our plan is to make METAFONT84 widely available and to design it so that it can be used on all but the smallest computers.

Please forgive me for inserting so many biographical remarks into this paper. My main purpose is to explain the lessons I have been learning during this work, and it is high time that I give some more concrete details.

One of the first important things that I learned was that the computer deserves to be treated as a new medium. When we approach the problem of digital type design, we should not expect to do everything exactly as it was done before; we should rather expect that we can learn to guide a computer as people have traditionally learned to guide a brush or a chisel. When using the machine, it is best to hold back and

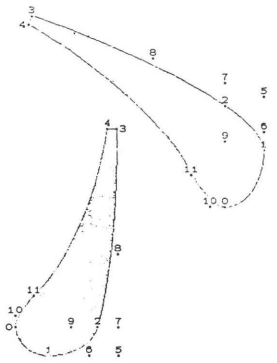


Figure 8

to relinquish some of our own control—to let the machine "have its own head" as we find out what works and what does not. The ideal is to work together with the tool; we specify the important details, but we are willing to accept help as we do.

Of course, this idea makes sense only if the computer is a decent medium—only if the curves that it draws are aesthetically pleasing. Consider, for example, Figure 7a; it turns out that today's METAFONT will produce these horrid shapes if the user simply specifies eight or nine points as shown without giving any additional instructions. A person soon learns how to overcome such problems and to obtain pleasing curves with METAFONT79, but the new system will be much better: John Hobby has recently done some important mathematical work that makes it possible to obtain Figure 7b from the same data that produced Figure 7a, and his new approach will be adopted in METAFONT84. This is quite important not only because it makes the system simpler to use and more responsive, but also because curves need to be adjusted when low-resolution characters are drawn; Hobby's method makes it more likely that such adjustments will not destroy the shapes of the curves.

Figures 8 and 9 illustrate another important sense in which a designer might find that computers can provide an expressive medium. The "teardrop" shapes in Figure 8 were drawn by a METAFONT subroutine in which only a few points needed to be specified (one at the top, one at the bottom, and the horizontal coordinate at the edge of the bulb); all of the other points were determined by mathematical calculations inside the subroutine. John Hobby worked hard to create that subroutine, but a designer can learn to use teardrops effectively without worrying about exactly how the subroutine actually computes them. Figure 9 shows some of the strokes drawn by the teardrop subroutine and by three other subroutines in Hobby and Gu's early experiments on oriental character design [2]. (Further work by Hobby and Gu has led to another set of subroutines that may well be adequate for drawing a complete set of Chinese and Japanese characters in a variety of styles [3].)

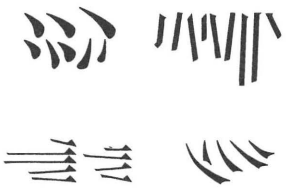


Figure 9

The second chief lesson I learned while using METAFONT was that it is best to let different parts of a design interact, rather than to specify them independently. For example, it is better to say that one point is midway between two others, instead of giving ex-

mathematics
mathematics
mathematics
mathematics
mathematics

Figure 10

plicit coordinates to all three points. One way to illustrate this is shown in Figure 10, which is the result of an experiment with random numbers that I tried in 1977: I changed my early programs so that key points of the design were not specified exactly; the computer was supposed to pretend that it was a bit tipsy when placing those points. The top line shows perfect placement, but the second line shows what happened when the points were placed randomly with a standard deviation of about 1%; the third line shows a standard deviation of 2%, and so on. The chief thing I learned from this experiment was that the resulting letters seemed to be "warmer" when a little bit of randomness entered into the design. But the reason I am including Figure 10 is that it demonstrates that different parts of a design can be interrelated so that they depend on each other. For example, when the stems move, the serifs move with them; the individual points are not independently random.

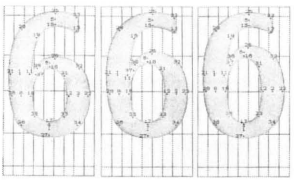


Figure 11

Figure 11 exhibits a similar dependence; I made these three '6's by varying the position of only one point in the specification (point 6, which is at the top of the bowl). Many of the other points changed their position when point 6 moved, because my METAFONT program specified their positions relative to other points rather than with absolute coordinates.

Another example of interdependence appears in Figure 12; again a series of letters has been drawn with only one parameter of the program changing. In the upper line I changed the shape at the middle of the S; in the lower line I changed the weight. In both cases a number of points changed their position in order to accommodate other changes, because I defined the positions by formulas instead of using numbers.

SSSSS
SSSSS

Figure 12

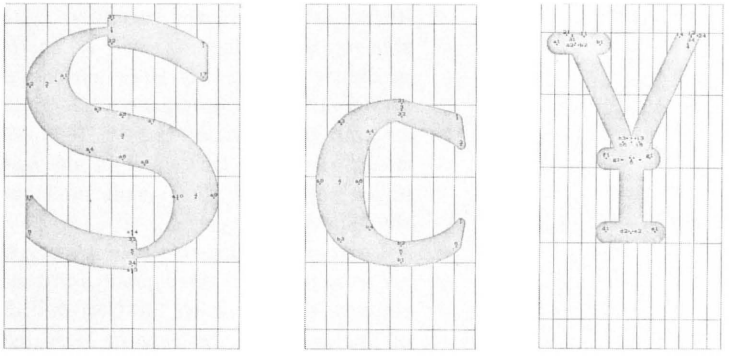
Perhaps the best way for me to convey the flavor of METAFONT work is to show you some of my "metaflops": things that came out in quite unexpected ways. In fact, the computer is full of surprises, and this is where a lot of the fun comes in. For example, one of my programming mistakes caused a link in the 'g' to fold over in an interesting way (Figure 13a); and one of my attempts to draw a sans-serif 'A' came out looking more like an ad for Levi's western jeans (Figure 13b). Fallacious formulas led to a marvelous 'M' (Figure 13c), a sparky 'S' (Figure 13d), and a cruel 'C' (Figure 13e). When I misplaced the serif in Figure 13f, I swear that I was not thinking about Japanese yen; the currency connection was purely coincidental!

Figure 13g came about when I was trying to discover why METAFONT was drawing the wrong curve in an 'a'; I wanted to see more details of the underlying strokes, because I suspected a computer error. In this case it turned out that METAFONT was not at fault—I had made a mathematical mistake when I specified the slope at the critical point.

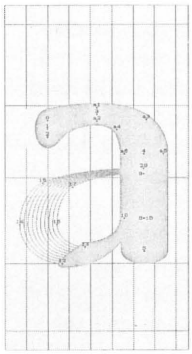
To complete this exhibition of meta-flops, Figure 13h illustrates a ligature in which I unwittingly told the computer to make *both* of the 'f's aim at the dot on the 'i'. And Figure 13i is what I like to call the "ffilling station."

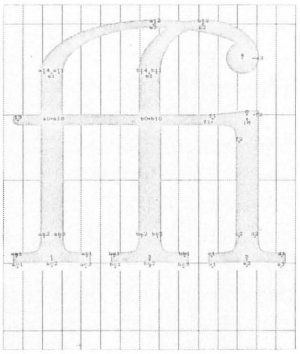
Since 1980 I have been enormously fortunate in this research, because people like Hermann Zapf, Matthew Carter, Chuck Bigelow, and Richard Southall have generously been helping me to refine the crude tools I began with. In particular, Richard and I spent three weeks intensively going over each letter, and our preliminary studies were quite encouraging. He taught me many important lessons, and I would like to give some indication of what kinds of things we did.

Figure 13 *a* *b* *c*



d *e* *f*





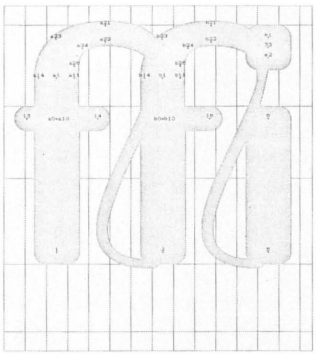


Figure 13g *h* *i*

Figure 14 shows two of the 'O's we drew. The image is slightly heavier at the bottom than at the top, and we added a parameter that makes it possible to have different curves on the inside and outside without losing the properties of a meta-font. Simply drawing two independent super-ellipses with different degrees of "superness" doesn't work, because the inner curve sometimes gets too close to the outer curve or even crosses it; our solution was to draw two superellipses from the same family and then to "pull" the inner curve a certain fraction of the way towards the outer one.

Some of Richard's corrections, made as we were revising the 'P', are shown in Figure 15. Note, for example, that we took a little weight away from the stem inside the counter. In order to retain the spirit of a meta-font while making such refinements, we introduced a "stem correction" parameter that could be used for stem-weight changes in other letters. Sometimes a stem weight is changed by two or even three times the stem correction.

We were pleased to discover that METAFONT is good at *notching* the inside of diagonal strokes that fill in if they are not treated carefully. For example, the inside top of a bold sans-serif 'A' has been opened up in Figure 16a, so that the counter has an appropriate amount of white space while giving the illusion of straight thick stems. Our METAFONT programs are designed to give this effect in low resolutions as well as high. Figure 16b shows that the same idea applies to the typewriter-style 'A'.

I can summarize this recent work by saying that we are now paying a great deal of attention to the edges; the new version of METAFONT will differ from the old one primarily in this respect. I realize now that I was

extremely naïve in 1977 when I believed that the edges would take care of themselves if I simply drew with a pen that had the right shape. On the other hand, we are not abandoning the pen metaphor, because it gives the correct "first-order" insights about how letters are drawn; the edge details are important second-order corrections that refine the designs, but they should not distract us from the chief characteristics of the forms.

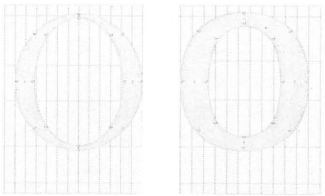


Figure 14

Figure 17 is a test palette that I made in 1980 when first experimenting with METAFONT programs to simulate broad-edged pens with varying pressure, based on the advice of Hermann Zapf. (In fact, this was the first thing Hermann wanted to try when he encountered METAFONT for the first time.) Although these particular strokes were all drawn by holding the pen at a fixed angle, in this case 25°, further experiments showed that a varying pen angle could also be imitated.

I would like to conclude by inviting you to participate with me in a thought experiment: Let us consider the letters 'ATYPI' that Sumner Stone has prepared as the symbol of the conference [8], and let us try to imagine how they could be incorporated into a new meta-font. Of course we could simply trace the outlines of the letters; but that would not be any fun, and it would not give us any insights. Let us rather try to embed the principles of Sumner's design into a specification that will produce lots of beautiful letters.

Take first the 'A' (Figure 18a): This is clearly made up of three strokes, two of which are thin and the other is thick. The thin strokes appear to have been drawn with a narrower pen than was used to produce the thick stroke. Immediately we are led to introduce parameters for the width of those two pens.

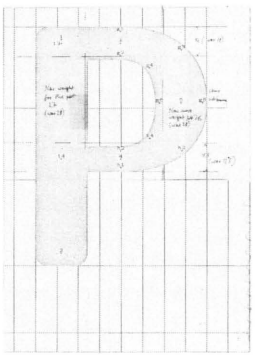


Figure 15

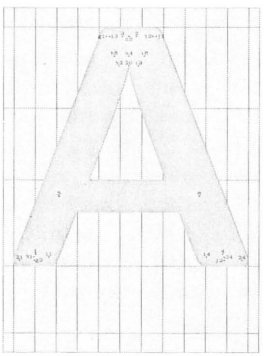
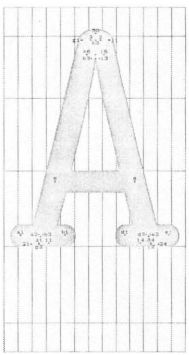


Figure 16a



b

Figure 17

The strokes also taper gracefully; we can add a third parameter to govern the amount of tapering. (By varying this parameter we can experiment with letters that do not taper at all and with letters that taper too much.)

Turning to the 'T' (Figure 18b), we see that its crossbar is neither thin nor thick. We can either introduce a new parameter, or we can assign it an intermediate weight (e.g., halfway between the narrow and wide pens in the 'A'). Tapering is present here but not quite so prominently as before; again we need not introduce a new parameter if we decide, for example, that the stem of the 'T' tapers half as much as that of the 'A'. Another parameter of the design is the angle at which the stem stroke terminates at the baseline; looking ahead, we can relate this to analogous features of the 'Y' and the 'P'.

The 'Y' itself (Figure 18c) will probably be difficult, because it will be necessary to work out the principles that underly a rather complex joining of three strokes at the center. This part of the letter looks simple, when it is done right, but I would expect to spend three or four hours trying different things before I found a scheme that would work properly as the parameters were varied.

The 'P' (Figure 18d) has an interesting little taper at the top of the bowl, but its most prominent feature is the gap at the bottom of the bowl. We should probably introduce a 'gap' parameter, which can be used also in the 'A'.

Finally there is the 'hungry I' (Figure 18e), which I do not really understand. Probably I would understand it more after actually trying to incorporate it into a meta-font, but I would want to ask Sumner for more information first. Then my METAFONT program would be able to reflect the designer's true intentions.

Looking to the future, I have not got any good insights about how new alphabets will actually be designed in, say, the year 2000. I certainly hope that none of the computer methods we are using today will still be in use; at the moment we are just beginning to explore the subject, and we should have lots of better ideas by then. But I have a hunch that METAFONT's notions of pens, parameters, and programs will find a place as part of what is eventually perceived to be the most suitable way to apply computers in digital alphabet design.

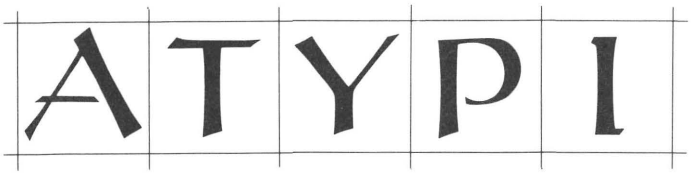


Figure 18

a *b* *c* *d* *e*

Appendix. [I could not resist actually trying the ATYPI experiment. I hope that the following detailed example helps to clarify some of the points that I was trying to make.]

METAFONT can simulate broad-edged pen writing if we represent the pen's position by three points: left edge, middle, and right edge. The middle point is halfway between the other two. In the existing METAFONT, it is convenient to give numbers to the points by numbering the midpoint and adding 100 for the left edge and 200 for the right edge; thus, three points `(101,1,201)` correspond to pen position `1`. [In the new METAFONT I plan to work things out so that the points can be called `(1L,1,1R)` instead.]

It is easy to write a METAFONT subroutine that draws a simple stroke with such pens, allowing for the possibility of tapering. For example, Figure 19 illustrates a subroutine that I am currently exploring. Two pen positions are given—in this case they are called `(101,1,201)` and `(102,2,202)`—together with three fractions λ, ρ, and α; the fractions λ and ρ represent an amount of taper at the left and the right, while α represents the position of maximum taper. The stroke is drawn as follows: First the computer constructs points `(a11,a1,a21)` that are α of the way from `(101,1,201)` to `(102,2,202)`. [In Figure 19, for example, α is 0.4; thus a straight line drawn from `101` to `102` passes through `a11`, and the distance from `a11` to `101` is 0.4 times the distance from `102` to `101`. The three points `(a11,a1,a21)` constructed in this way will lie on a straight line.] Next the computer constructs point `a101` by going λ of the way from `a11` to `a1`, and it constructs `a201` by going ρ of the way from `a21` to `a1`; this determines the amount of taper. Finally the edges of the stroke are determined as follows: A curve starts at `101` aiming towards `a1`; it passes through `a101`, at which time it is traveling in the direction parallel to a straight line from `101` to `102`; then it finishes at `102`, as if coming from `a1`. This determines the left edge; the right edge is similar.

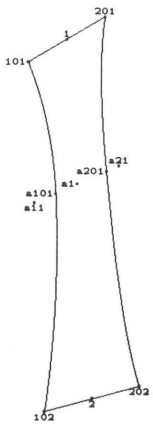


Figure 19

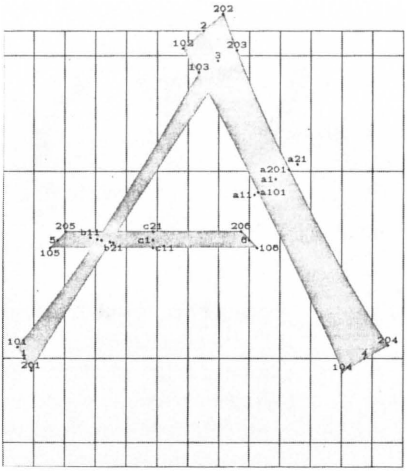


Figure 20

By changing the widths and angles at the endpoints, and by changing the fractions λ, ρ, and α, it is possible to achieve a great variety of strokes. And it is possible to learn the use of these strokes without knowing or caring about the geometrical construction that produced them. Much more elaborate stroke subroutines are obviously possible, but at the moment I am getting familiar with simple ones like this. In particular, I have found that it is not difficult to get a fairly good approximation to Sumner's 'A' with just three such strokes, even when everything is parameterized so that the construction works in quite general circumstances.

Figure 20 shows the meta-A that I came up with. It was drawn by a METAFONT program that can be paraphrased as follows: "The character will be 13 units wide; its height will be 1.1 times the cap height of the font, and its depth will be zero. Pen position **1** is at the baseline, with its left edge a half unit from the left of the entire character. Pen position **4** is at the baseline with its right edge a half unit from the right of the character. Pen position **2** is at 1.1 times the cap height and at the horizontal midpoint of the character. Pen position **3** is at the cap height and on a straight line between positions **2** and **4**. The width of the pen at position **1** is the thin width; at positions **2** and **4** it is the thick width; and at position **3** it is 2/3 of the way from thin to thick. The pen angle at **3** and **4** is 15 degrees more than the normal "cut angle" in a vertical stem, and the angle at **2** exceeds the cut angle by 30 degrees. The bar line is determined by pen positions **5** and **6**, whose top is at 3/7 of the cap height; the angle at **5** is 45°, the angle at **6** is 135°, and the width at both positions is a fraction of the thin width,

determined by a given "aspect ratio" parameter. Position 5 is offset to the left of where a straight line from 5 to 6 intersects a straight line from 3 to 1; the amount of offset is the "gap amount" plus half the thin pen width. Similarly position 6 is offset from where a straight line from 5 to 6 intersects a straight line from 2 to 4; the amount of offset is the gap amount plus half the thick width. Let τ be the value of the taper parameter. The diagonal stroke from 2 to 4 is drawn with $\lambda = \tau^2$, $\rho = \tau$, and $\alpha = .45$; the diagonal stroke from 3 to 1 is drawn with $\lambda = \tau^{1/2}$, $\rho = \tau^{3/2}$, and $\alpha = .6$."

In order to complete the specification, we need to define the parameter values. Figure 19 was obtained by letting the unit width be $26x$ (where x is an arbitrary scale factor); the cap height was $250x$; the thin width and thick width were $22x$ and $44x$, respectively. The aspect ratio was 0.85; the cut angle was 15 degrees; the gap amount was one unit; and the taper parameter was $\tau = 0.4$.

Figure 21

Figure 21 shows four 'A's drawn with the same parameters except that the unit widths were $17x$, $20x$, $23x$, and $26x$. Figure 22 shows the effects of increasing weight: $(thin, thick) = (22x, 44x)$, $(33x, 55x)$, and $(44x, 66x)$. Finally, Figure 23 illustrates a few other variations: (a) stem weights $(55x, 55x)$; (b) taper parameter increased to 0.6; (c) cut angle reduced to 5° and gap amount reduced to 0.1 unit. (It is doubtful, of course, that Sumner would approve of these particular examples, which were obtained by extrapolation from a single drawing. But I think the two of us could work out something satisfactory.)

Figure 22

Figure 23

Since this is an appendix, I shall conclude by appending the actual METAFONT programs, for the benefit of people who would like to see the complete details. The last half of this program, following `"The letter A"`, is what was paraphrased above. Equivalent programs will be much simpler and more readable in next year's METAFONT.

It is possible for point 203 to stick out of the stem, for certain values of the parameters. Therefore I subsequently modified the program so that it draws the left diagonal stroke first; then it says

rpen#; *thick* **draw** 2 .. 4;

thereby erasing everything to the right of a straight line from 2 to 4. Then it draws the right diagonal and the bar line.

```
minvr 0; minvs 0;                                   % shut off velocity corrections
fill = 1;                                           % width of pen used to fill the strokes
subroutine penpos(index i, var angle, var d):       % pen position subroutine
  x_i = .5[x_{i+100}, x_{i+200}]; y_i = .5[y_{i+100}, y_{i+200}]
  x_{i+200} - x_{i+100} = d · cosd angle;
  y_{i+200} - y_{i+100} = d · sind angle.
subroutine stroke(index i, index j,                 % stroke from i to j
    var lambda, var rho,                            % left and right taper amounts
    var alpha):                                     % position of maximum taper
  x_1 = alpha[x_i, x_j]; x_11 = alpha[x_{i+100}, x_{j+100}]; x_21 = alpha[x_{i+200}, x_{j+200}];
  y_1 = alpha[y_i, y_j]; y_11 = alpha[y_{i+100}, y_{j+100}]; y_21 = alpha[y_{i+200}, y_{j+200}];
  x_101 = lambda[x_11, x_1]; y_101 = lambda[y_11, y_1];
  x_201 = rho[x_21, x_1]; y_201 = rho[y_21, y_1];
  cpen; fill ddraw
    i + 100{x_1 - x_{i+100}, y_1 - y_{i+100}}
            .. 101{x_{j+100} - x_{i+100}, y_{j+100} - y_{i+100}}
            .. j + 100{x_{j+100} - x_1, y_{j+100} - y_1},
    i + 200{x_1 - x_{i+200}, y_1 - y_{i+200}}
            .. 201{x_{j+200} - x_{i+200}, y_{j+200} - y_{i+200}}
            .. j + 200{x_{j+200} - x_1, y_{j+200} - y_1}.

"The letter A";
call charbegin('A, 13, 1.1phh, 0);
y_1 = 0; x_101 = .5u;
y_4 = 0; x_204 = r - .5u;
y_2 = 1.1hh; x_2 = .5r;
y_3 = hh; new aa; y_3 = aa[y_2, y_4]; x_3 = aa[x_2, x_4];
call penpos(1, -cut - 45, thin);
call penpos(2, cut + 25, thick);
call penpos(3, cut + 15, 2/3[thin, thick]);
call penpos(4, cut + 15, thick);
y_205 = y_206 = 3/7 hh;
call penpos(5, 45, aspect · thin);
call penpos(6, 135, aspect · thin);
new aa; y_5 = aa[y_1, y_3]; x_5 + gap · u + .5thin = aa[x_1, x_3];
new aa; y_6 = aa[y_2, y_4]; x_6 + gap · u + .5thick = aa[x_2, x_4];
call 'a stroke(2, 4, tau · tau, tau, .45);          % right diagonal
call 'b stroke(3, 1, sqrt tau, tau · sqrt tau, .6); % left diagonal
call 'c stroke(5, 6, 0, 0, .5).                     % bar line
```

I have used *hh* in this program to stand for cap height in pixels, *phh* for cap height in points; *r* denotes the right edge of the character, and *u* denotes the unit width, in pixels; *charbegin(character_code,unit_width,height_in_points,depth_in_points)* is a subroutine that sets up values like *r* and *u*, and tells where to put the result in a complete font.

This research and preparation was supported in part by National Science Foundation grant IST-820-1926, and by the Systems Development Foundation. 'TEX' is a trademark of the American Mathematical Society.

References

[1] Patrick Baudelaire, personal communication, 1977.

[2] John D. Hobby and Gu Guo-an, "Using METAFONT to Design Chinese characters," *Proc. 1982 International Conference of the Chinese-Language Computer Society* September 1982, 18–36.

[3] John D. Hobby and Gu Guo-an, "A Chinese Meta-Font," Stanford Computer Science Report STAN-83-974 (July 1983).

[4] Donald E. Knuth, "METAFONT, a system for alphabet design," Stanford Artificial Intelligence Memo AIM-332 (September 1979). Reprinted as part 3 of *TEX and METAFONT: New Directions in Typesetting* (American Mathematical Society and Digital Press, 1979).

[5] Donald E. Knuth, *Seminumerical Algorithms*, Vol. 2 of *The Art of Computer Programming*, second edition (Reading, Mass.: Addison-Wesley, 1981).

[6] Donald E. Knuth, "The concept of a meta-font," *Visible Language* **16** (1982), 3–27.

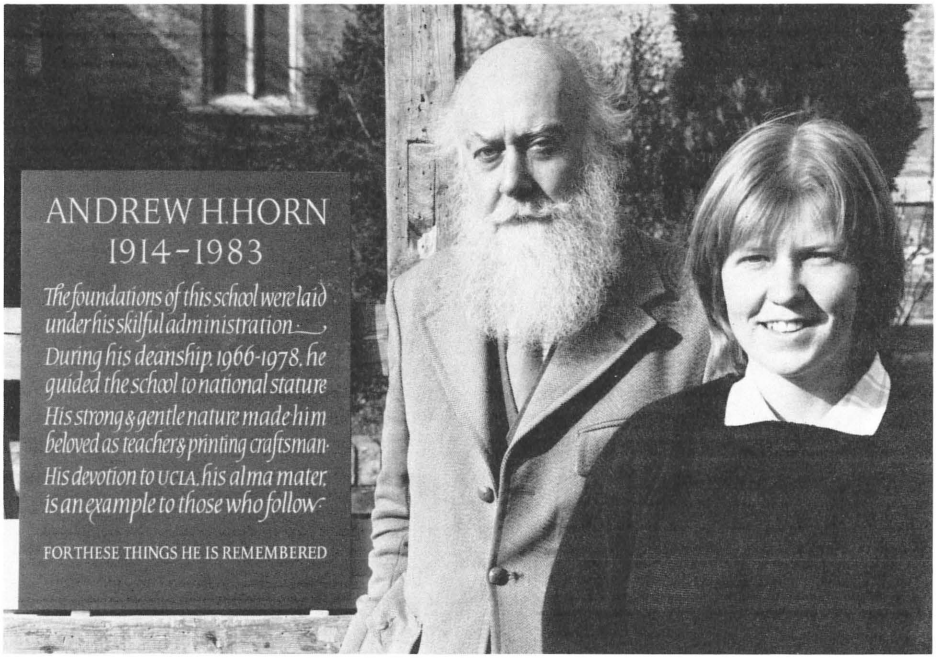
[7] Raymond Smullyan, "Metagame," *American Math. Monthly* **90** (1983), 390.

[8] Sumner Stone, "The ATypI Logotype: A Digital Design Process," presented at Fifth ATypI Working Seminar, Stanford, California, August 1983.

The printer's mark of Wechel. 1495–1554.

Stonecuttings from David Kindersley's Workshop

Lida Lopes Cardozo



The following are examples of the stonecutting work done at David Kindersley's workshop in Cambridge, England. Here David Kindersley and Lida Lopes Cardozo stand beside a slate tablet cut for the University of California, Los Angeles.

Visible Language, XIX 1 Winter 1985
Author's Address: 152 Victoria Rd, Cambridge CB4 3DZ, England

1

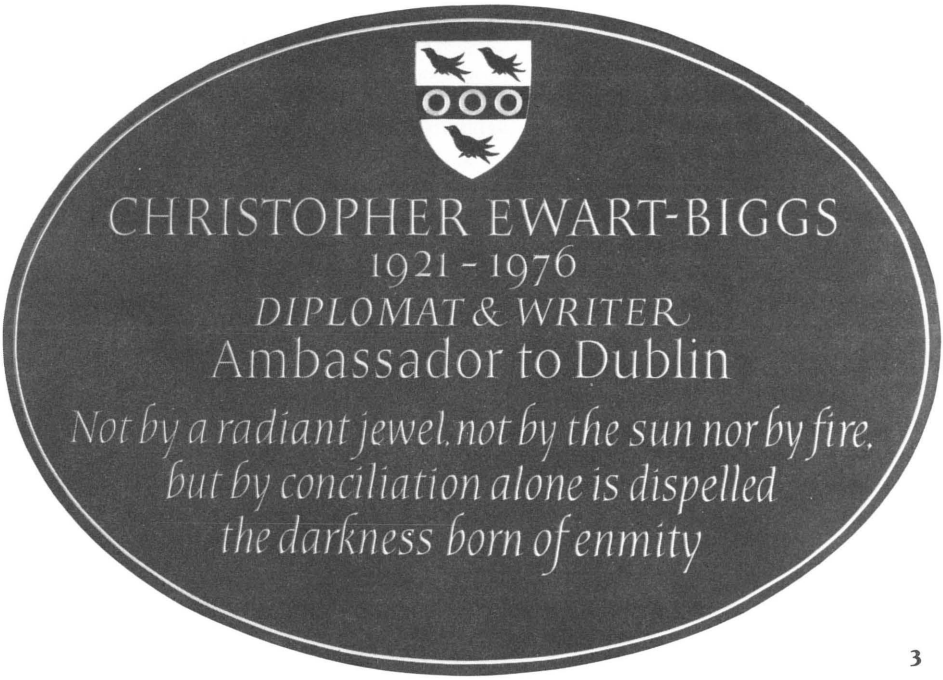
2

1

The 'i' in this piece has been platinum leafed. Cut in slate by Lida Lopes Cardozo, 1981.

2

A rustic alphabet cut by Lida Lopes Cardozo, 1982, in blue Hornton stone.



3

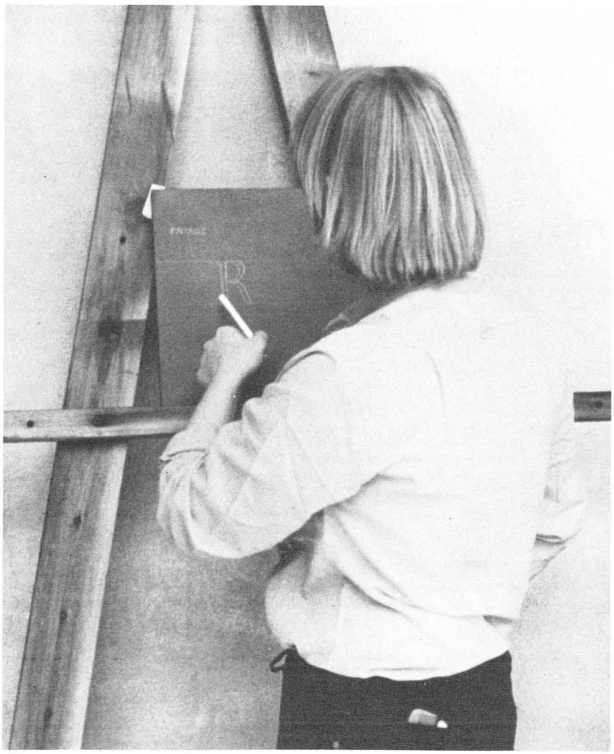
4

3

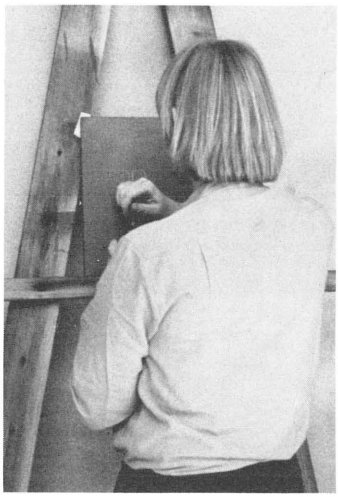
A Welsh slate tablet with heraldry cut by Lida Lopes Cardozo, 1984.

4

An alphabet cut for M. Taylor, 1984, in Welsh slate. The letters have been gold leafed.



5



Photographs courtesy of David Comberg. **6**

5

Lida Lopes Cardozo giving a stone cutting demonstration at the 5th ATypI Working Seminar, Stanford University, 1983.

6

Later, Lida encourages Donald Knuth to try his hand at cutting slate.


R O M A N I A
Debrecen
Oradea
Cluj
Timişoara
Belgrade
(Beograd)
Turda
Zalău
Dej
Gherla
Reghin
Tîrgu-Mureş
Satu-Mare
Sighet
Baia-Mare
Carei
Nyíregyháza
Mátészalka
Miskolc
Eger
Tokaj
Kisvárda
Beregovo
Khust
Tyachev
Rakhov
Yasinya
Storozhinets
Siret
Rădăuţi
Suceava
Fălticeni
Botoşani
Darabani
Dorohoi
Cîmpulung Moldovenesc
Gura-Humorului
Vatra-Dornei
Tîrgu-Neamţ
Piatra-Neamţ
Roman
Buhuşi
Paşcani
Bistriţa
Şimleul-Silvaniei
Huedin
Beiuş
Brad
Alba Iulia
Aiud
Blaj
Mediaş
Sighişoara
Odorhei
Tîrnăveni
Sebeş
Ocna Sibiului
Sibiu
Făgăraş
Braşov
Deva
Orăştie
Hunedoara
Haţeg
Lugoj
Lipova
Arad
Caransebeş
Reşiţa
Petroşeni
Lupeni
Rîmnicu-Vîlcea
Ocnele-Mari
Curtea-de-Argeş
Cîmpulung
Sinaia
Slănic
Cîmpina
Ploieşti
Tîrgovişte
Piteşti
Găeşti
Drăgăşani
Slatina
Strehaia
Turnu-Severin
Orşova
IRON GATE
Tîrgu-Jiu
Bozovici
Anina
Oraviţa
Bela Crkva
Vršac
Pančevo
Smederevo
Požarevac
Zrenjanin
(Petrovgrad)
Kikinda
Ada
Jimbolia
Bečej
Makó
Nădlac
Sînnicolau-Mare
Curtici
Battonya
Hódmezővásárhely
Orosháza
Szentes
Békéscsaba
Békés
Gyula
Salonta
Vésztő
Szarvas
Kunszentmárton
Mezőtúr
Dévaványa
Törökszentmiklós
Karcag
Kisújszállás
Berettyóújfalu
Püspökladány
Hajdúszoboszló
Hajdúböszörmény
Hajdúnánás
Balmazújváros
Tiszafüred
Mezőkövesd
Hajdúhadház
Kazincbarcika
Ózd
Abony
Tîrgu-Ocna
Tîrgu-Secuesc
Sfîntul-Gheorghe
Gheorgheni
Mizil
Bucharest
(Bucureşti)
RODNEI MTS.
CALIMAN MTS.
HARGHITEI MTS.
CIUCUL MTS.
BIHOR MTS.
CODRULUI MTS.
BIHOR 6,066 FT.
MOLDOVEANU 8,343 FT.
ROSUL PASS
TRANSYLVANIAN ALPS
CARPATHIAN MTS.
TRANSYLVANIA
WALLACHIA

Figure 1

The Transylvanian Phoenix: the Kis-Janson Types in the Digital Era

Jack Stauffacher

Let our people come to respect books, so their reading will allow knowledge to spread throughout Transylvania... Once an old woman asked me if she could look at one of my books, and while leafing through the pages, asked me if there were any with thicker letters... This is my profession, to see to it that in this country books are plentiful and cheap.

These are the words of Miklós Kis (Nicholas Kis), a typographer and scholar of Transylvania in the 17th century who devoted his life to spreading knowledge and religion with the technology of his time: printing. Both his location in Transylvania and the strong and dictating rule of the Church made his desire to spread literacy a difficult task. In the 17th century Kis was considered an iconoclast because he challenged the ways of the Church in spreading enlightenment and education. Involvement with all aspects of the printing process from letter design to printing made it possible for him to express his ideas to a wide audience, but it also subjected him to a great amount of criticism.

Not until recently have Kis' accomplishments been acknowledged and Kis recognized as a leader in his times. The importance of his work is apparent, particularly in the design of the Baroque Dutch Old Style typeface which was originally credited to Anton Janson, a punchcutter who lived and worked during the same period. It is believed today that this elegant typeface was actually the work of Kis. The following sequence of images and text may help to demonstrate that Kis had the ingredients to be the remarkable man behind the beautiful Kis-Janson letters.

Visible Language, XIX 1 Winter 1985
Authors' Address: 300 Broadway, San Francisco, CA 94133

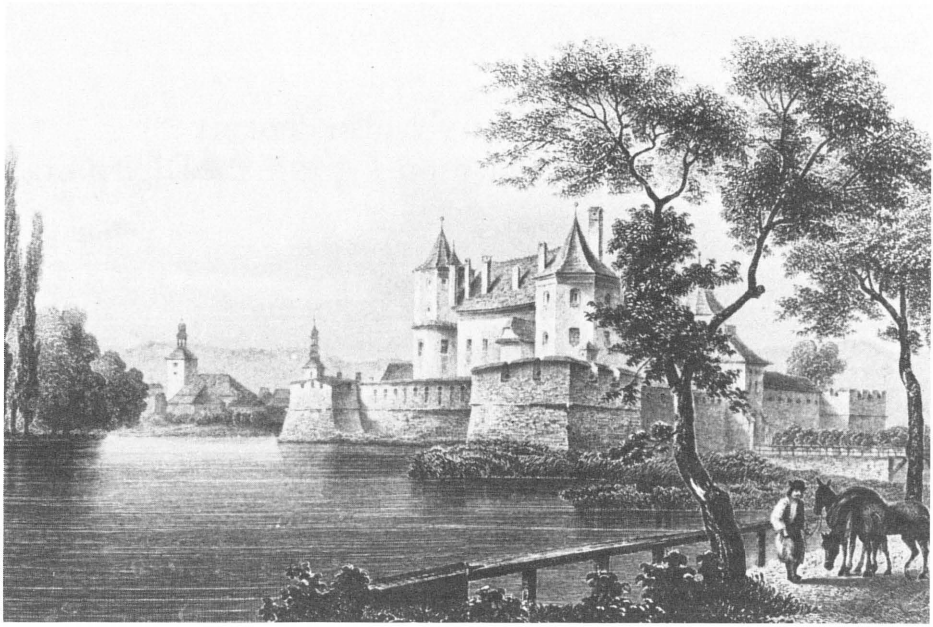


Figure 2

In 1650, Nicholas Kis was born in Eastern Europe in the small borough of Misztófalu (now Tauti-Margherus, Romania), near Nagy-Banya (Baia Mare), which belonged to a region then called Partium of Transylvania. According to György Haiman in his book, *Nicholas Kis**, Kis' dedication to 'civic liberties' may be partly attributed to the environment in which he lived. The inhabitants of Nagy-Banya were largely vine-dressers, miners, and potters, living with a degree of self-government in a region of Hungary that was exempt from the Feudal System.

Upon completion of his secondary studies, Kis was accepted to the noted Enyed (now Aiud) Reformed Church College (Enyed Collegium Academium). This Academium had an established reputation, attracting the intellectual life of the region and was at that time considered the center for the Transylvanian Reformed Church. The years of study at the Academium provided Kis with the desire and skills to propagate the spread of literacy and the message of the Bible.

---

* *Nicholas Kis: A Hungarian Punchcutter and Printer,* 1650-1702, Jack W. Stauffacher/Greenwood Press in association with Gilman D. Parson Books, 38 Hill Point, San Francisco, California 94117

In 1677, at the age of 27, Kis completed his study at the Academium and accepted a position as head master of a school in Fogaris (Figure 2). During his stay at Fogaris he was attracted, as were many Hungarian scholars, to the study of Calvanistic Theology in Holland. Simultaneously, the leaders of the Transylvanian Reformed Church recognized the new central role of the Hungarian Bible. The only Bible printed at that time was a small format edition of the Hungarian Reformed Church Bible and it did not meet the anticipated demand. Printing facilities in Hungary were not sufficient enough to produce a new Bible, so the Reformed Church had to print the Bible in Holland.

Kis was entrusted by the Church to help the Dutch printer Daniel Elzevier in supervising the printing. Kis left Fogaris in 1680 for Holland where he was to function as an editor and proofreader. He was also encouraged by the Church to acquaint himself with the printing trade. After the death of Daniel Elsevier in 1681, Kis lacked the necessary funds to purchase type matrices, so he decided to abandon his study of Calvanistic Theology and to pursue the craft of printing so that he could eventually print the Bible himself. He joined the Voskens typefoundry and apprenticed with Dirck Voskens or possibly one of the noted Blaeus. At that time in Holland the skill of punchcutting, matrix making, typefounding and typography were separate jobs.

Figure 3

In 1683, after his apprenticeship, Nicholas Kis set up his own shop to start printing the Hungarian Bible with his own types. As Kis states in his APOLOGIUM of 1698, 'Mine is a kind of work which requires full concentration of mind and eyes, one cannot do it well while talking. This is how I became such a silent man after nearly ten years of this work up there in Amsterdam.'

A map of Amsterdam from 1625 shows the area in which Kis located his shop (Figure 3). He was situated on the Nieuwe-Lydts Achter Burchwal Street. The fourth house from the left is believed to be his studio (Figure 4). A legend in Dutch at the bottom of his type specimen reads: *If any man desires strikes or matrices of these types newly cut by Nikolas Kis, let him address himself to the afore-named master dwelling in Amsterdam on the Achter Burgwal over the brewery at the sign of the Swan in the house of Warner Warnersz, and they can get them for a reasonable price.*

Figure 4

Figure 5

The production of the Hungarian Bible was already in progress by 1684. Kis was the foreman and proofreader. He hired a press in Amsterdam with about twenty men to do the typefounding, composing and printing. He notes in the corrigenda at the end of the Bible that 'gross errors occured due to the single handedness and many other worries of the proofreader. . . and to the workers' lack of knowledge of the Hungarian language.' The Bible was completed in 1685; the total volume came to 1,200 doudecimo (160 x 166mm) pages with about 4,500 letter-types per page. Figure 5 is a picture of the bound version which is dated 1695.

Figure 6

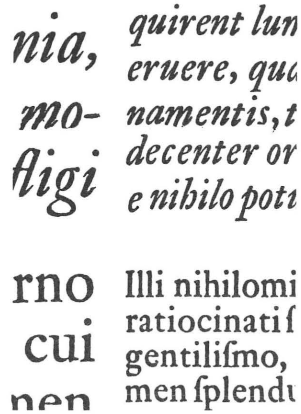


Figure 7

To finance the Bible printing, Kis cut a variety of types for other foundries. His type cutting commissions came from Germany, Poland, Sweden, Italy, England and there was even an offer from the Chinese. Additionally, Kis produced type for publications that were intended to spread the Protestant faith in the Middle East and thus he cut the first Georgian types. Figure 6 is the specimen sheet from his shop in 1684. It is printed in 4 columns and measures 480 x 322 mm. It includes 17 Roman sizes, 15 Italics, Greek and Hebrew. A detail of the sheet is shown in Figure 7.

Figure 9

A P O L O G I A
B I B L I O R U M
Anno 1684. Amſtelodami impreſſorum,

ùt &
O R TH O G R A PH I Æ
in iis obſervatæ:

In Tres Partes diviſa.

I. *Epiſtolam Apologeticam*, in qua utplurimum tractatur de alterationibus quibusdam, quæ in ea Editione contigerunt, earumque Generibus, cum Exemplis.

II. *Catalogum vocum ibi omiſſarum, hìc reſtitutarum:* ubi interim ſignantur (duntaxat) Loca de neceſſariis mutationibus, vel aliis difficultatibus.

III. *Ratiocinationem* de Orthographia eo modo inſtituenda.

Ad multorum prejudicia de iis concepta medendum cum coactione à nobis invitis expreſſa

Per
NICOLAUM KIS de M.TÓTFALU.
CLAUDIOPOLI
Anno 1697.

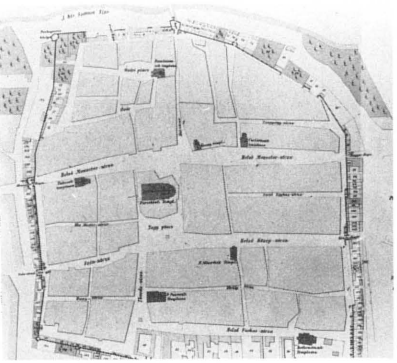


Figure 8

In referring to his first types cut for the production of the Bible, Kis states in a letter dated August 1684, 'The types I am printing with at the present are not as trim as they should be In Excellenti Gradu; their shortcomings are due to the fact that they are specimens from my initial work, that is I prepared their matrices when I was still learning the trade. But God willing, I shall yet make types that will be notable in any part of Europe.'

In 1689, Kis left Amsterdam to return to Transylvania. It is believed that on his way home he left a set of matrices in Leipzig for the purpose of selling them, probably to Anton Janson. This would explain how Janson obtained the type for which he was later credited with having cut himself. Kis returned to the Transylvanian town of Kolozsvár to set up his printing press, typefoundry, and punchcutting shop. Figure 8 is a picture of Kolozsvár in 1607.

Despite the difficult circumstances imposed by the loss of his types during his move from Holland and the lack of time for cutting new and better type, Kis published a rich assortment of books. He printed works of Physics, Mathematics, Religion, Prose, and Medicine for the general public as well as textbooks and cookbooks.

Kis' reason for devoting his time to printing was his desire to increase literacy and the amount of knowledge available to the public. He felt he could do this by producing a variety of inexpensive books. Because he was dedicated to educational matters and accuracy, he exercised his own orthographic standards during the production of the Hungarian Bible. The changes he made to the Bible were not well received by the Elders of the Reformed Church in Hungary and they ordered Kis to print and issue a public apology for his Bible modifications. The APOLOGIUM BIBLIORUM, in defense of Kis' Amsterdam Bible, was directed towards those who 'disliked the typographer-scholar' and to people who disapproved of his modern educational book publishing principles.

Kis' opponents attacked not only his work but threatened him personally. In continued defense, Kis published the APOLOGIUM in 1698, which justifies his life's work. This autobiographic book is over 100 pages and is a thorough recount of his life's activities. It provides us with a detailed description of the printing process and the attitudes of the 17th century. The italic typeface (shown in Figure 10) at the end of the APOLOGIUM preface is an example of the Kis-Janson style.

Figure 10

me difficulter, neque ſine magna ruina jam avelli poſſe non inficior) ſaltèm notificare debui cauſam omnis tumultuationis, & ſi quod judiciû Dei ſequetur, ulterioris incommodi: quòd ſcil. dona (quæ quidem vàlde tenuia agnoſco:) apud me depoſita, & nationi cariſſimæ exornandæ devota, multi in terram defoſſa eſſe vellent. Vale, quisquis es æquus judex & candoris amans.

Cui eſt & erit ad omnia obſequia addictus

NICOLAUS KIS de M. TÓTFALU.

ELEMENTA
GRAMMATI-
CÆ LATINÆ,
Pro recta Scholaſticæ
Juventutis Inſtitutione, ex præci-
puis Grammaticorum præceptis à GRE-
GORIO MOLNAR contracta.

Poſt

Multijuga acceſſione per varios locupletata · præſertim Regulis de Nominum Generibus, Verbo-rum Præteritis & Supinis, nec-non Quantitate Syllabarum metrò comprehenſis aucta. Nunc verò *vitiis innumeris ſublatis, ſuperfluis reſectis, meliori & Methodò & Compendiò donata.*

EDITIO SECUNDA

CLAUDIOPOLI,
Ex Officina NICOLAI K[illegible] TÓTFALUSI
Anno M. DC. XCVIII.

Figure 11

SIRALMAS
PANASZ;
Iſtennek KOLOSVÁRON fekvő nagy
haragjáról, abból ſzármazott egy-
néhány ſúlyos oſtoriról, és annak nevezete-
ſen ez 1697 Eſztendöben Pünköſt Há-
vának 6-dik napján iſonyú
TÜZZEL
való megpuſztításáról.

*Kellyben e' Városnak ſiralmas ſorsának lerajzo-
lását és a' Megtérésre való Intést Iſtenhez nyúj-
tott áhitatos Könyörgö Ének követi-bé.*

Emlekezetnek okáért irattatott

M. TOTFALUSI K. MIKLÓS által,

Nyomtattatott KOLOSVÁRATT
1697 Eſztendöben.

Figure 12

Titles, title pages and other typographic standards evolved from text because of the need to clarify the contents of the book. In developing stages, the title page was the introductory material of the book, usually consisting of one sentence arranged in a centered composition. Figure 11 shows the title page of a Latin Grammer book printed by Kis in 1698. In Figure 12, the title page includes a verse reproving the corrupted ethics of the lords of Kolozsvár in 1697.

Sectio VIII. *De Verbis Imperfectis* 77

175. *Prima radicalis* Aleph in futuro Kal repudiato ſchevate muto, quod ex §.148. debebat recipere, quieſcit in cholem ; in prima ſingulari *(nè duo Aleph concurrant)* planè etiam omittitur ; terminatio autem eſt tzeri ordinariè ; in prima ſingulari patach ut plurimùm, ad diſtinctionem à participio præſenti. Obtinet autem hæc anomalia in iſtis ſolùm verbis, אָבַד *periit*, אָחַז *apprehendit*, אָכַל *comedit*, אָמַר *dixit*, אָבָה *voluit*, אָפָה *coxit*. Imitantur interdum אָהַב *congregavit*, & אָהַב *amavit*. Prima א in prima ſingulari futuri Hiphil ſolet ſimiliter omitti, & ſub characteriſtica eſt Kametz : אָזִין pro אַאֲזִין *auribus percipiam;* in aliis perſonis futuri, nec non in participio Hiphil nonnunquam obtinet contractio, juxta §.78. eliſo tamen aleph: יְהַל pro יְאַהֵל *tentorium figet*, מֵזִין pro מַאֲזִין *auribus percipiens*.

f. Plural. m.	Futurum Kal.	f. Singul. m.	
יֹאבְדוּ תֹּאבַדְנָה	תֹּאבַד יֹאבֵד	תֹּאבַד יֹאבֵד	3.
תֹּאבְדוּ תֹּאבַדְנָה	תֹּאבְדִי תֹּאבַד	תֹּאבְדִי תֹּאבַד	2.
Com. נֹאבַד	Com. אֹבַד		1

176. Prima radicalis Jod quieſcit in Conjugationibus Non-dageſſatis, quoties ob acceſſum unius characteriſticæ ſyllabam debet terminare, ex §.148. adeòque reſpuit ſchewa mutum, juxta §.75. Quies verò ejus diverſimodè ſe habet.

177. In futuro Kal quieſcit, ex §.75. vel in chirek explicitè ſive expreſſa, & terminationem patach poſtulat : יָשֵׁן *dormiet :* vel in tzeri implicitè ſive latens, ac terminationem tzeri requirit : יֵשֵׁב *habitabit*. Illorum infiniti-

F 2 vus

Figure 13

LEXICI HEBRAICI COMPENDIUM METRICUM.

I. Nomina. *Alphabetum* 1.

א Áb *pater*, ém *mater*, bén *filius*, cbjón *egenus*.
ב bánjal Adón *dominus*, báth *filia*, néfel *abortus*.
ג gáb *gibbus*, njeljón gabóah bamá ráim maróm *altus*.
ד dézel néz *vexilla*, sana *annus*, tzena *ficus*.
ה hód pér tzebí *decus*, makóm *locus*, asré *beatus*.
ו zebúb *muſca*, menjíl *toga*, njéreẓ *ſponda*, dób *urſus*.
ז hhág *feſtú (eſt.)* hhódes *menſis*, jakár [méred] *pretioſus*.
ח tál *ros*, ẓak *ſaccus*, ẓadé sadmóth *agri*, sús *equus, gyrus*.
ט jám *mare*, tzúf *favus*, 'achbár *mus*, péle péli-*q*; *mirus*.
י kochab *ſtella*, jasár kén *rectus*, tzaddík *juſtus*.
כ lappíd *fax*, kodkód *vertex*, navé nanjím *amœnus*.
ל maittéanh *clavis*, mathók 'atéb *dulcis*, már *amarus*.
מ nabál *keſil évil* sachál pothé pethi *ſtultus*.
נ sarís *eunuchus*, siré *cantica*, tehóm *abyſſus*.
ס njéd *teſtis*, njóf tzippór *avis*, dál dách *tenuatus*.
ע páhh *laqueus*, ploní is *aliquis*, dód *amor*, kiná *zelus*.
פ tzélanj *coſta*, njéyel *vitulus*, góren *area*, dáth *jus*.
צ kéreb *intima*, gág *tectum (eſt.)* hhúr tzáhh labán *albus*.
ק rás: njaní dách *pauper*, dáj *ſufficiens*, kasé *durus*.
ר éid *calx*, ẖhazák afík *validus*, nochrí zár *alienus*.
ש tá *thalamus*, methóm adám énós *homo*, yér *peregrinus*.

Alphabetum 2.

א addír *magnificus*, njájir hhánor athón *aſellus*.
ב bál Ieb *cor*, kóthnóth *tunica*, dód réaij *amicus*.
ג gój *gens*, kaléa *ſcutella*, séfer *codex*, gahhón *alvus*.
ד dasén barí saimén *pingvis*, hhérí hhóm hharón *aſtus*.
ה hâyiná *recta*, sónij njasír *dives*, hhólí *morbus*.
ו zachár *mas*, nánjar jéled *puer*, asmá *reatus*.
ח hhétz *telum*, ẓé *pecus*, kár talé kébeẓ kéẓeb *agnus*.
ט tób *bone*, dín ríb *lis*, etzbánj *digitus*, perí *fructus*.
י jáhhaẓ *ſtemma*, sofár *tuba*, 'ád 'olám *ſæcla*, gán *hortus*.
כ kós yabía' aggán *crater*, jóm-*que dies*, késeth *arcus*.
ל la-

B

Figure 14

An example of the diversity of Kis' type and skill in handling difficult typographic situations can be seen in Figure 13 in a Latin and Hebrew text. Figure 14 demonstrates Kis' solution to a complicated linguistic compostition printed in 1698.

44 PROLOGI TITULUS XVI.

i. Nemo debet tetere Iudicem, ut aliquem torqueat : Imò neque captus poteſt ſe torturæ ſubjicere, ſi ſecus judicatū eſt ; quia nemo eſt Dominus ſuorum membrorū. Pro inquirenda tamen rei alicujus veritate, quādoque debent Capitanei confinia tenentes captum torturæ ſubjicere. Alioquin cùm ſit meri & miſti judicii pedanei, Judices absque ſcitu Principis torturam exercere non permittuntur.: ut patet Par. 3. Tit. 20.

Igitur aliunde eſt edocendus, vel per *i* teſtes, vel alia documēta, ut poſſit torquere criminosū.

Ezokáért a' Biró mástól mennyen végére, és annak módgya ſzerint úgy tudgya-meg nyilván, vagy a' bizonyságoknak vallások által, vagy egyéb környül-álló dolgoknak törvény ſzerint való meg-értekezése által, hogy a' gonoſz-tévöt meg-kinoztathaſſa.

k. Carnifices excuſantur ab homicidio.

Dubium quoque eſt de miniſtris & executoribus, qui ſciunt teſtes falsò juráſſe, vel Judicem iniquè judicáſſe ; tamen coguntur à Judice innocentem *k* interimere, vel aliter punire. Unde communis eſt Theologorū ſententia : Eos non debere obtemperare, ſi pro certo id ſciunt ; Secus verò ſi dubitēt, quia tunc excuſentur propter obedientiæ bonum. Ideo ſecundum S. Thomam, ſi ſententia intolerabilem errorem ac injuriam contineat, nō debent obedire. *l* Alioquin excuſarētur carnifices, qui Martyres occiderunt. Si verò non adeò manifeſtā contineat injuſtitiā, tunc non peccāt exequendo : quia ſententiā ſuperioris nō habent discutere. Nec ipſi *m* innocentē interimunt ; ſed Judex, cui miniſterium præbent.

l. Carnifices, qui Martyres occiderunt, non excuſantur.

m. Innocentis interemptio Judici infamat.

De kételkedhetnénk azok felöl-is, kiket igaz-tételre botsátnak ; és egyéb ſzolgák felöl-is, úgymint kik a' Birák' tötte törvényit véghez ſzokták vinnie, kiknél nyilván lehet az, hogy a' tanúk hamiſſat vallottak és hamiſſan esküttek valakire, avagy hogy a' Biró hamis törvényt tett ; mindazáltal a' Biró kinſzeríti öket, hogy az ártatlant megöljék, avagy másképen megbünteſſék. Mellyröl a' Sz. Irás Magyarázó Doktorok köz akarattal így ſzólnak : A' Biró ſzavát nem kell meg-fogadni és engedelmesnek nékie lenni, ha azt nyilván tudgyák. Külömb azért az, ha ök-is nem tellyeſséggel bizonyosok benne, hanem még nálok-is kétséges ; mert ollykor mentségek vagyon az engedelmességnek ditséretes jóvóltáért. Erröl a' dologról Sz. Tamás azt irja : hogy-ha a' Biró ſententiájában eltürhetetlen hamiſságot és nyilván-való boſzſzúságot látnak, ne legyenek engedelmesek. Mert ekképē mentségek lehetne a' hóhéroknak, kik a' Sz. Mártiromokat meg-ölték. Ha pedig nem olly nyilván-való hamiſság lejénd a' Biró ſententiájában, akkoron engedhetnek és ſzolgálhatnak a' Biró parantsolattyára : mert náloknál nagyobbnak mondását ök meg nem czirkálhatják, el ſem kerülhetik. Az ártatlant-is nem ök ölik-meg ; hanem a' Biró, kit ök ſzolgálnak.

FINIS PROLOGI

A' TE-

Figure 15

t omni vi & contentione eniteremi
m exul ſapientia induceretur; quoru
ırentum optimi filii præceptis, perq
ceat mihi veſtrâ modeſtiâ non interp
b eorum eſſe conſvetudine, qui ſum
ı Tabulas Mecœnatum nomina infeı
nt; verùm etiam beneficiorum ſumn
ı exiſtimant. Quorum ut pietati in
ıſſime, Magni Cæſaris Magne Conſi
Theſaurariæ fideliſſime STEPHANE APC
ſtigia ad Te patrocinii Principem, ſi
ı Claudiopolitanam properare Acad
ı, fida Mecœnatis limina ſubeuntem.
iam, ut non ſolùm commodè, sed
enim tua in deſtitutam ſubſidiis vive
ecêre. O nunquam moriture in ſapi
! qui annuos munificè ſtatuiſti prove
uctum reddi, quàm doctas Patriæ fil
nicum ad ſumma tua in fidem Rom
ddi poterat, ut qui Pietati quaqua
nus fidei Romanæ propugnator ſur

Figure 16

Figure 15 is a harmonious typographic composition of a page setting from a bilingual text with marginal notes. Figure 16 is an example of the rich texture of a page of text set by Kis in a 14 point Augustin Roman type.

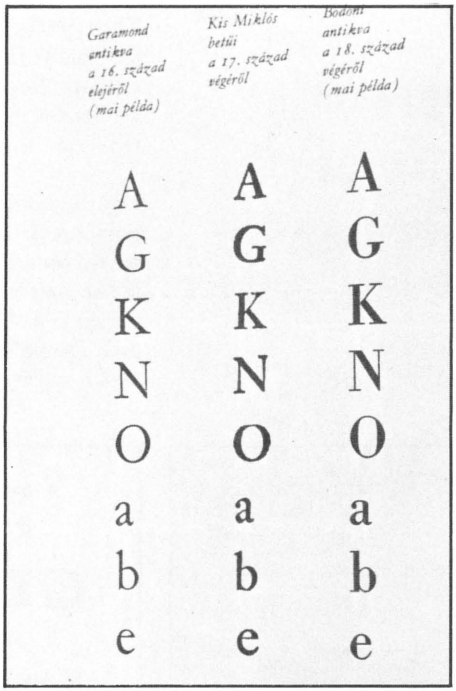


Figure 18

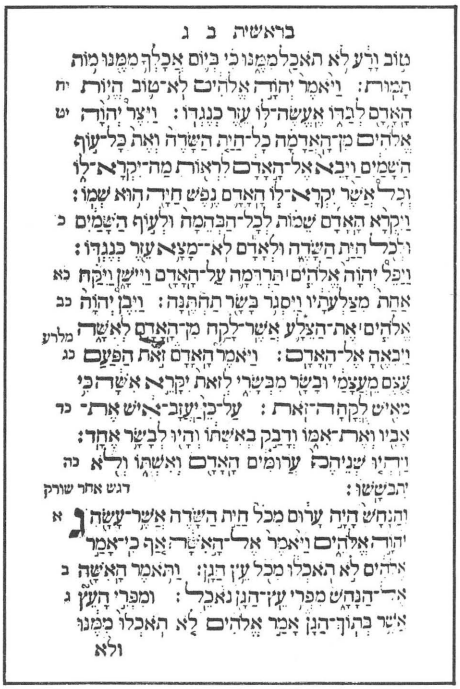


Figure 17

Figure 17 is an example of Hebrew text cut and set by Kis. Figure 18 is a comparison of three text faces, Garamond, Kis-Janson, and Bodoni.

The types of Nicholas Kis were not confined to Holland and Hungary, but also made their way to places such as Italy. Giovanni Filippo Cecchi, the Granducale Press printer for the Grand Duke in Florence (1690), purchased type from Kis during Kis' stay in Holland.

Figure 20 shows one of Kis' last books, printed in 1701. Kis spent his last years pressured by those in power who sentenced him to public penance and asked him to withdraw his APOLOGIUM. He died in 1702 at the age of 52 and was buried in Kolozsvár where a death notice still stands today. The notice is in the reformed Church of Farkas Street which is pictured in Figure 21.

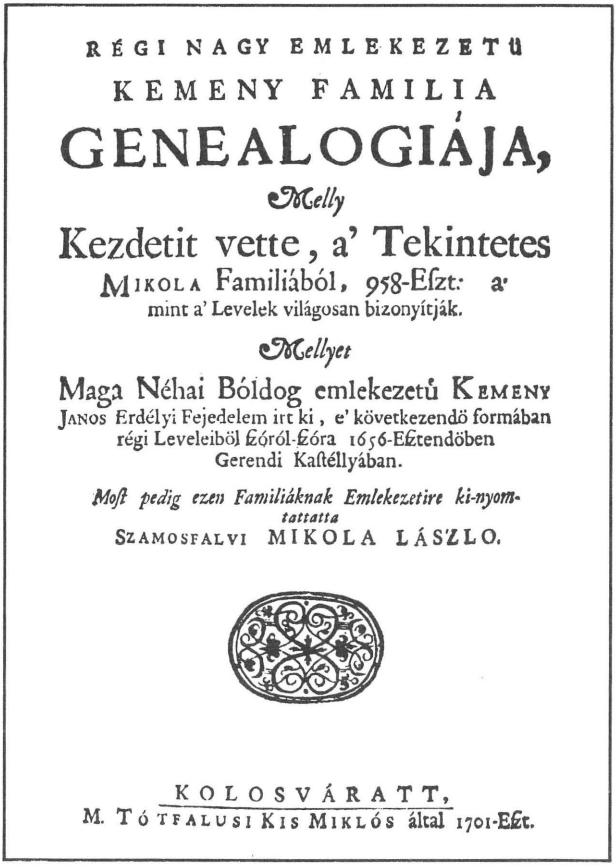

Regiſtro dell' Opera. 331

✠ A B C D E F G H I K L M N O P Q R S T V X Y Z
Aa Bb Cc Dd Ee Ff Gg Hh Ii Kk Ll Mm Nn
Oo Pp Qq Rr Ss.

Tutti ſono Duerni, eccetto Ss, che è Terno.

IN FIRENZE, M.DC.XCVI.
Nella Stamperia di S.A.S. per Gio: Filippo Cecchi.
In Via del Palagio. *Con Licenza de' Super.*

Figure 19


RÉGI NAGY EMLEKEZETŰ
KEMENY FAMILIA
GENEALOGIÁJA,
Melly
Kezdetit vette, a' Tekintetes
MIKOLA Familiából, 958-Eſzt: a'
mint a' Levelek világosan bizonyítják.
Mellyet
Maga Néhai Bóldog emlekezetű KEMENY
JANOS Erdélyi Fejedelem irt ki, e' következendö formában
régi Leveleiböl Ezóról-Ezóra 1656-Eztendöben
Gerendi Kaſtéllyában.
Moſt pedig ezen Familiáknak Emlekezetire ki-nyomtattatta
SZAMOSFALVI MIKOLA LÁSZLO.

KOLOSVÁRATT,
M. TÓTFALUSI KIS MIKLÓS által 1701-Eſt.

Figure 20

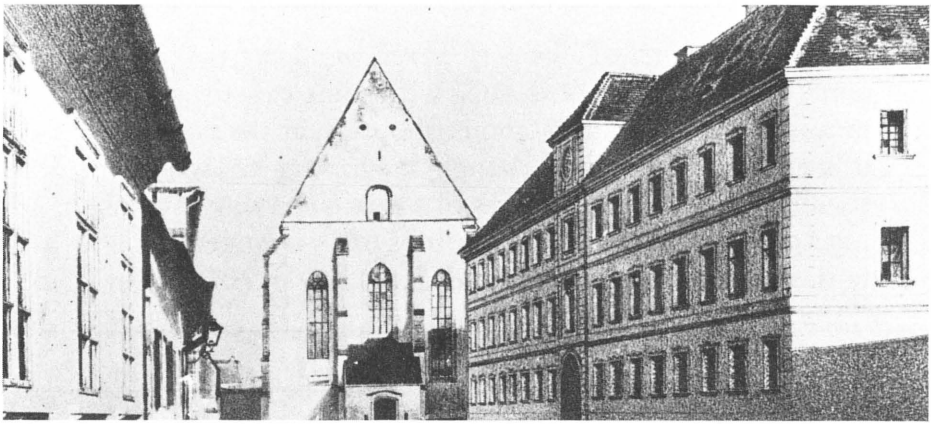


Figure 21

As the significance of Kis' typefaces and work is realized, it is appropriate to observe the changes that his type has undergone since the 17th century. The Kis-Janson type face has been subject to modifications imposed by new printing and letter making processes. In 1983, Jack Stauffacher, together with a group of his students at the Center for Typographic Language (Greenwood Press, San Francisco), took up the task of following the evolution of the Kis-Janson typeface by observing and commenting on the quality of its translation into different mediums.

The participants in the study wanted to compare a given block of text when it was typeset by companies who owned a version of Kis-Janson. The text was taken from a passage by Paul Valéry and was to be copied according to a model set and printed by Jack Stauffacher with the original Stempel Janson metal fonts. The model was set in both a justified and flush left format using 12/14 point type. The line length measured 25 picas. The participating companies were asked to follow the models exactly to insure an accurate comparison between the various versions. Line length, punctuation, italics, small caps and special spacing were to be identical with the model.

Portions of the resulting typeset material are shown on the following pages. The emphasis here is not to render judgement regarding the talents of one company over another, but instead to observe the ingredients necessary to recapture the unique liveliness and clarity that allowed this Baroque Dutch Old Style typeface to remain timeless and to survive for as many centuries as it has.

A fine book is first of all a perfect *reading device*, the properties of which may be defined with some exactitude by means of the laws and methods of optics; at the same time it is a work of art, a *thing*, though one having its own personality, showing the features of a particular way of thinking, suggesting the noble intentions of an arrangement both successful and determined. *Let us not forget, however,*

1

A fine book is first of all a perfect *reading device*, the properties of which may be defined with some exactitude by means of the laws and methods of optics; at the same time it is a work of art, a *thing*, though one having its own personality, showing the features of a particular way of thinking, suggesting the noble intentions of an arrangement both successful and determined. *Let us not forget, however, that*

2

A fine book is first of all a perfect *reading device*, the properties of which may be defined with some exactitude by means of the laws and methods of optics; at the same time it is a work of art, a *thing*, though one having its own personality, showing the features of a particular way of thinking, suggesting the noble intentions of an arrangement both successful and determined. *Let us not forget, however,*

3

1 Model set and printed by Jack Stauffacher with the original Stemple Janson metal fonts.

2 Sample set by Mergenthaler VIP Photosetter.

3 Sample set by ITEK Composition Systems.

A fine book is first of all a perfect *reading device*, the properties of which may be defined with same exactitude by means of the laws and methods of optics; at the some time it is a work of art, a *thing*, though one having its own personality, showing the features of a particular way of thinking, successful and determined. *Let us not forget, however, that typography excludes improvisation;* it is

4

A fine book is first of all a perfect *reading device*, the properties of which may be defined with some exactitude by means of the laws and methods of optics; at the same time it is a work of art, a *thing*, though one having its own personality, showing the features of a particular way of thinking, suggesting the noble intentions of an arrangement both successful and determined. *Let us not forget, however,*

5

A fine book is first of all a perfect *reading device*, the properties of which may be defined with some exactitude by means of the laws and methods of optics; at the same time it is a work of art, a *thing*, though one having its own personality, showing the features of a particular way of thinking, suggesting the noble intentions of an arrangement both successful and determined. *Let us not forget, however,*

6

4 Sample set by Information International Incorporated on a COMP 80/2 Universal Pagesetter.

5 Sample set by HELL GmbH, with their digital *Nikis* font.

6 Sample set on an Autologic APS-5.

Special thanks are due to the companies that participated in this study:
Irish Setter, Oregon (Merganthaler VIP)
Itek Composition Systems
Information International, Inc.
Dr. Ing Rugolf Hell GmbH
Autologic, Inc.
Ladislas Mandel, Lumitype-Deberny & Peignot, Paris (not shown)
John Dreyfus, Monotype Corporation, England (not shown)

Many of the illustrations in this article were taken from *Nicholas Kis, A Hungarian Punch-Cutter and Printer, 1650-1702*, by György Haiman, English version published by Jack W. Stauffacher, The Greenwood Press in association with Gilman D. Parsons Books, San Francisco, 1983.

Galliard: a modern revival of the types of Robert Granjon

Matthew Carter

The types that Galliard hopes to revive were cut by a French artist, Robert Granjon, who worked between about 1540 and 1590. I should begin by sketching in the historical circumstances. In the early part of the sixteenth century, Paris became the center of the book arts in succession to the northern Italian cities. The æsthetic Renaissance and the new humanist learning from the Catholic south met the religious reforms of the north in France and, whatever else these powerful currents stirred up, they certainly made bookselling profitable. Competition among printers benefitted the emergent trades of typecutting and typefounding.

Parisian types for roman and italic were based, as their names in both French and English tell us, on Italian models; in fact on the types of Aldus Manutius cut in the last years of the previous century, which the French lettercutters naturalized and surpassed. The man seen by his contemporaries — and by us — as personifying the French ascendency in lettercutting was Claude Garamond, whose name has come down to us for the genus of majestic old-style romans from which the whole subsequent evolution of roman has sprung. Within Garamond's own lifetime (he died in 1561), there began the first commercial typefoundries.

Originally printers had made, or had had made, their own types. In time, they traded in types with one another and bought new ones from independent punchcutters. Typefoundries made the step to capitalism: they stocked faces by many cutters and dealt

Visible Language, XIX 1 Winter 1985
Author's Address: Bitstream, 215 First St, Cambridge, MA 02142

with the printing trade at large. I think it was their need to distinguish between the various faces they stocked for the common bodies that led them to use the names of cutters to identify and eventually to commend their types, so that from this time (the middle of the sixteenth century) punchcutting ceases to be an anonymous calling. We know the names of many of the cutters of sixteenth-century types.

1

One of the first typefoundries was that of Christopher Plantin, a Frenchman denizened in Antwerp, a fine printer with a passion for type which he collected and commissioned (Figure 1). He hired out matrices and sold duplicate sets at the regular Frankfurt fairs, disseminating the masterpieces of French letter design through northern Europe.

Plantin's business declined after his death, but the building that housed his press remained in the family until it was given by his descendents to the city of Antwerp as a museum. A book by the first curator of the Plantin-Moretus Museum, published in 1905, showed that some typographical material survived there, but it was not until fifty years later that an expert assessment was made. The occasion was the quatercentenary of Plantin's first printing, celebrated in 1955, when it was revealed that although the Museum's wooden presses were well post-Plantinian, and there was little or no serviceable cast type of any antiquity, Plantin's entire stock of punches and matrices survived.

This astonishing discovery: that the finest collection of printing types made in typography's golden age was in perfect condition (some muddle apart), was made even more valuable by the survival under the same roof of Plantin's accounts and inventories which named the cutters of his types. The job of matching the material to the documents took about five years, and the results, which have been published, have had considerable impact on typographical scholarship, on bibliography and on the æsthetic appreciation of type design of that period. It is now possible to study a sufficient corpus of confidently attributed work by half a dozen sixteenth-century cutters to get an idea of the quantity of their output, and a proper sense of their individual styles as designers. The first result of such an assessment must be, I am sure, to confirm the stature of Garamond, but to see him no longer as a solitary eminence but rather as first among equals.

Of other cutters well represented at the Museum, two were Flemish, François Guyot and Hendrik van

den Keere, the latter employed extensively by Plantin; and three were French, Guillaume Le Bé, specialist in Hebrew types; Pierre Haultin, a fine and still underrated artist, a red-hot Calvinist and the most considerable printer among sixteenth-century punchcutters; and Robert Granjon.

Granjon's name was not unknown before the Plantin celebrations of 1955. In fact, there is a British Linotype face called Granjon, a very good one. Many of his italics had been identified in French and Italian printing, and most of the twentieth-century Garamond revivals familiar to us have italics that were based, unwittingly, on Granjon's designs. But the Plantin-Moretus collection of Granjon's types really showed their range and virtuosity for the first time to modern eyes.

Mike Parker was one of the researchers in Antwerp who worked on cataloging and identifying the punches and matrices there. In due course, he became Director of Typographic Development at Mergenthaler Linotype in New York. When I joined him at Mergenthaler in 1965, one of our first concerns was to consider whether any of the Plantinian treasures that were familiar to us would yield a good contemporary photocomposition typeface. Our choice fell immediately on the work of Granjon.

I include here a few biographical facts about Granjon himself. He was born in 1513, about one generation after Garamond. He was a Parisian, the son of a bookseller, and was apprenticed to a goldsmith, though I do not think it is necessary to infer that he was trained to work in precious metals — there is much in common between lettercutting and goldsmithing, two branches of minute metalworking that include the cutting of punches as part of both trades (Gutenberg's punchcutter was a goldsmith, as was Aldus'). On the other hand, I must admit, for one of his early typefaces Granjon was paid in gemstones — perhaps he set them.

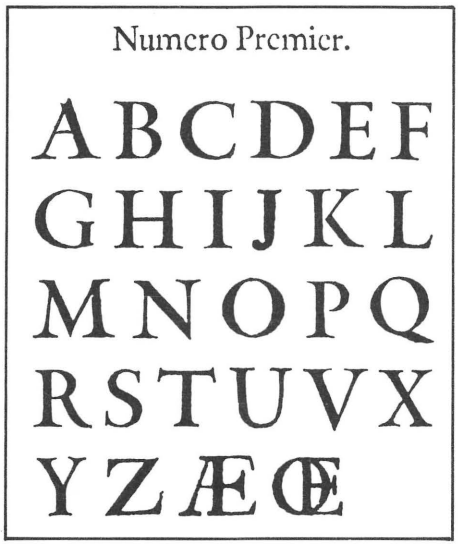
Granjon started cutting type in the early 1540's and soon built up contacts with the city of Lyons in southeast France, the entrepôt for the Italian trade. He spent all his life on the move, living at various times in Paris, at others in Lyons (he married a *lyonnaise*, the daughter of an artist), also in Antwerp and in Frankfurt, and ending his days in Rome.

He had a prodigious output. Surviving account books at Antwerp show that for a period of several months he was producing punches at an average rate of two a day. He cut sixty to sixty-five faces in all: eighteen or


CIVILITE PVERILE

EX AEQVITATE, ET PRVDENTIA, HONOS.

2


Numero Premier.

ABCDEF
GHIJKL
MNOPQ
RSTUVX
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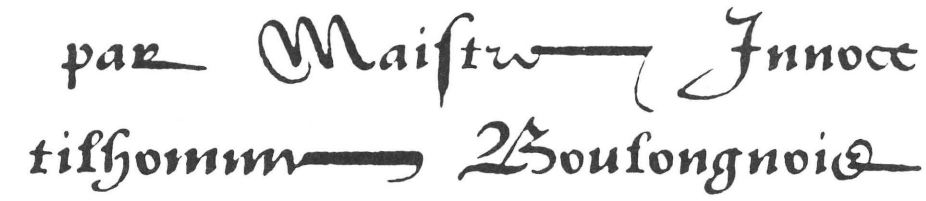
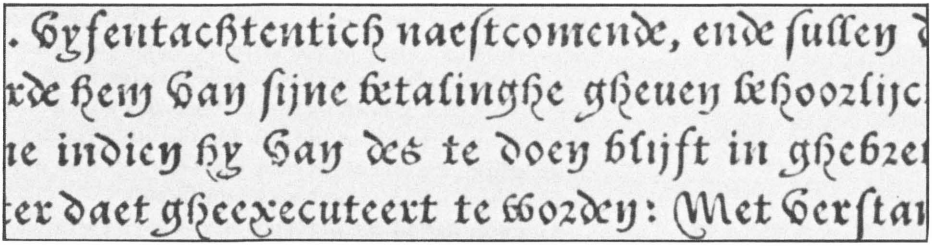
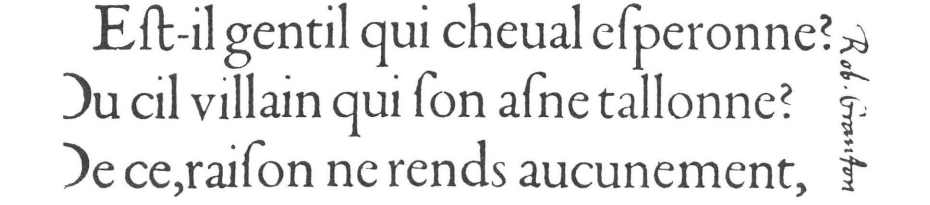
6


par Maiſtre Innocent
tilhomme Boulongnoiſe

3


. Syfentachtentich naeſtcomende, ende ſulley
xde hem Hay ſijne tetalinghe gheuen tehoozlijc
ie indiey hy Hay des te doey blijft in ghebze
ter daet gheexecuteert te wozdey: Met Gerſta

4


Eſt-il gentil qui cheual eſperonne?
Ou cil villain qui ſon aſne tallonne?
De ce,raiſon ne rends aucunement,

Rob. Granjon

5

nineteen were italics, in at least four distinct styles and ranging in size from 6.5 to 42 point; nine or ten romans; six or seven Greeks; between eleven and thirteen other exotics including Syriac, Armenian, Cyrillic, Arabic and, probably, a Hebrew; seven or eight musics of various notations; eight Civilité scripts; and many decorative fleurons. I think in looking at the work of the masters of the art that his virtuosity is unequalled.

Figure 2 shows a book for children about courteous behavior, *La Civilité Puérile*, printed by Granjon in 1558, which gave its name to the style of type used in it. The bullrush in his mark on the title page is a rebus for Granjon's name — *grand jonc* means 'big rush.' Civilité type imitated ordinary handwriting of the period, the equivalent of an informal script face today. Granjon, who invented the style, considered it indigenous to France and better for setting French than the imported roman or italic. Figure 3 is a close-up of the same face, showing its wonderfully dynamic rhythm.

A more sober version of the same Gothic style is shown in Figure 4. This is a tax form for the City of Antwerp printed by Plantin, who was not above jobbing printing. Civilité is interesting as being one of the very few types once well established that have completely fallen out of the present-day typographic repertory.

Figure 5 shows an early roman face by Granjon from about 1549, cut before his maturity, and looking Garamondian. Figure 6, by contrast, is a titling face (24 point capitals) of ten years later — Granjon in full flower (discount 'J', 'U' and the dipthongs which are apocryphal). I find in these letters a splendid confidence, the result of artistic assurance expressed through technical mastery.

I would like to try to explain what Mike Parker and I saw in Granjon's letterforms, and what gives them their individuality. This can best be done by making a contrast: Figures 7 and 8 show capitals by Garamond (the 'J', again, has no business here). When I look at them, words such as 'stately,' 'calm' and 'dignified' come to mind.

The letters in Figures 9 through 11 are unmistakably Granjon's. Looking at them, adjectives like 'spirited,' 'tense' and 'vigorous' come to mind. I see considerable differences in drawing between Garamond's shapes and Granjon's. To me these springing forms are more obviously stylish and more individualistic than those of Garamond, and of other contemporary letter artists.

One of Granjon's romans that we studied most closely when looking for a model for a photocomposition design was the *Gros Cicero* (large pica) shown in Figure 12, an interesting face, and one of the pioneering designs in the move away from the canonical proportions of Aldine and Garamond romans — in other words, one of the first large x-height faces, forerunner of seventeenth century Dutch designs and of Caslon.

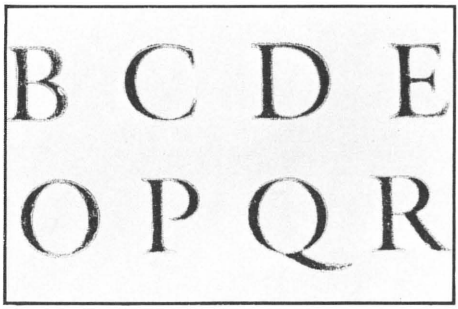
Figure 13 shows a close-up of the *Gros Cicero*, and Figure 14 is a specimen of the same face from the book on the Plantinian archives published in 1905 that I mentioned earlier, showing a corrupt 'a' in the font. This specimen was the basis of a fine Monotype face named Plantin, which preserves the wrong 'a' (Figure 15). To the extent that Times Roman is thought to have been conceived as a refinement of Monotype Plantin, the *Gros Cicero* can claim a considerable influence on our present-day typography.

It is easy to admire Granjon's work; one also feels drawn to the man. Like Fournier le Jeune and Vincent Figgins, for example, his work suggests an attractive and interesting person.

Granjon had an endearing habit of printing small specimens to celebrate the completion of projects, and he was also the first (so far as we know) to give his faces names other than those of the bodies on which they were meant to be cast. The type in Figures 16 and 17, an 8 point, has the name we adopted for our revival, *La Gaillarde*. A galliard was a dance, a sprightly jig, appropriate to the man and his work. Other names he gave his faces were *La Valentine, L'Immortelle, La Granjonne* (I suppose a tribute to Antoinette, his wife), *La Poétique, La Mignonne* — charming names.

The flowers in the specimen are also his. It is not strictly true that he invented modular fleurons in elements that can be combined in various patterns, but he certainly perfected and popularized them. One can perhaps see in these arabesque ornaments so reminiscent of embroidery the influence of Granjon's contact with Lyons, the center of the silk trade in France.

Figure 18 shows a Granjon italic of the style adopted in recent times as the companion to Garamond romans. It was described by Granjon, and Plantin, as *pendante* or *couchée*, meaning hanging or lying — relative terms. There are no less than four different ampersands in the font, all seen on this page, typical panache on Granjon's part. In Granjon's time, italic was acquiring its present function as an ancillary to roman, but also



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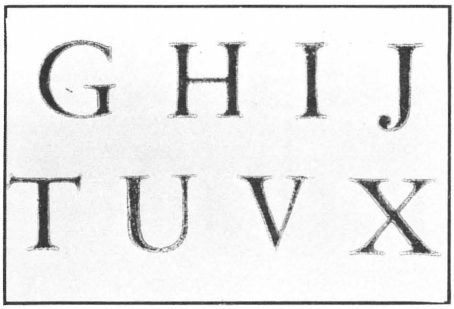

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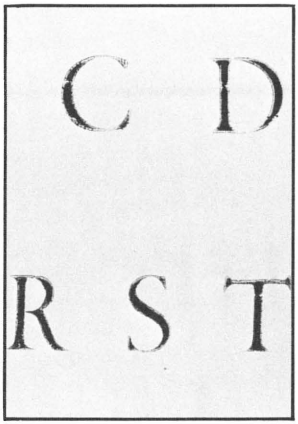

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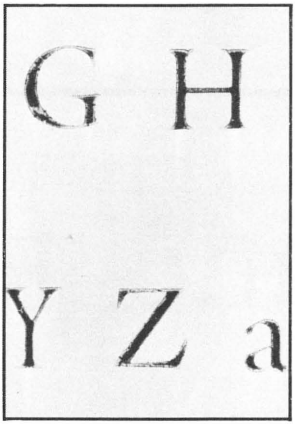

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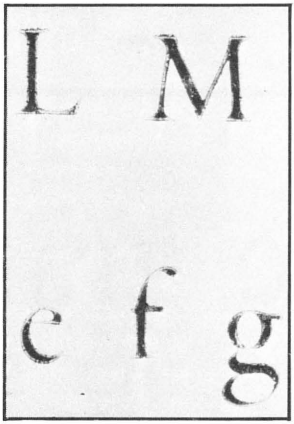


11

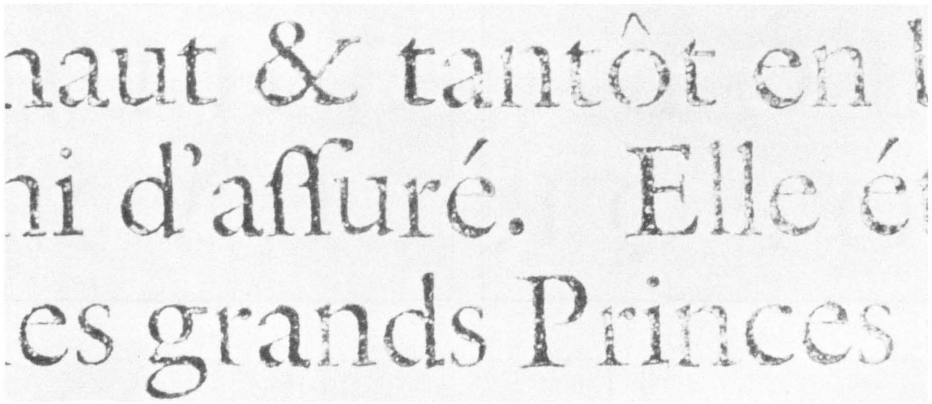
CICERO ROMAIN GROS ŒIL,
Numero XXXIV.

Outre ces Divinitez communes & univerſelles, dont nous avons parlé juſqu'à préſent, il y en avoit d'autres dans la créance des Payens, qui n'étoient attachées qu'au bien particulier, ou des maiſons, ou des perſonnes.

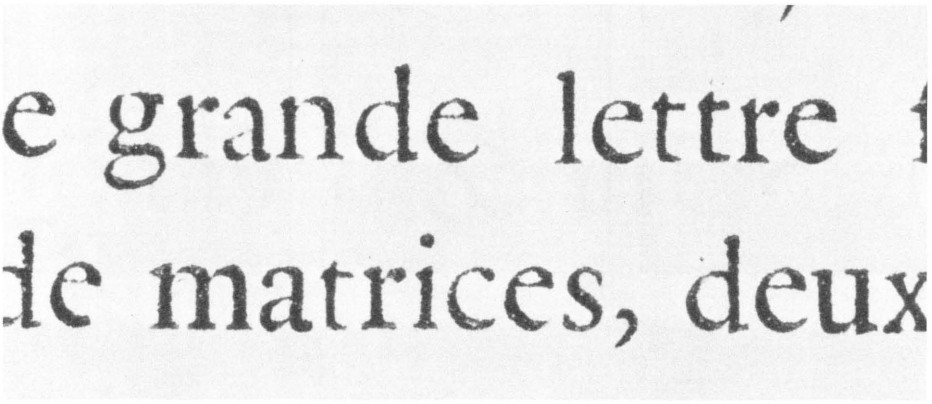
Les Dieux domeſtiques s'appelloient Lares, ou bien Penates, & étoient ſouvent de petits Marmouſets attachez en divers lieux de la maiſon, qu'ils honoroient comme leurs protecteurs, & de tems en tems leur offroient des ſacrifices de vin & d'encens.

Chacun encore, à leur dire, naiſſoit avec deux Génies propres & particuliers, qu'on nommoit Démons, l'un deſquels étoit le bon, qui les portoit au bien, & leur procuroit

12


naut & tantôt en
ni d'assuré. Elle é
es grands Princes

13


e grande lettre
de matrices, deux

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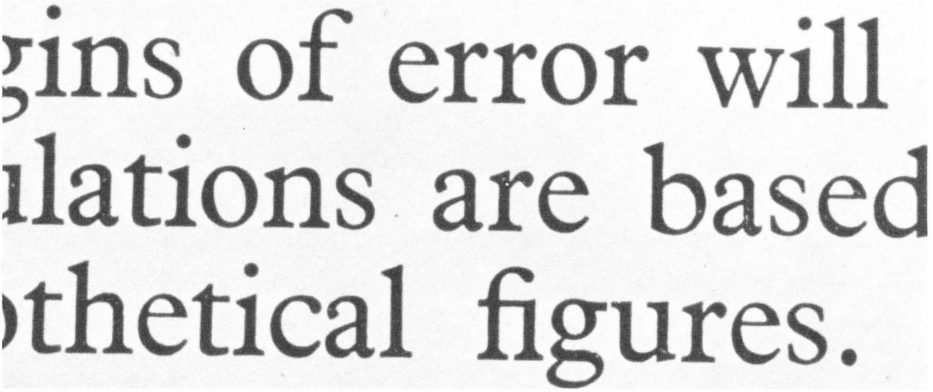
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ılations are based
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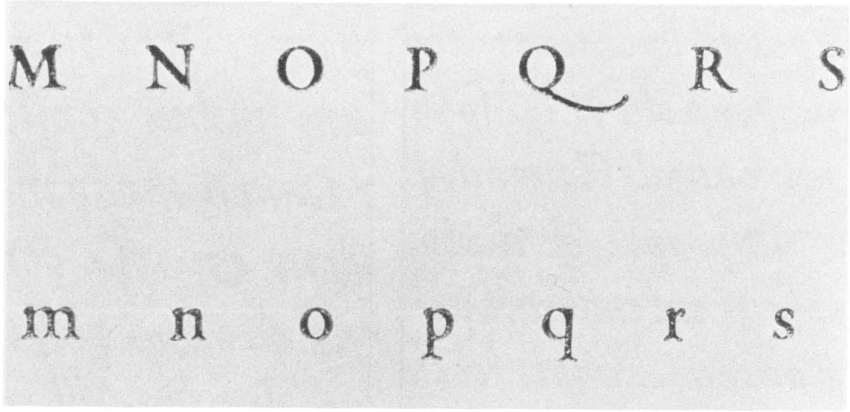
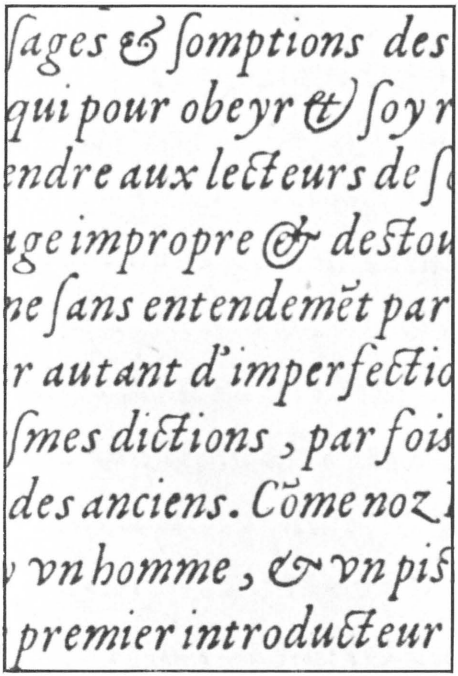

M N O P Q R S
m n o p q r s

17


Epreuue de la petitte Antique ou
Romaine, de Rob, Granlon nom-
mée la Gaillarde. en Anuers
1570.
Oratio Suſannæ. Danielis xiij.
Deus æterne, qui abſconditorum cognitor
es, qui nouiſti omnia antequam fiant, tu ſcis
quoniam falſum contra me tulerunt teſtimo-
nium. Et Domine morior, cùm nihil horum
fecerim, quæ iſti malitioſe compoſuerunt ad
uerſum me. Sed nunc tu Domine Deus adiu-
ua me in hac hora: vt benedicam te Deum viuũ
qui ſaluas ſperantes in te. Et nunc quæſo ſi non
tollis hoc opprobrium & hanc anguſtiam, tolle
animam meam à me: quia melior eſt mihi mors
quàm vita, ſi tibi placeat Deus meus. Amen.

16



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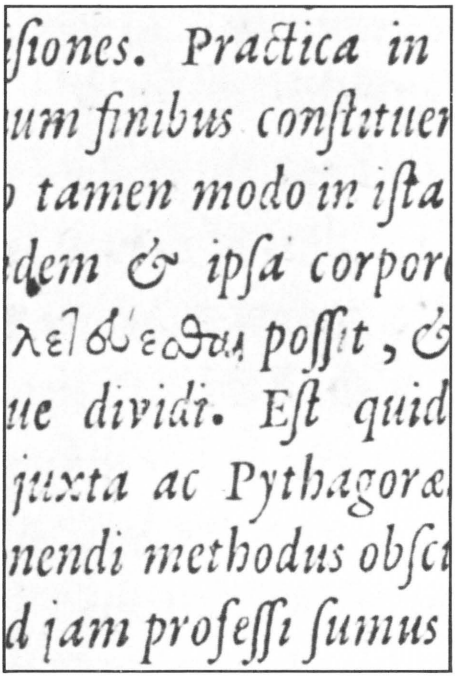

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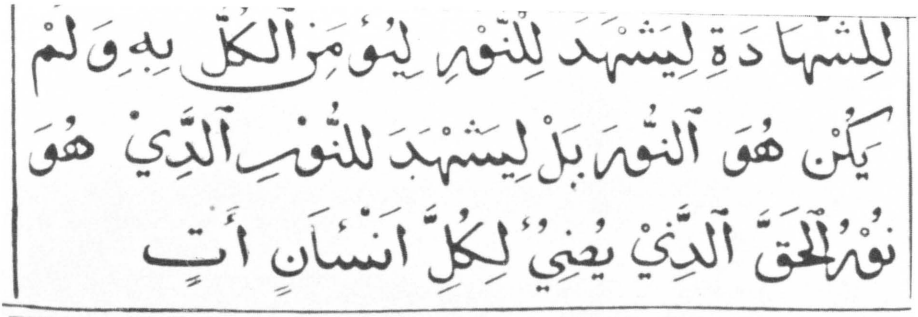


Rob. Granlon Parisien. Typographus &
Characterum inciſor. incidebat Romæ.
1583.

ÆTATIS SVÆ. LXX.

20

and perhaps chiefly, it still retained its original purpose as an alternative text face. Aldus had set books in italic for reasons of compaction, and the practice continued. It would be surprising today to find a book set in italic throughout, but in the sixteenth century it was commonplace. Figure 19 shows a different style of italic, more condensed and regular, known as *droite*, upright — again a relative term by comparison with *couchée* — intended for continuous text.

Granjon spent the last dozen years of his life in Rome in the service of the Cardinal de Medici and Pope Gregory XIII. There he cut exotic faces to equip the Medicean and Vatican presses for the extraordinary publishing enterprise of the Catholic Counter-Reformation; aimed not against Protestantism in Europe but as part of the Jesuits' attempt to convert infidels in the Middle East by means of printing the Christian scriptures in Arabic, Armenian, Syriac and Hebrew. Granjon was held in high regard in the Papal service: the records refer to him as *Mæstro Roberto*, and he was well paid.

Figure 20 is a specimen of one of the faces cut in Rome, an Arabic, that establishes the date of his birth by its imprint. Accounts of payments to Granjon late in 1589 refer to punches as being his last because of an illness from which he died. He would then have been 76 or 77.

The object of designing Galliard was to make a serviceable, hard-working, adaptable, contemporary, photocomposition typeface based on a strong historical style in no way anachronistic but without a true modern version (Monotype Plantin, excellent face though it is, having departed considerably from the model). However, the result is not a literal copy of any one of Granjon's faces, more a reinterpretation of his style. The face was produced by drawing from scratch rather than working over enlarged photographs of punches or proofs, for two reasons. Firstly, in looking with Mike Parker at the early trial drawings of Galliard Roman, he would comment that some letter must be wrong because Granjon would never have cut it that way. I could immediately point to a case where Granjon had cut it exactly so; but Mike was essentially right because the perception of style is subjective; it must be assimilated and re-created as a whole, and not defined by its eccentricities.

The second reason for not following the model too slavishly was that such a dependence led so far and no

24

further. Granjon gave no direct guidance to much that is needed in a modern type family: bold weights of roman and italic, lining figures, superiors, '$', '£', and so on. Some initiative in designing the roman and italic seemed the best training for applying Granjon's style to characters he never knew.

One early choice to be made was between the various different kinds of italic that Granjon cut. We thought the familiar *pendante* had been overdone in revivals (Figure 21). We tried the *droite* but found it hard to read (Figure 22). The problem was compounded by technical restrictions. The development of Galliard began in the days of the 18-unit Linofilm photosetter whose coarse spacing system made it hard to fit the roman properly. Two versions were drawn and scrapped. Then came the Linofilm Quick which I thought was going to be my salvation because of its very fine spacing unit, but the Quick had commercial problems and did not last long in production. It was not until the advent of the 54-unit VIP that we took up the project again. Immediately I felt the roman was more promising, although a good italic still eluded us.

In the end we chose the most novel and calligraphic of Granjon's four distinct italic styles. Figure 23 shows it with its roman counterpart. The pair were cut for the body called Ascendonica (20 point). They were commissioned by Plantin and perhaps, therefore, reflect his own taste in italic letters. Of all Granjon's faces, the Ascendonicas are, I believe, the only pair intended to have what is now the accepted relationship between roman and italic of matching size and color but contrasting texture. We admired the italic, both by itself and as companion to the roman. Figure 24 shows it photographed from the punches which survive in Antwerp.

Herminion ſe far pel campo feſta,
paruegli queſto buon cominciamento,
endossa haveuvna sua soprauesta,
Douera vn Macometto in purargento,
pel campo aspasso con gran feſta andaua,
Di sua prodezza ognun molo parlaua.

21

How is one to assess and evaluate a type
its esthetic design? Why do the pace-mak
printing rave over a specific face of type
see in it? Why is it so superlatively pleasa
Good design is always practical design.

22

Aſcendonica Romaine.

Alfonſus rex Arrag. Idem dicere ſo-
let, ita demùm matrimonium tran-
quillè citraque querimonias exigi
poſſe, ſi maritus ſurdus fiat, vxor
cæca: innuens, opinor, fœmineum

23

Requirements for quire ten courses

25

BALLAD TO HIS MISTRESS

Dishonored beauty, who have cost me so,
All harsh in works, so those sweet looks must be
Liars and false, your love a fiercer blow
Than thrusting steel: O charms attaint to me,
For killing of a heart, in felony,
Pride all contempt, and scorning that you kill,
Hard eyes, lies there in your inclemency
Some ease at last for woe, nor wound it still?

26

Il n'est soing que quant on a fain,
Ne service que d'ennemy,
Ne maschier qu'ung botel de foing,
Ne fort guet que d'homme endormy,
Ne clemence que felonnie,
N'asseurence que de peureux,
Ne foy que d'homme qui regnie,
Ne bien conseillé qu'amoureux.

27

28

29

Figure 25 shows Galliard Roman and Italic together, in a piece of everyday printing. Figures 26 and 27 show them used separately on facing pages in the first book set in Galliard, an edition of Villon set and printed at the Stinehour Press. Until recent times, book-work would have been the extent of the ambitions of a face like Galliard. But to launch and sell a new typeface today, one cannot depend on book designers who tend to be conservative in their choice of text faces. To be commerically successful, a new face must be accepted for the widest possible range of typography. Most importantly, it must gain a footing in advertising typography where it must perform in both text and display (Figure 28).

Although perhaps eighty percent of the total use of a type family is in its normal book weight, even in advertising, it is the existence of heavier weights suited to the rough and tumble of newspaper advertising, for example, that allows the face to be widely accepted by typographers.

Unlike sanserifs and slabserifs whose structures have always allowed them good bold weights, the design of boldfaces for old-styles like Galliard has undergone a change since the advent of photocomposition.

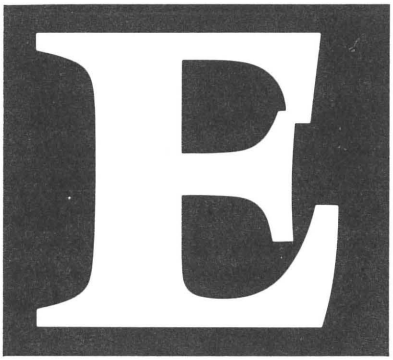
Figure 29 is a comparison between two italics with similar historical antecedents; a Linotype Garamond on top, Galliard below, both of them in the boldest weights in their respective families. Galliard Ultra Italic, the heaviest of four weights, is able to be much heavier than the hot-metal Garamond Bold (the only extra weight), due to the fact that the characters in the photocomposition face can kern. Almost all letters in the bottom line kern (shaded portion), most on both sides. As inter-character space is reduced by bringing the letters closer together, overlapping where necessary, the internal

counters can be reduced in proportion, and the positive image — the letterform — correspondingly increased in weight.

As bolds grow bolder, and bigger type series become possible, the type designer has the problem of reconciling stylistic consistency through the ascending range of weights with intrinsic quality in the bulky letterforms. I found this the most interesting part of the design of the Galliard series. It is one thing to lay out a multi-weight family schematically, it is quite another to draw a workable Ultra Black with personality of its own, a process close to caricature — an exaggeration of normal features to shape forms at once massive and articulate. Without careful design, boldfaces lose definition and look as though they have been dipped in chocolate.

Figure 30 shows a progression of three of the roman weights in Galliard. The Bold still retains some softness in its outline, but as the weight increases to Black and Ultra, the shape becomes more angular to emphasize the sharpness of the image in the interests of legibility. Similarly in Galliard Italic: the crotches become progressively more open and squared off (Figure 31). Of course, the caricature can be overdone. The solution in Figure 32 was forbidden by my editor.

Two of the roman weights were designed by computer, on the Ikarus system developed by URW in Hamburg and now in use widely in type design studios. Galliard was the first original type design to make substantial use of a computer in its creation (in 1977). I drew the Normal and Black weights; the Bold was interpolated and the Ultra extrapolated from the first two. The italics were all drawn by hand, although we did do trials on the Ikarus — pushed to deliberately absurd extremes in the case of Figure 33.



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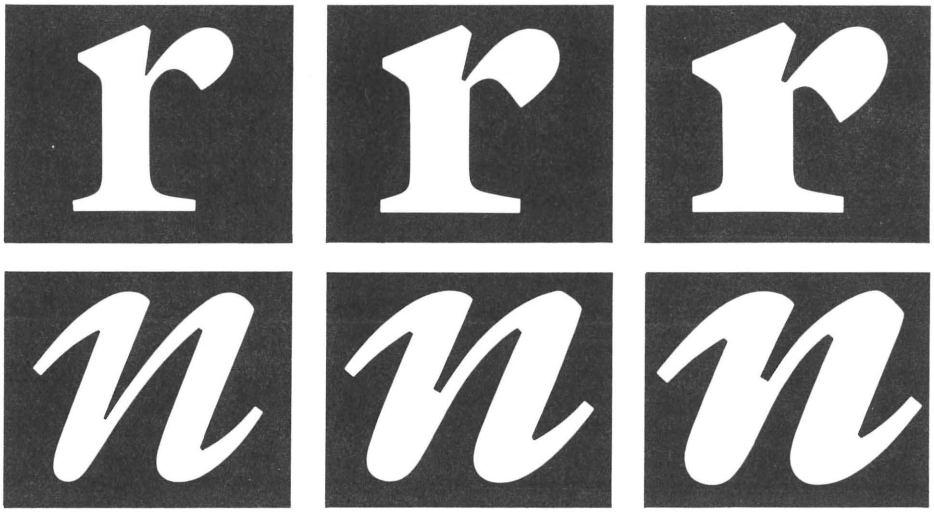

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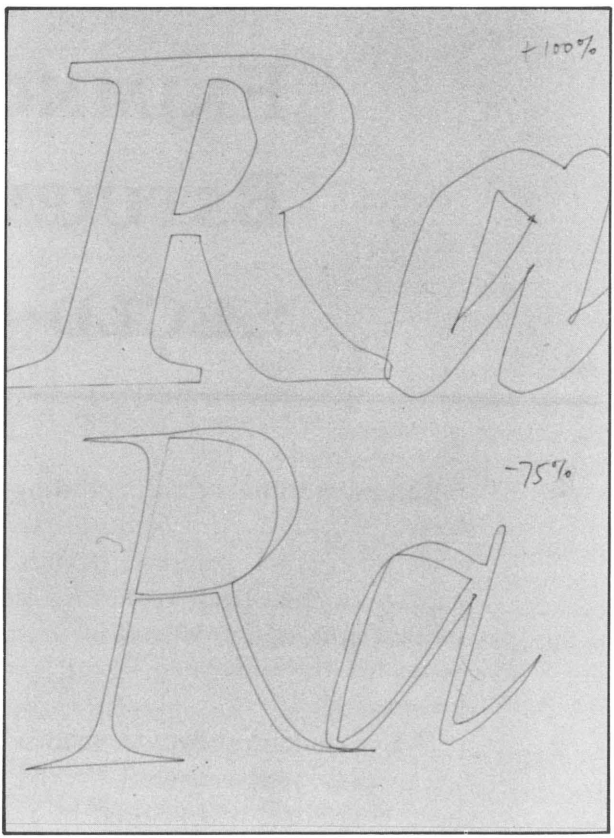

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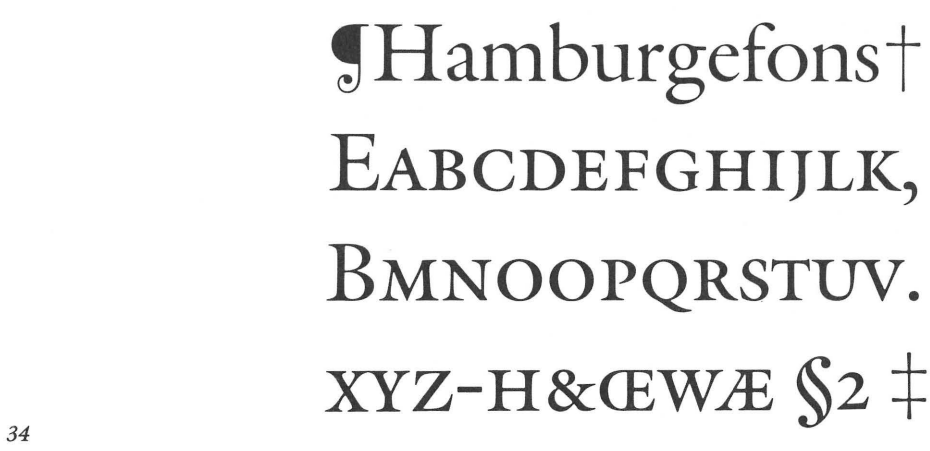

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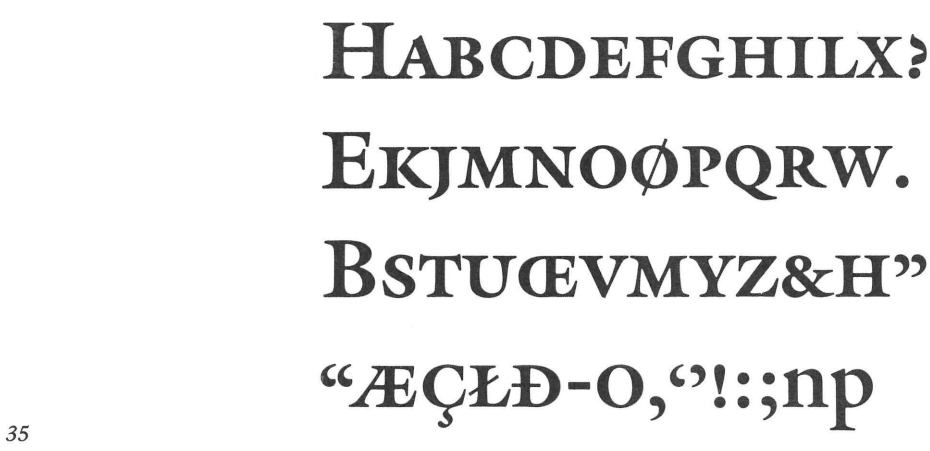

35

Representations of the printing-press in *La Grant danse macabre des hommes* (Lyons, 1499) and in sixteenth-century printers' devices show the essential features of the later common press. Joseph Moxon's full description in *Mechanick Exercises, vol. ii (London 1683-4)* fits this specimen, apart from variations in the dimensions.

The wooden press was made to hold a forme of twice the area covered by the platen. A full-sized sheet, therefore, was printed by two pulls of the press

38

¶Hamburgefons
HO1234567890.
B$600$12345678900¢
EHO2168

36

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37

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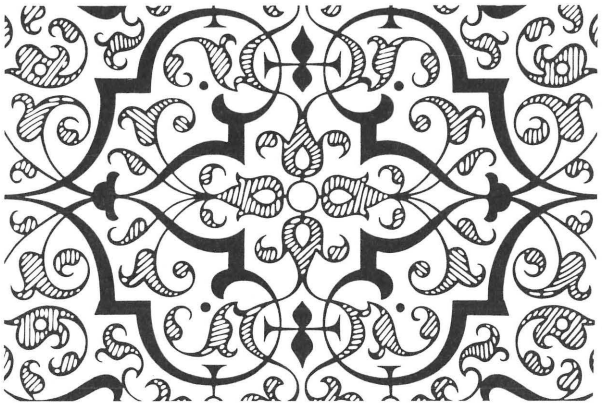
&e Qus tta P ll nt sta & d st
A tt as tr B D fu T J ti cta et e
M th fr ey ty is m M Th N

39



40

Ann Holly Carrie
Lorraine Cathy Bob
Gerben Geoffry Abe
Jan Tom Katy David
Jessica Renée Alison
Barbara Amy Jeanne
John Tom Juan Brad
Kristie Anne Claude
Ilisha Doug & Ileana
Merry Christmas

First specimen of Poster Gallard, drawn by the graphic design students at Yale in Nov. 1981, with encouragement from David Quinde, Larry Oppenberg and Matthew Carter

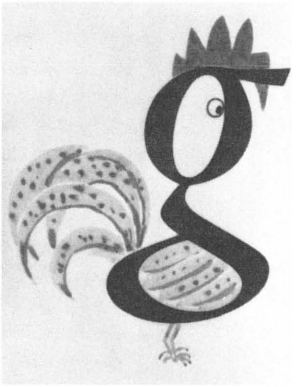
41

Galliard is a fairly complete family; it has two weights of small caps, whose design is an interesting exercise, a rare opportunity for a type designer to draw capitals for use in words with themselves, ordinary big capitals being most importantly initials for words otherwise in lowercase. The small caps are not just re-scaled caps, therefore, but differ in detail (Figures 34 and 35). Galliard has old-style and modern lining figures, superiors, and accents (Figures 36 and 37). We also provided some flourished final letters in keeping with Granjon's exuberant practice — running the risk of over-exuberant use; this tongue-in-cheek setting arrived on my desk at Mergenthaler one day (Figure 38). Figure 39 shows more that I drew but held back from releasing. I also drew a range of Granjon's fleurons, but as far as I know they have never been manufactured and released (Figure 40).

Galliard was launched by Mergenthaler in 1978, and re-launched three years later by ITC who took the face over and released it on a wider basis to manufacturers of typesetters, dry transfer lettering, etc.

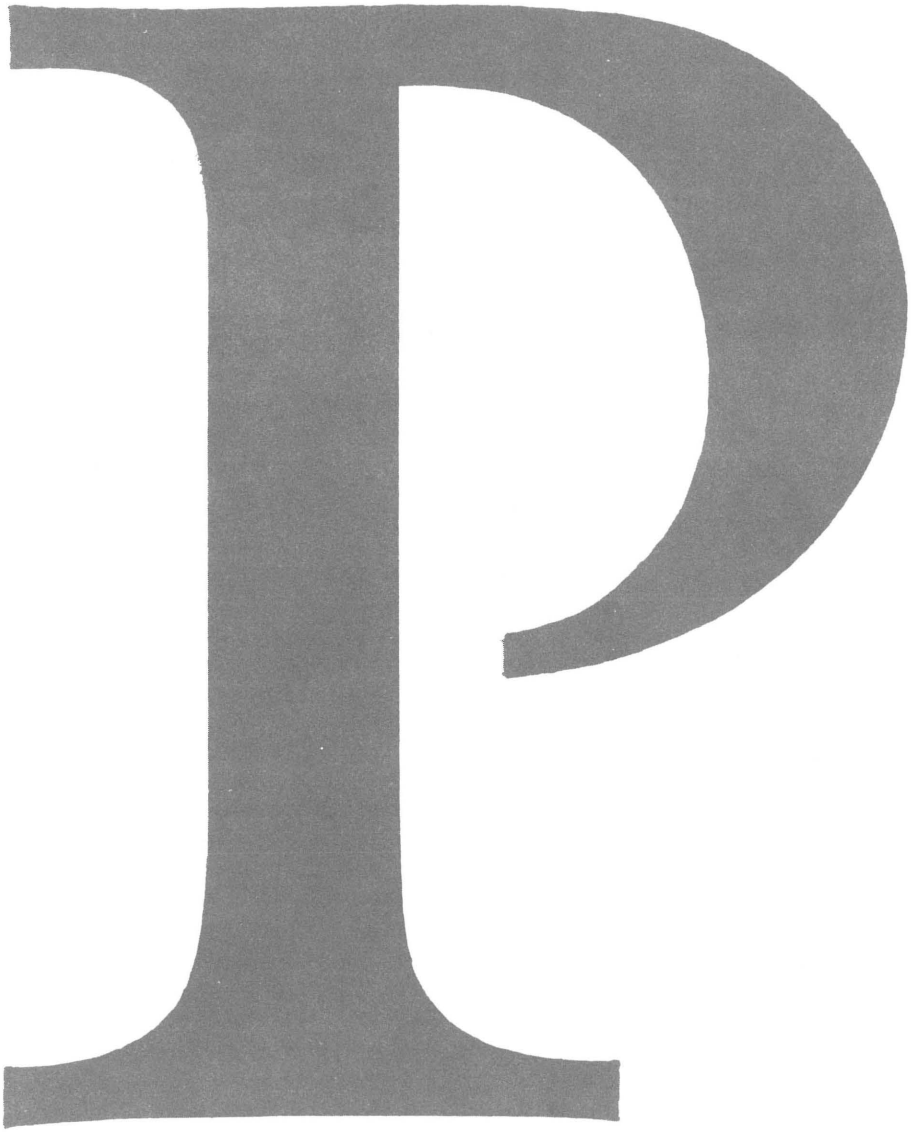
42

I have the pleasant task every couple of years of teaching a short course to the graduate graphic design students at Yale, where communication within the university seems to be entirely by poster. I took with me the 12 point drawings for Galliard Roman and we made a refined version with narrower characters and thinner hairlines specifically for use at poster sizes, say, one inch and up. This I pasted up as a broadside Christmas card to the students who had made the Poster Galliard drawings (Figure 41).



I don't like to end on a note of dissention, but in contrast to the normally amicable relations that exist between board members at Bitstream, there is one particular vendetta directed by a fellow vice-president against the lowercase 'g' in Galliard Italic. The vice-president in question, who happens to be in charge of production, made it very plain to me that ITC Galliard would never be made by Bitstream unless I drew an alternative lowercase 'g' of more acceptable form. Figure 43 was the result.

43

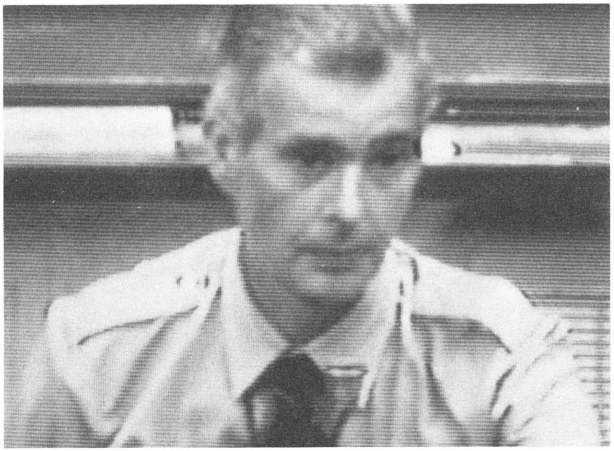


Henk Drost *The punchcutter is a prisoner to the designer.*

Sometimes I have to change such little things, that I cannot see the difference.

Punch Cutting Demonstration

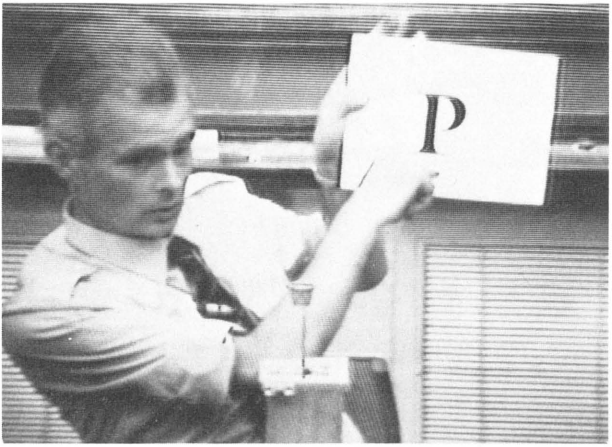
Henk Drost



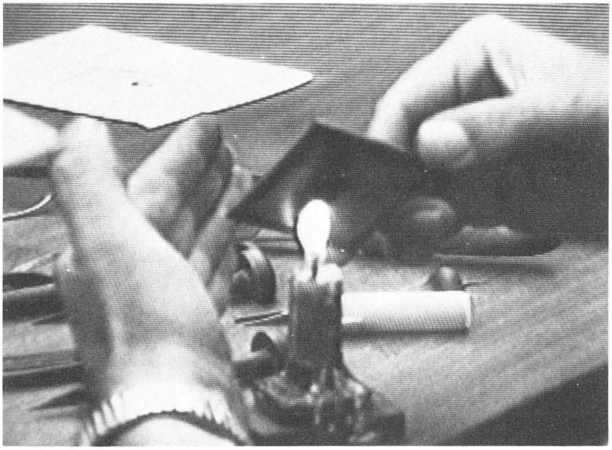
The following article is excerpted from a demonstration of punchcutting given by Henk Drost of the Enschedé Foundry in Haarlem, Holland. These photographs are taken from a video tape made during the demonstration and show some of the steps involved in hand punchcutting. Drost's comments have been edited to accompany the photographs.

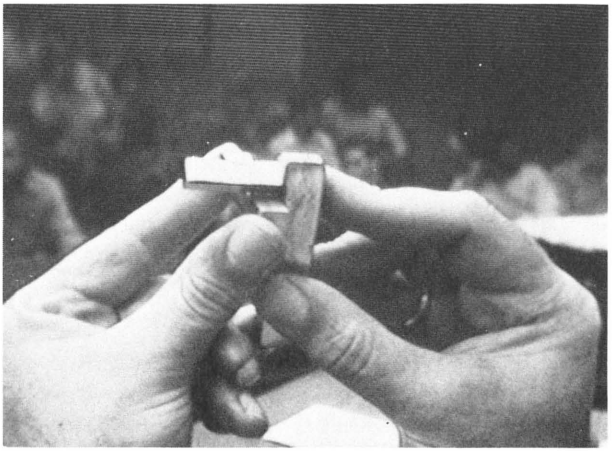
Visible Language, XIX 1 Winter 1985
Author's Address: c/o Joh. Enschedé & Zonen
Grafische Inrichting B.V., Klokhuisplein 5, 2011 HK Haarlem

I am going to describe how we are making punches at Enschedé and Sons in Haarlem.



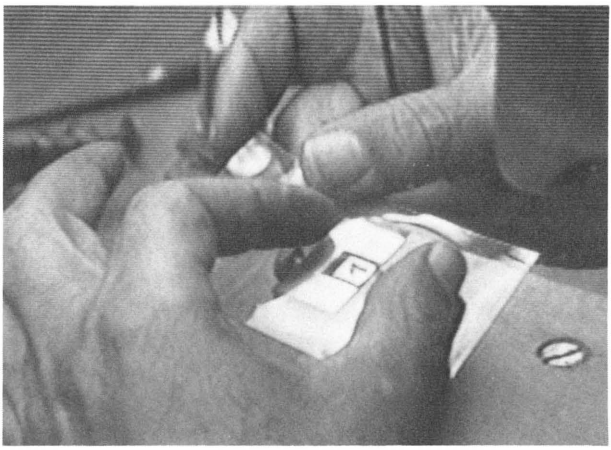
The drawing of the letter is transferred in the required size to a small plate through photo-etching; from this plate a smoke proof is made.

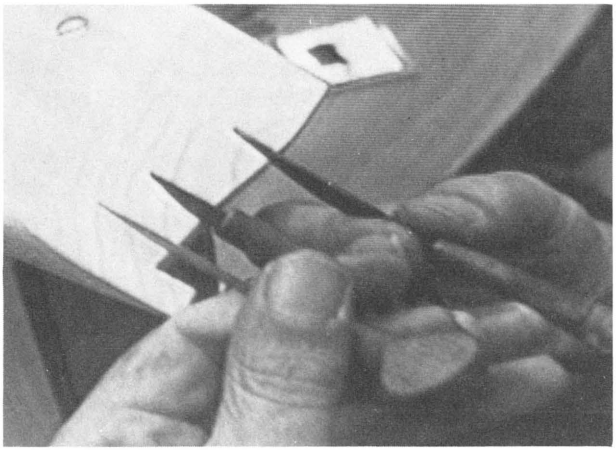




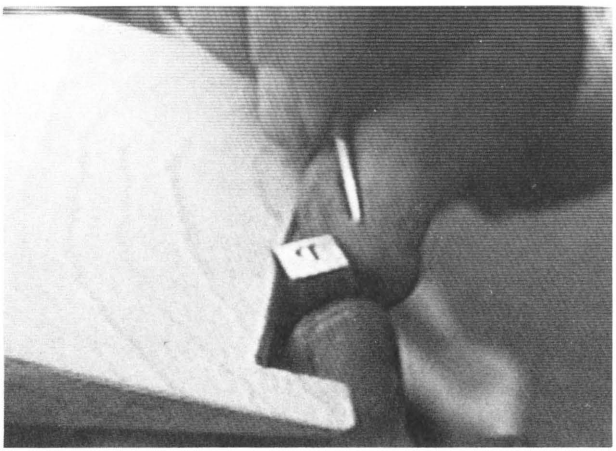
I start with a rough piece of steel, and square it on two sides.

When the steel is ready, a little varnish is put on top of the steel. Then the smoke proof is transferred to the steel.

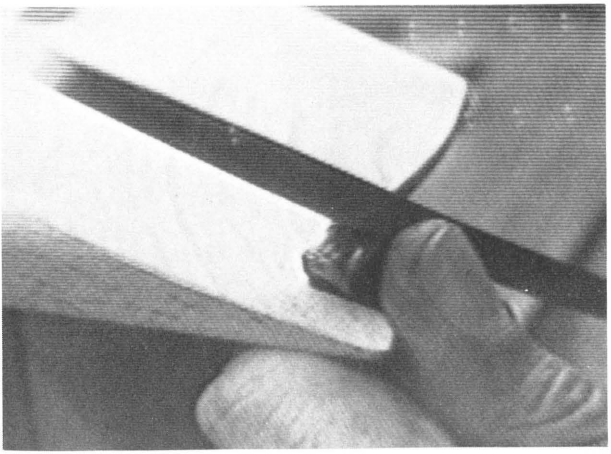




A graver is used to cut the steel. There are three kinds: a sharp one, a round one and a flat one.

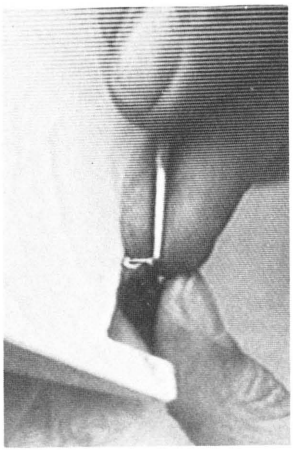


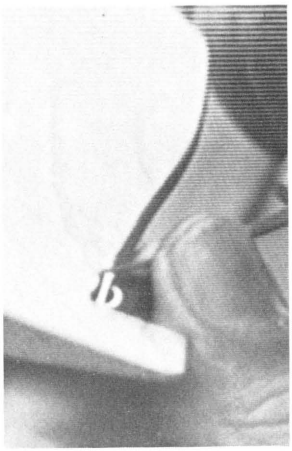
When the drawing is on the punch, the round graver is used to engrave the inside or counter of the letter. I never use counterpunches. I think that those tools are not as nice to use as the gravers. The punchcutter must make most of his tools himself, even grinding his files to the right size.

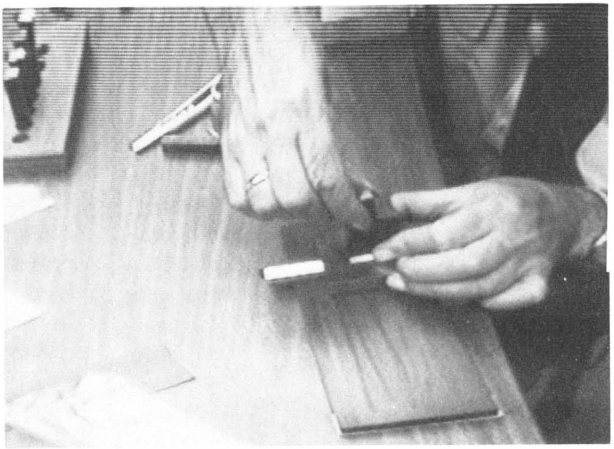


When the counters are smooth and clean inside, I start on the outside of the letter.

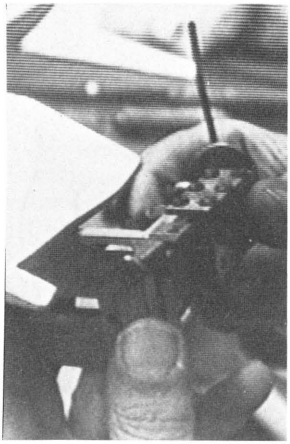
At first, I use big files and then finer files. I take off any steel that I do not need.







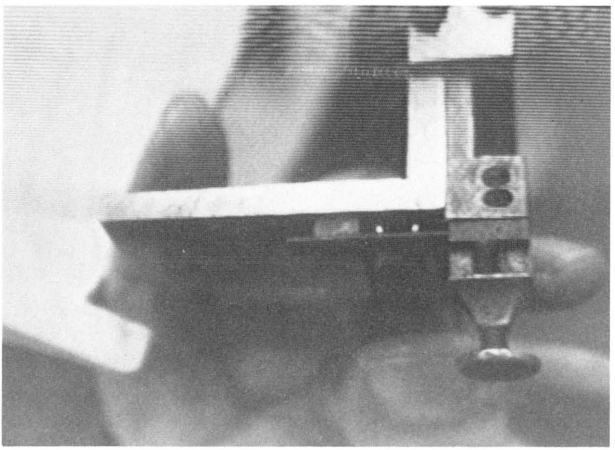
When the graving is finished, I grind the punch on a stone to smooth it off. Then the punch is ready to make the first smoke proof for control.

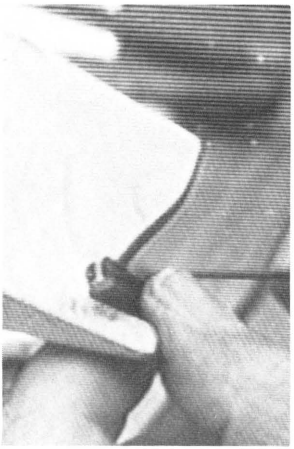


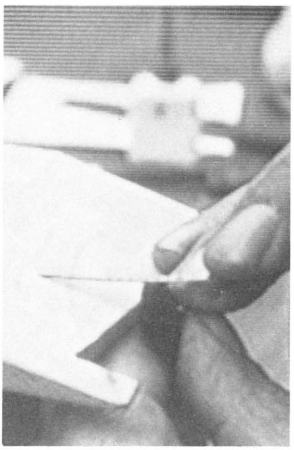
I warm the punch like the plate and make a smoke proof. Then I can see the letter as it will print on the paper.

Using a lining gauge, I can see if the baseline is straight.

The base of the letter must be a little hollow, not flat. I should see, on two sides of the baseline, two little spots. When I print the letter, the line comes out flat. If I have a flat part on the punch, and I print it, then it comes out round. So the punchcutter makes the base just a little bit hollow.



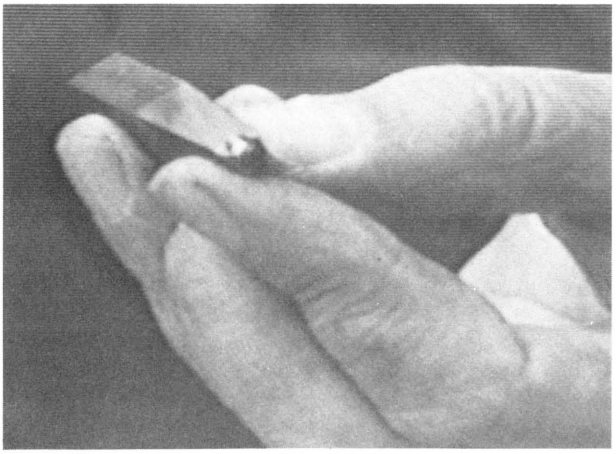


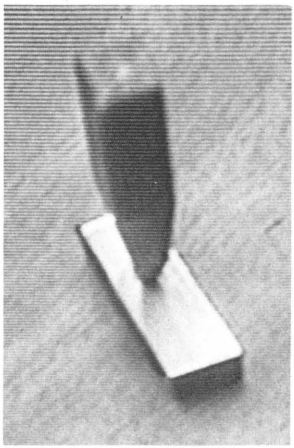


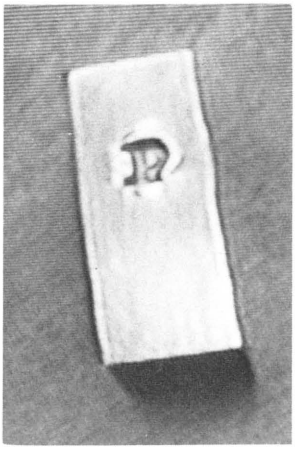
Using the lining gauge, I can see that part of the stem is good, but on the other side there is a little spot that I have to take off by filing.

I also have to see if the height is correct, and that I do with a little tool that is called 'crocodile teeth.' Then I grind the punch again on the stone.

When the punch is ready, it is fixed for hardening and striking. Before I make the punch ready for striking, I have to make the sides very steep, for driving into the matrix. Then I clean the punch and put it in the fire. When it is light red, I put it in water. It is black when it comes out. The punch must then be cleaned and tempered by warming it up again until it is yellow—light yellow. After it is again put in water, I am ready to strike the matrix.





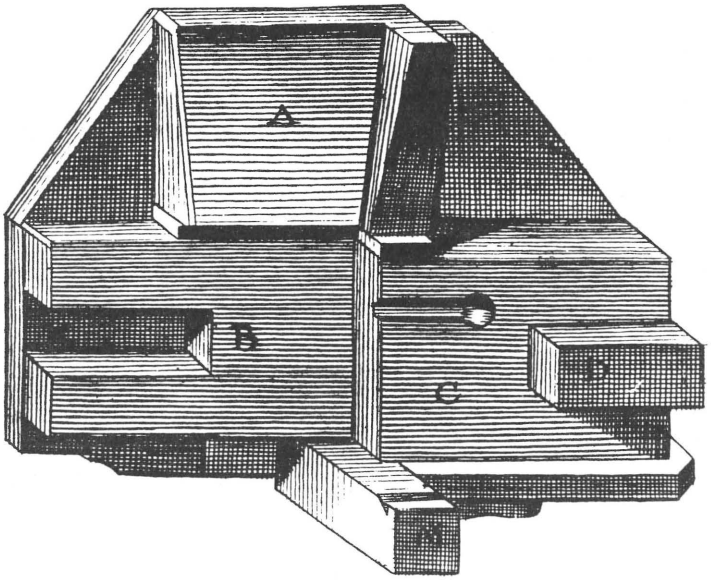


To strike a matrix, I need a piece of copper, a rough piece. I polish it and mark the place where I want to strike the punch. At Enschedé, we have a press for striking. After the striking, I take the punch out, and then have an unjustified matrix, or strike, which has to be justified by hand with a file. It is difficult to make the sides square and to the right proportions. When I have justified the strike, I have a matrix which can be used for casting.

I can then cast type. The type is planed to the right height and then can be used for printing. It takes a whole day, more or less, before a punch is ready. That is why I have shown you just the steps here.

(Hugh Dubberly, photo)

Above: Henk Drost working at the Enschedé Foundry in Haarlem, Holland.
Left: Left to right, Charles Bigelow, Stan Nelson, Henk Drost.



A French mould from Diderot's Encyclopedia.

Mould Making, Matrix Fitting, and Hand Casting

Stan Nelson

Joseph Moxon, the author of *Mechanick Exercises on the Whole Art of Printing*, arranged his essays on typefounding in a very particular manner. He began with the art of letter cutting but before moving on to matrix justification and type casting, Moxon stopped to discuss the making of the mould. The reason was simply that matrices cannot be justified or type cast without it. As Theodore DeVinne so clearly states in *The Invention of Printing* (1878), 'In this type-mould we find the key to the invention of typography. It is not the press, nor the types, but the type-mould that must be accepted as the origin and symbol of the art. He was the inventor of typography, and the founder of modern printing, who made the first adjustable type-mould.' It was the type mould that made printing from movable type a practical and economical process.

Henk Drost of Enschedé has described how a punch is cut, so I will go on to describe how the punch is used to strike a matrix, how the matrix is justified, and how types are cast. But first, like Moxon, we will take a detour to see how that most important mould can be made.

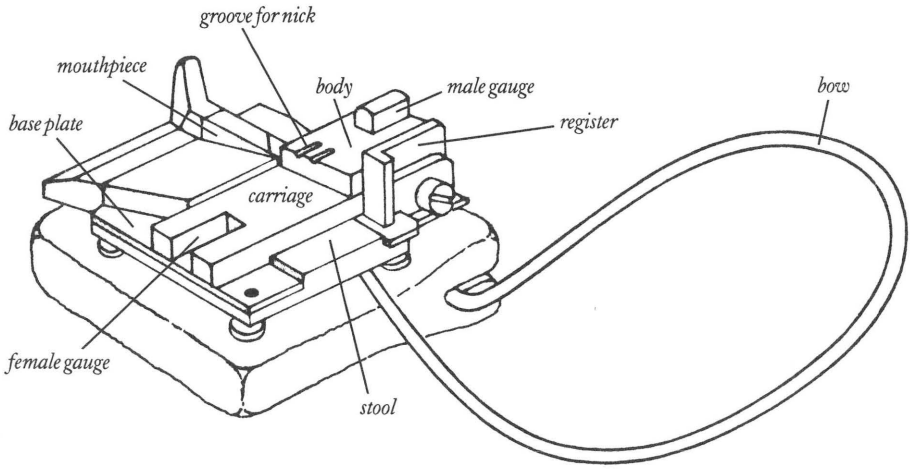
Mould Making

In its elemental form, the type mould is made up of two 'L' shaped pieces. During casting these fit closely against each other. By adjusting their position, they can be made to form either a wide or a narrow cavity. Because this cavity changes only in width, all the letters cast in the mould have the same exact body and height.

Visible Language, XIX 1 Winter 1985
Author's Address: 8486 Hayshed Lane,
Columbia, Maryland 21045

While authors in the past have speculated about the construction of early type moulds, the oldest surviving type mould, discovered in the collection of the Plantin-Moretus Museum, Antwerp, is quite similar in its construction to moulds used commercially for type production as late as the mid-nineteenth century. This early mould falls into the category of 'Flemish' mould which is one of two major divisions of type mould construction, the other being the 'French' style. The Flemish mould has all of its various pieces fastened to the 'carriage', but the many parts of the French mould are fixed to 'base plates'. There are many variations on these two approaches, but so far I have chosen to make French-style moulds. It is this form of mould that I will now describe in more detail.

Figure 1
The bottom half of a 20 point type mould from the author's shop.



The 'L' portions of each half of the mould are made up of two carriages and body pieces. These four pieces, when joined properly, create the cavity which forms the body of the type. A 'mouthpiece' is provided to serve as a funnel to guide type metal into the mould, and it also forms the feet of the type. The 'stool' and two 'registers' position the matrix beneath the mould so that the face of the type will be cast in the exact position required (relative to the body). These various parts can be seen in Figure 1. By thoroughly understanding how the mould works, how it can be assembled and which dimensions are important, almost any craftsman can make a usable mould.

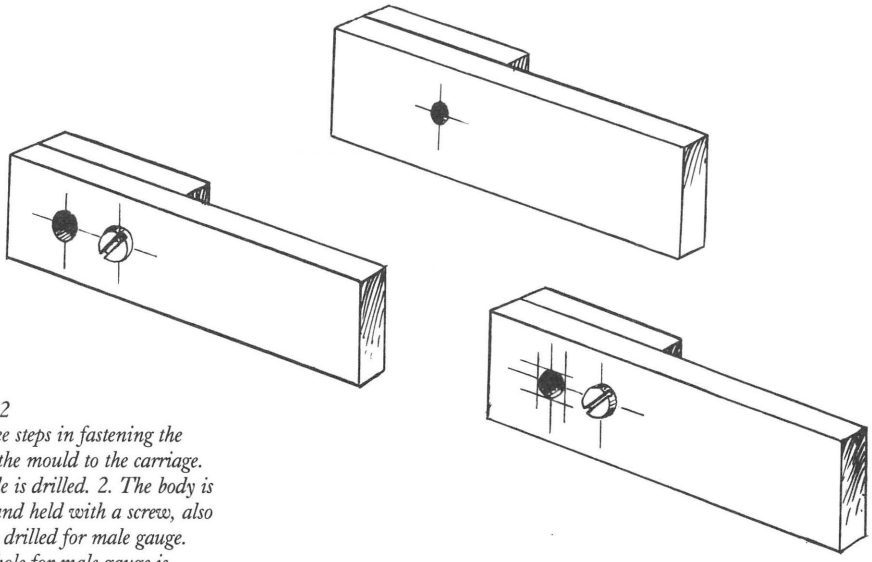
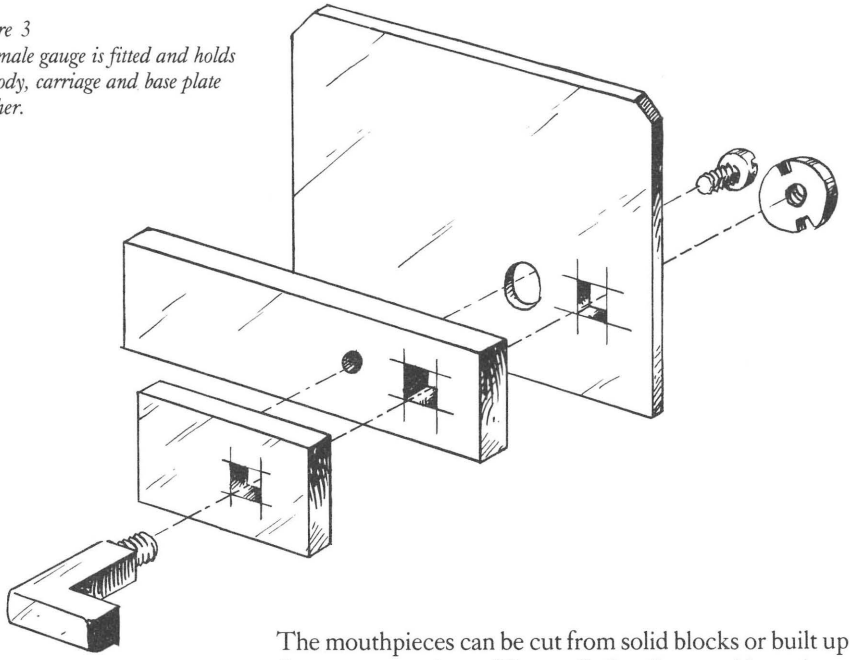


Figure 2
The three steps in fastening the body of the mould to the carriage. 1. A hole is drilled. 2. The body is tapped and held with a screw, also a hole is drilled for male gauge. 3. The hole for male gauge is marked out for filing square.

The carriages and body pieces require the greatest attention to accuracy when building a mould. These four chunks of metal have to be sawn, filed (or milled) and lapped (or ground) to very precise dimensions in order to establish the height-to-shoulder and body size of the mould. All four pieces must be exactly the same height. They must also be carefully squared. The body pieces have to be the exact thickness of the type to be cast and the inside end of each body piece has to be perfectly square. Once these two pairs have exactly the correct dimension, they are fixed together with screws as shown in the drawing in Figure 2. It is very important that the body and carriage be clamped together when they are drilled to keep them in the proper relationship to each other.

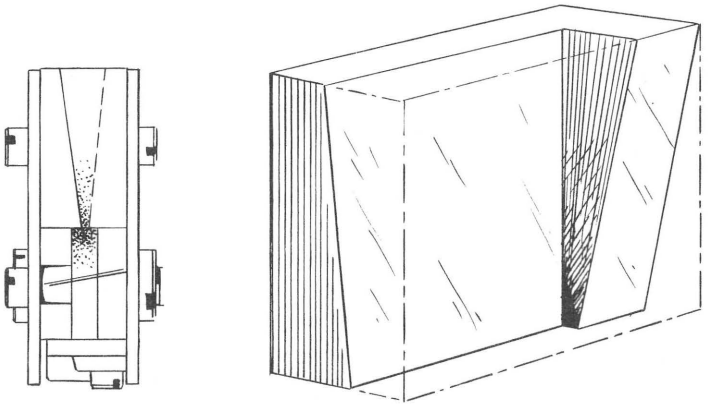
The carriage and body pieces are held to a 'base plate' partly by a 'male gauge' and also by a screw (Figure 3). The 'male gauge' is square in cross-section, requiring that a square hole be made through the body, carriage, and base plate. This is done by drilling a hole and then filing the corners out. Once the male gauge and screws have fixed the carriage/body unit to the base plate, a slot is cut in the other end of the carriage to fit the male gauge. This slot is the female gauge. It serves to create a close sliding fit of the mould halves which helps insure accurately cast types. After fitting these halves to each other, the craftsman can consider the mouthpiece.

Figure 3
The male gauge is fitted and holds the body, carriage and base plate together.



The mouthpieces can be cut from solid blocks or built up from separate pieces (Figure 4). Smaller moulds are best made with a single piece, but large ones can make good use of the two piece construction. In either case, the opening in the 'throat' of the mouthpiece, where the metal enters the body cavity, should be about one-third of the body being cast. The volume of the jet formed by the mouthpiece should not be too great.

Figure 4
An end view of the mould and a perspective view of one form of mouthpiece.



A large jet is easy to fill but it uses up a lot of molten metal. Thus the mould heats too quickly, and the pot empties sooner. For both reasons, it slows the caster. Of course the mouthpiece should be large enough to pour metal in freely. It is helpful to look at examples of original moulds when planning the mouthpiece.

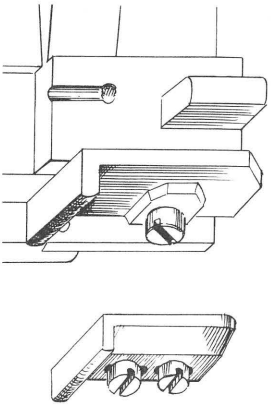


Figure 5
The register in two forms.

The mouthpiece should fit closely but not interfere with the closing of the mould, which would prevent the types from being cast to the correct dimension. A slightly oversized mouthpiece may not be obvious, but the types cast will not be parallel. A noticeably undersized mouthpiece makes the mould liable to 'rock' and will also encourage type to be out of parallel or 'unsquare'.

The registers come next (Figure 5). The cheeks of the register are square to the mould and close firmly upon the matrix when casting. The registers determine the 'set width' of the various letters since each matrix is made wider or narrower according to the letter it contains. The registers are fitted to the carriages with from one to three screws. They position the matrix laterally below the mould and once set, they do not need to be moved very often. Adjustment may be needed when casting a heavily kerned letter such as 'Q', so it is best that the registers be movable.

Now the mould is really shaping up. It has the carriages, bodies, mouthpieces and registers in place, and can be used as is; but, to be really complete, several more items are needed (Figure 6). Although the base plate can serve as a 'stool' or abutment for the head of the matrix, it is best to have a seperate stool fitted since this allows adjustment for wear and for a change from one set of matrices to another when alignment differs. Stools can be made in various ways that are very adjustable or very simple.

Insulators are needed in order to prevent the typefounder from burning his hands. These are held to the base plate by a screw and brass nut. The screw is often riveted to the base plate and the nut is either slotted or has notches cut in its edge to allow it to be turned with a special wrench. A large spring or 'bow' is mounted to the 'bottom half' of the mould. (The bottom half rests in the left hand and has the stool fixed to it.) This bow can have various shapes but usually forms a large circle with its point resting just below the mould where the matrix rests (Figure 7). The bow is a very noticeable feature of the mould. It often elicits a question regarding its

Figure 6
The stool in four forms and a view of how the insulator is held to the base plate.

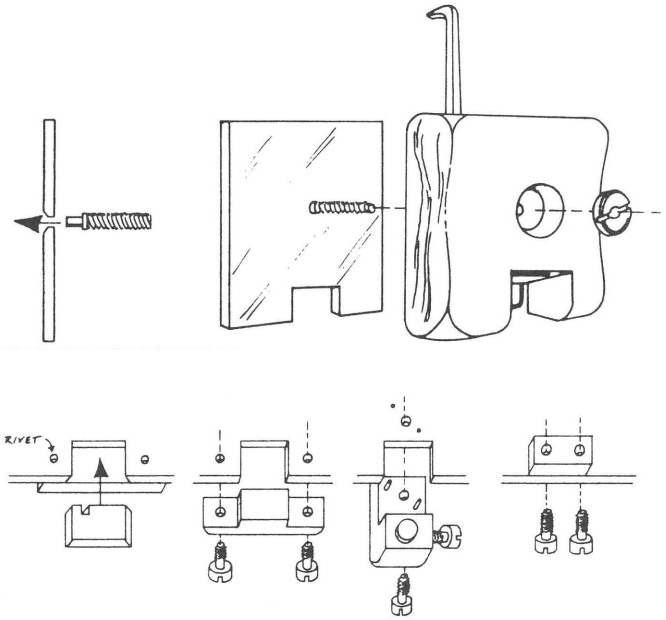
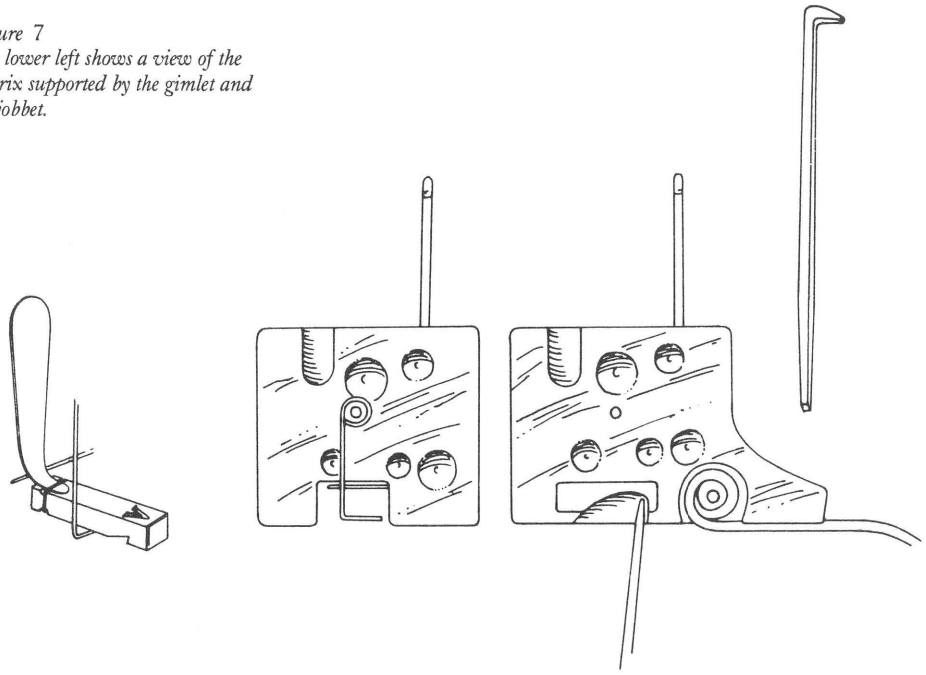


Figure 7
The lower left shows a view of the matrix supported by the gimlet and the jobbet.



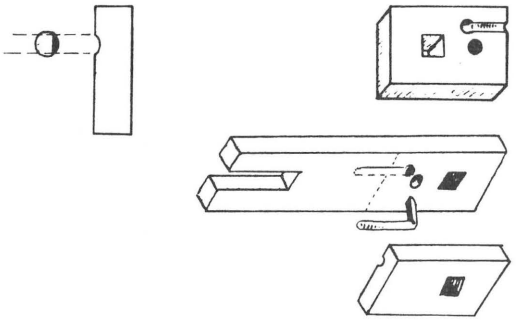


Figure 8
The nick wire fits into the mould. The end view emphasizes that the nick is not quite half the diameter of the wire. (If it were, the types would not come out of the mould so easily.)

purpose which is quite simply to hold the matrix in position while casting. I should mention that some moulds had a 'jobbet' and 'gallows', which are wires that help support the matrix beneath the mould during casting in order to increase production.

I have left out one important feature of the mould which could easily have been added earlier. It is my habit, however, to add this item when the mould is nearly done. I am referring to the 'nick wire' which is needed to form the identifying nick in the cast type (Figure 8). It is simply a piece of wire, filed flat on one side a bit more than halfway. The nick is fitted to the 'top half' of the mould. It is held in place by engraving a slot in the back of the body piece in the top half. A corresponding slot is engraved in the bottom half to receive the nick wire when the mould is closed. Some moulds had several nicks. Frequently hand moulds had only one. Usually additional nicks indicated that more than one mould of a given size was in the foundry or that it was a bastard (or odd sized) body.

After all of this work one step remains before the mould is ready to be used. A number of types are cast and measured to determine whether they are accurate. If any error is detected it must be corrected before type is cast. This is called justifying the mould and might involve hours of careful work until the types cast are perfectly square.

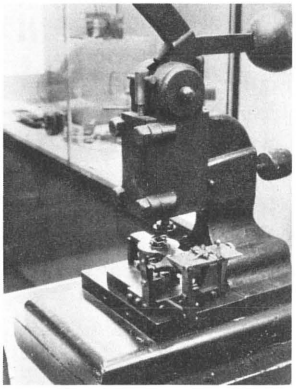
That just about wraps up the making of a French-style hand mould. Clearly it is a business that requires patience and some skill with tools. A machine shop is also usefull. Still, you can make a mould with a saw and files. It's all a matter of will.

Matrix Fitting

Matrix fitting represents one of the most crucial steps in preparing a new font for casting. It is probably as important as punch cutting since a poorly cut design, well fitted, is useable, whereas a poorly fitted font of matrices will render a well-cut design useless. Matrices *are* the heart and soul of a foundry. They were carefully stored, and if lost by fire, meant the absolute loss of the foundry. Moulds and other hardware could always be replaced, but matrices struck from punches were in many cases unique. Let's explore what work goes into the preparation of matrices by hand.

Before any other work is begun, the punches should be examined to see whether they are all clean, free of cracks and are straight. If they are warped, small bits of gummed paper may be glued at the proper points to bring the face parallel to the surface of the copper into which it will be struck. If a punch is cracked badly, it may be useless, but if the crack is not too serious it may serve. The various widths of the letters are noted to determine the widths and quantity of copper blanks that will be needed to strike all of the punches.

Figure 9
A striking: This press for driving matrices is in the collection of the St. Bride Printing Library, St. Bride Institute. The photograph was taken with the kind permission of Mr. James Mosley.



Pure copper blanks must be carefully prepared before striking. The sides of the copper blanks are filed square to the face. Then the face is smoothed and polished. If the design to be struck is large, the copper might require annealing by being heated and quenched in water. This will, however, cause the surface of the copper blank to 'cave in' when the matrix is struck, requiring a deep strike and causing a lot of distortion. For this reason, annealing is best avoided if possible. One-quarter inch thick copper was common, but I use strips that are three-eights of an inch thick. This is cut to the desired lengths. There is more substance to the thicker copper which reduces distortion during striking, and it is a little easier on the punch. Once the copper blanks are ready it is time to begin striking the punches.

Three fingers and a hammer represent the oldest method of holding punches while striking them into copper. Fournier Le Jeune, writing in the mid-eighteenth century, recommended this method. Elaborate striking fixtures were, however, used as early as the 1680's. Since a 'matrix well struck is half justified', and the greatest risk for the punch occurs during striking, any tool that lessens the chance of breakage and helps ensure a 'true' strike is worth the trouble of making it.

Assuming a fixture will be used, the punch is clamped over the polished matrix blank and the two are adjusted relative to each other using guide lines marked on the face of the copper to help determine the exact position. With everything clamped in place, the punch is either beaten into the copper blank with a hammer or the fixture is positioned in a 'striking', which is a large press (Figure 9). These 'strikings' can be set to powerfully push the punch to exact depths and they are a great improvement over the hammer since they are more precise and are less liable to break the punch.

The punch is driven into the copper a bit deeper than the final depth required to allow for 'fitting' and the fixture is disassembled. After rubbing off the bulges of copper produced by striking, the depth of the drive is measured with a needle gauge (Figure 10). The overall depth should be sufficient, and any irregularity in depth is observed. Before beginning to alter the depth of the strike, casts are made to double check the squareness of the face. In most cases, one portion of the strike is deeper than another. This fault is noted and that portion of the strike which is too deep is filed away. If

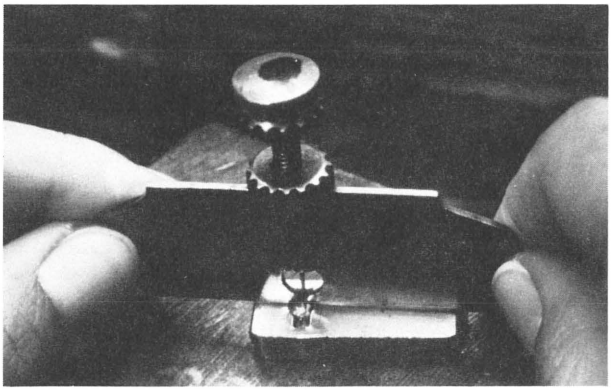


Figure 10
A needle gauge in use. The needle gauge measures the depth of the strike into the matrix and helps determine if the drive is level.

the discrepancy is very great, it may be best to re-strike. Still, careful filing can be quite effective. Once the face of the strike has been adjusted, the sides must be checked with the tri-square and made true to the face. If the sides are not square, there will be a tendency for the registers of the mould to force the matrix out of position. This results in inaccurate casts that will be misleading and may complicate the task of fitting. Also, chips of metal below the mould can throw off a cast and cause one to file away the matrix where it is not needed, if the fault in casting is not noticed.

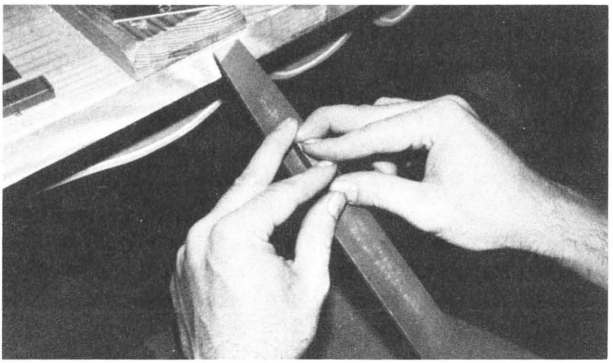
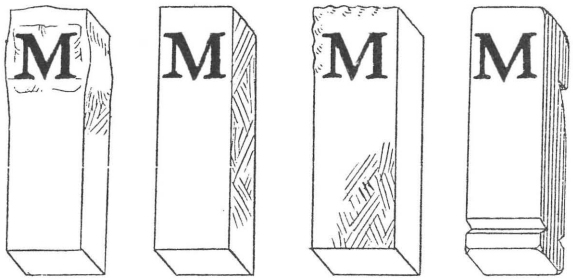


Figure 11
Rubbing a matrix on a file during the fitting of the matrix.

By steady, careful filing, the depth of the matrix is made even and is brought to the exact dimension needed. A height-to-paper gauge is used to check the height. Much of the filing is done by bracing the file between the stomach and the work bench and rubbing the matrix face down on the file (Figure 11). Very small amounts of metal are carefully removed, depending on where the fingers are placed and how hard one presses on the matrix. It is easy to round off the face of the matrix by careless filing, so care is needed. Once the depth is correct, it is time to adjust the alignment of the letter. (In fact, I do preliminary alignment when I am adjusting the depth of drive.) Final alignment is determined by placing trial casts between standard letters such as the capital 'H' or lower case 'x'. I use a lining stick and straight edge but an alignment gauge is better. This tool has a built in straight edge and a micrometer screw adjustment to allow very fine measurements. Some letters such as 'o', 'e', 'v', or 'w' require special care since they are made a trifle larger than 'm' or 'x'.

Adjusting the verticality of the letters and the exact 'set width' for each letter represents the toughest part of matrix fitting. Where fitting the depth of drive is a purely mechanical operation and adjusting the alignment is nearly so, making the letters seem vertical and adjusting the set widths is a subtle operation and makes the greatest difference between really well fitted letters and those that are less so. There are many optical illusions to consider when fitting matrices. Letters such as 'b' and 'd' must be made to lean a little, so as to seem upright. Some letters must be fitted closer together than others so that they will all seem evenly spaced. The ideal space between letters is thought to be the space within the strokes of the lower case 'n' or 'm'. (Fournier's comments on fitting are excellent, and an article by Joseph Blumenthal in *The Dolphin*, Vol. II, p. 71, should be referred to.)

This single subject of 'fitting' is sufficient for a monograph of its own. I will end this portion with the comment that this is truly where hand-set foundry types are superior to other forms of type setting. The founder arrived at the optimum fitting of his book fonts after months of work by craftsmen who had spent their entire careers learning their skills. Book fonts were well fitted when cast and sold. The printer could not mishandle them very much. Admittedly there were always a few awkward combinations such as 'WA' and 'LA', but good fitting and a knowledgeable compositor could deal with those well established situations. Today, despite the potential for kerning and mortising type, actual typesetting practice is less than perfect. The compositor can tighten up a line or spread it out to suit himself. If a column is narrow, the type is made to fit. So much for good letter fitting!



1. A rough strike or matrix.
2. The strike filed smooth and square for casting.
3. It may be necessary to protect part of the matrix from being filed away by raising its edge with small dents (upper left) so that the file cuts away only undesired parts of the matrix (lower right) to achieve squareness.
4. A final fitted matrix.

With a matrix fitted for depth, alignment, uprightness, and set, all that is left is to cut a notch for the bow and leather grooves (Figure 12). These small details vary according to the period, locale, and maker. With the matrices carefully finished and stored in a drawer or box, one can begin using them for casting.

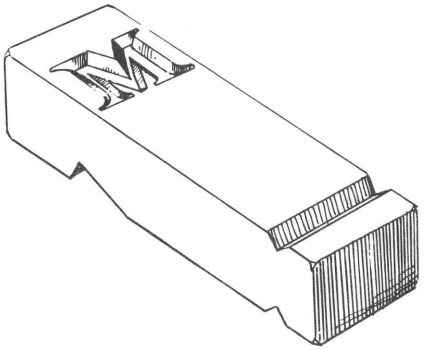


Figure 12
A matrix for a hand mould.

Casting Type with a Handmould

The primary goal of the typefounder is to produce clean, sharp faces correctly aligned on accurate bodies. When casting type by hand, the typecaster must adjust several factors in order to satisfy this goal. Metal temperature, manner of pouring, percentage of metals in the alloy, type size, set width, and type design all influence the quality and ease of casting.

Tools used in casting type.

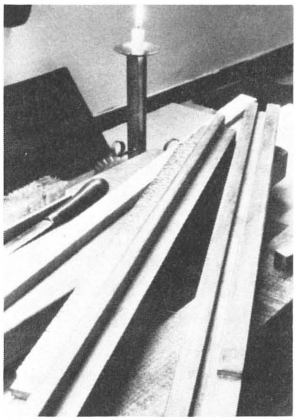
Adjusting the temperature of the metal is the simplest step towards better type. It is best to use the lowest temperature of metal that will work. This will reduce shrinkage and seems to minimize air bubbles. Small type bodies require hotter metal than large ones, so gradually raise the temperature until casting becomes easier.

While raising the temperature of the metal it is best to experiment with the 'shake' given to the mould when the metal is poured in. This unusual motion, consisting of a sudden, upward jerk at the instant of pouring, helps force the metal into the face of the matrix. Both the force and angle of the shake are varied for different individual letters. The shake is the essential skill developed by a caster over years of practice, and it has a lot to do with his success.

In stubborn cases it becomes necessary to alter the proportions of the tin, lead, and antimony that make up typemetal. Metal containing more tin is less hard but more free flowing, so stubborn letters or characters with large kerns may 'come-up' better in softer metal. I should add that the composition of the metal is also varied according to the size of type being cast. Small types are best cast in hard metal but larger bodies must be made of softer metal. This

is largely due to the rates at which the mixtures solidify but wearability is also a consideration. Hard metal solidifies more rapidly than soft metal, but it wears better.

Regardless of size, the set width of types affects casting. Very narrow sets can be hard to cast but wide sets are always harder to cast. The capital letters 'M' and 'W' are usually the worst. Coating the mould with soot from a lamp or candle is a great help in stubborn cases, especially with small bodies.



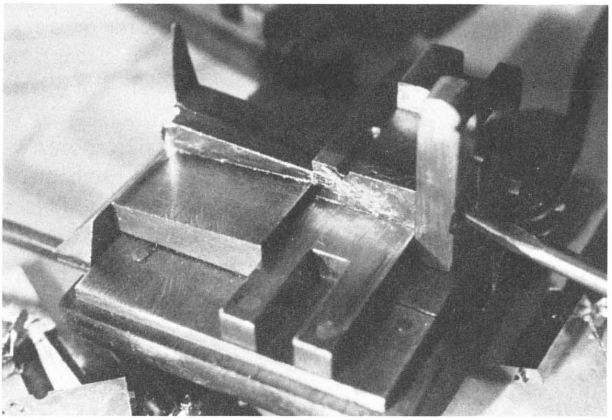
A dressing rod. Individual pieces of cast types are placed upside down in a row on the rod and trimmed at the foot to insure an even height for consistant printing.

Finally, the type design is a major factor in determining whether types are easy or difficult to cast. Highly ornamental or shaded letters are sometimes impossible to cast by hand. Very bold, 'fat face' designs can be quite difficult to cast cleanly. Some characters with thin serifs can present problems since the fine details can resist 'coming-up'.

In addition to the essential task of casting a clean face, the typefounder must continually watch that the letters he makes are cast with the proper set width and alignment. The bodies of hand cast type must be accurate as to size and parallelness, but small wrinkles and air bubbles are common and do not present a problem, unless the voids are large.

After the types are cast they go through several more stages in the process of 'dressing', or finishing. The jet, formed in the mouthpiece of the mould, is broken off, the letter rubbed on two sides on a flat stone, and then the rubbed sorts are composed on 'setting sticks' which are fairly long wooden sticks made to support a long line of type. When the stick is full, the line of rubbed types is scraped smooth on the remaining sides and then is moved into the dressing block where the feet of the types are grooved to trim away the rough spot where the jet was removed. After having the feet plowed, the types are ready for printing unless the particular letters have over-hanging kerns which require special trimming. Types cast in the nineteenth century and earlier had their shoulders 'bearded' or trimmed so that they would not print accidentally. In the twentieth century this procedure has been omitted since it is no longer necessary.

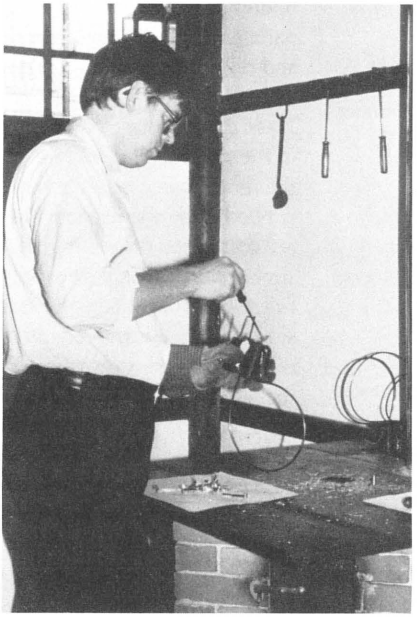
With the type dressed and ready for use, this brief account of matrix fitting and type casting is finished. I wish that there were space enough to give all of the particulars of this subject, but I believe that you should at least now have



A close-up of the author's 24 point mould.

a clear understanding of all the work that goes into producing type with early hand methods. If you want to learn more about this subject, I recommend that you refer to Joseph Moxon's *Mechanick Exercises on the Whole Art of Printing* and 'Fournier on Typefounding' which is the text of the *Manuel Typographique* translated by the late Harry Carter.

The author casting type.



The printer's mark of The Hackiana Press. Leyden, 1671.

The printer's mark of Antoine De Harsy. Lyon, 1550.

Fundamental Research Methods and Form Innovations in Type Design Compared to Technological Developments in Type Production

André Gürtler and Christian Mengelt

If we ask different professionals in the area of type and typography what the expression *Letterform Research* means, we will be given very different answers. The historian generally interprets it in a different way from the technician, and the typeface designer differently from the manufacturer or the typographic designer.

In this paper, we would like to investigate a specific aspect of Letterform Research, namely the design of the typeforms of our typographical past, present and future, in comparison and in contrast with the technical development of type production.

Gutenberg's type-case for the printing of his 42-line Bible contained 299 signs. The hand compositor's technique of assembling lines, letter by letter from a store of cast type, into the composing stick, remained unchanged in principle for nearly 500 years.

It was the invention and development of hot-metal composing machines that first brought a substantial increase in setting speed, from about 4,000 characters per hour to start with, up to 30,000 with linecasters controlled by punched paper-tape in the nineteen-fifties.

The first phototypesetting machines were still related to the hot-metal machines in their principles of construction. The typecasting matrices were replaced by film matrices, that is to say, a film negative, and an exposure device took the place of the casting device. Phototypesetting machines of conventional design allow exposure speeds of 50,000 to 250,000 characters per hour.

Visible Language, XIX 1 Winter 1985
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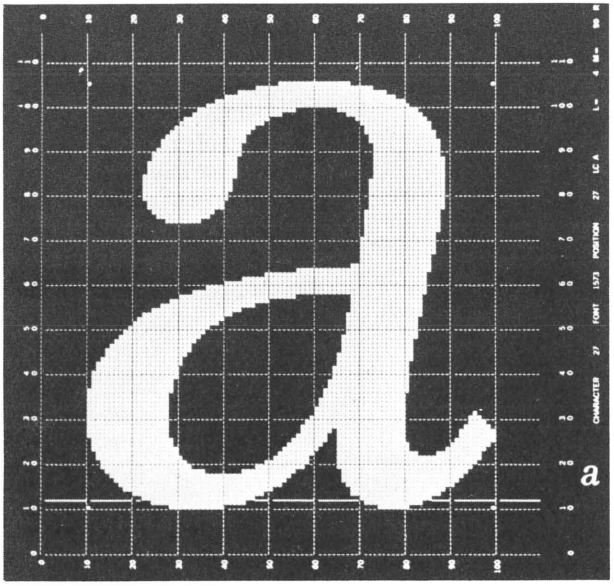

From Gutenberg's type case for his 42-line Bible to today's digital letterform reproduction for high-speed composition.

With the development of CRT and laser typesetting units, the technique of type image production has undergone such a rapid and revolutionary development within a few years that its effects on the whole situation of typography are still hard to grasp in their full implications. At the same time, the advent of digital-electronic typesetting computers has made exposure speeds from one million to several million characters per hour into a daily, but still astonishing, reality.

Parallel to this technical revolution, there has developed a design industry specific to the production of typefaces. The first manufacturers of phototypesetting machines mainly used their new technique to copy the *proven* typefaces of the past as faithfully as possible, to convert them for photosetting and to supplement the traditional basic styles with many variations of weight and width. Whether it is still meaningful today to interpret a distinguished old book-face of the sixteenth century by means of present-day technology is a question that we would like to discuss.

The fact that the *liberation* of typography from the restraints of metal opened up undreamed of new creative possibilities, is a statement from the pioneer days of phototype which is still often and gladly quoted today. If we now consider the typography of every day with a critical eye, more than 30 years after the introduction of phototypesetting, we must ask ourselves to what extent these possibilities have been used for a new creativity in typeface design as well.

A type specimen book of a photosetting firm in Switzerland shows how the revival of the most ridiculous typefaces of the nineteenth and early twentieth centuries has come into fashion today. Can the abundance of these revivals from the lumber-room of the nineteenth century count among the creative possibilities which have been opened up by the new technology?

Considering the entire production of typefaces during the past few decades, only a few genuine innovations in type design have been able to establish themselves in the phototype market. The job of researching and designing typefaces and typeface programs which not only take into account the system-oriented technical characteristics of new setting and printing processes such as so called *optical corrections*, but also place these technical conditions as the very basis of the whole design process – this job has comparatively seldom been undertaken.

In these critical remarks, we do not in any way wish to overlook the genuine achievements of individual typeface designers and individual companies – from Adrian Frutiger's Univers to Bram de Does' Trinité – to mention only one of the first and one of the latest typeface creations for photosetting. Our judgment applies only to the total amount of effort that has been made in our times in the design area of type and in the research and creative sense, as being relatively inadequate in comparison with the enormous technical development which has been based on correspondingly intensive research and major financial investments by the manufacturing business.

As typeface designers with teaching experience in this field, we must make a critical comparison of these developments. We are well aware of the social and commercial interdependencies of the highly-developed information industry, but we also know about the cultural values that are specific to our area of activity. Typefaces and typography, as an expression of the human spirit, are closely linked with the development of our society, and they comprise values whose preservation and further development seem all the more urgently important to us when the technical development of the means of production has practically no limits.

In this complex situation it must be our aim to make use of our professional abilities and knowledge, and our experience as designers and teachers, so as to return to a position in which we can further develop a sense of quality and creative research and design in the field of letterforms.

It is doubtful whether the present mass-production of all kinds of typefaces and the continued over-saturation of the market for type can continue to be meaningful, either from an artistic or a commercial point of view, even if such production may appear to be more practical with the use of computers and computer-controlled drawing.

On the other hand, the technical development of type and print production and the new electronic media present us with a whole range of tasks to which we have certainly not yet found answers, and which have to a large extent scarcely been formulated. These many-sided and complex undertakings within the comprehensive area of typeface design cannot be approached or resolved except in close and intensive collaboration between scientist and designer, technician

and businessman. The following are only a few examples of the kinds of tasks concerned:

- Typefaces for typewriters and word-processors, which in combination with the development of new copying and duplicating techniques will certainly not be limited to the revolutionizing of office information.
- Typefaces on the video screen. Beyond the use of screen typefaces in typesetting and computer stations, everyone will very soon be confronted with the type-forms of these new media through Teletext and Videotext.
- Digitised printing type and its electronic processing, in association with the development of new printing techniques, necessitates a coordinated re-thinking of the entire typographic situation of the present and the future.

It is our considered opinion that increased and intensive efforts are necessary today, especially within industry, in order to reorganize the technical development of type production equipment, not only in accordance with the criteria of technical rationalization and commercial profitability, but in association with wide-ranging basic research and development of the qualities of the product, of the artistic form and the readability function of type.

As a stimulus, and as only one example of the present urgent need for a program of basic research, we would like to consider, in the next part of this paper, an area of printing type which is today influenced to an exceptional degree by technical change in the production of type and print: The Typeface for Newspapers.

In the present contribution we cannot and should not be concerned with presenting a suggested design for a new newspaper typeface, but only with a catalogue of the criteria and factors which, in our opinion, must be borne in mind in the search for the qualities of design and readability of a present-day newspaper typeface.

It is only on the basis of the evaluation and judgment of all these factors and criteria, in collaboration with scientific research, with technicians, designers and industry, that the contours of a project, for example a new newspaper face, may be sketched out.

The oldest way of conveying news, still in use today in remote parts of Mexico and Africa, is by word of mouth. Regular written communication of news by correspondence is first known to us from the early Middle Ages. Witness to such a correspondence

service is provided by the famous letter-journals of the commercial House of the Fuggers which not only gave commercial news but also reported on major political, ecclesiastical and military events.

Letter-journals were duplicated in manuscript by the hundred. This relatively laborious and time-consuming work was later replaced by letterpress printing, a technique with much greater speed and scope. The single-sheet print or fly-sheet, for the rapid dissemination of news and information digests of all kinds, is known from the very earliest days of printing: an article printed in 1492 reports in verse on the fall of a meteor, and another sheet records an unusual appearance of the moon.

The fly-sheet and the pamphlet had exceptional importance and distribution as weapons in the religious and political struggles of Europe during the early sixteenth century. The Reformation pamphlet, *On the Freedom of a Christian*, by Martin Luther was printed in thousands of copies as soon as it had been written and subsequently went through eighteen editions.

Even if the fly-sheet has little to do with our theme, this medium shows how conditions were created in the sixteenth century to inform people on a large scale and enable them to participate in public events. These are the conditions which made newspapers really necessary.

From a kind of amalgamation of the single-sheet print with the handwritten letter-journal, there arose at the beginning of the sixteenth century the first examples of the printed newspaper, known in German as *Neue Zeitung* and giving news about contemporary events. The original meaning of the German word *Zeitung* is derived from the word *Zeit*, which in English is *Time*. Like the letter-journals, the *Neue Zeitungen* gave information on two to four pages about the political, religious, and also more trivial events of a period whose spirit is marked by uncertainty, anxiety and superstition. However, these publications lacked regular appearance, being published only sporadically in accordance with the arrival of oral or written news.

Printed news was published in regular sequence from 1588, with the six-monthly *Trade Fair Journals* (*Messrelationen* in German), which from then on were sold in conjunction with the Spring and Autumn Fairs. These journals were very popular and had wide circulation; one of them, published in Frankfurt, survived into the nineteenth century. The first monthly newspaper, the *Annus Christi*, appeared in Switzerland

July issue of the first and only monthly newspaper of the year 1597, edited in Switzerland. In comparison to traditional book typography in newspaper design of those days, a typographic image of the present day paper by 'Herald Tribune.'

IVLIVS Anni 1597. Jahrs.

Kurtze anzeigung der

etlicher fürnembsten Geschichten / so in dem Monat Julio / des 1597. Jahrs / zu Constantinopel / in Siebenbürgen / Ober vnd Nider Hungern / Oesterreich / rc. Behaimb in den Niderlanden / Franckreich / Engelland / Italia / Spania / vnd Aphrica / sich zugetragen.

Trewlich vnd auff das kürtzest verfaßt vnd zusammen geschrieben / Durch Samuelem Dilbaum Burgern in Augspurg.

Getruckt in deß F. Gotteshaus Sanct Gallen Reichshoff Rorschach am Bodensee / bey Leonhart Straub / Im Jar / 1597.

INTERNATIONAL Herald Tribune

Published With The New York Times and The Washington Post

ZURICH, WEDNESDAY, MAY 25, 1983

U.S.-Soviet Relations at One of Lowest Points in a Generation, Specialists Say

Maputo Reaffirms Guerrillas Can Stay

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Nicaragua Rebels Ambush Convoy of Foreign Journalists

towards the end of the sixteenth century. As was usual up to that time, it lacked both issue numbering and folio numbering. Planned as a year's project, it remained the only newspaper with monthly publication. After one year, the enterprise was given up, for reasons which we do not know.

In the first decade of the seventeenth century, frequency of publication was taken further. From January 1609, the first two weekly newspapers appeared: the Strasbourg *Relation* and Wolfenbuttel's *Aviso.*

Regularity now becomes apparent not only in publication but also in external appearance: the consecutive issues are numbered and the title-piece remains constant.

It was now only a question of time before the appearance of the first daily newspaper, which was published in Leipzig by the printer and bookseller Timotheus Ritzsch on the first of January, 1660. This seems to have been his fourth newspaper enterprise, for which he had received a twelve year Privilege in December of the previous year. It is uncertain whether he fully used this twelve year permission to publish, but we know that he was still issuing the newspaper in 1668.

In comparison with the countless weekly sheets which appeared throughout Europe up to the end of the eighteenth century, the number of daily newspapers remained very small. In England, the *Daily Current* first appeared in 1702, and France received its first daily newspaper considerably later, in 1777, with the *Journal de Paris.*

With the *Publick Occurences*, published in Boston, newspapers were introduced to America understandably late. Development of the newspaper press in America was very efficient, however, as there were already thirty-five weekly news-sheets by 1775, and the first daily newpaper appeared in 1784.

Up to the middle of the eighteenth century, newspaper typography conformed with the current design conventions of the book. The only difference worth mentioning consisted in the full utilization of the page area with a large type area. At first the title pages were very simply designed, with a bare mention of the contents, and often with a decorative surround for the title-text. Sometimes the title-page was embellished with a woodcut illustration. With time, the title-pages became more detailed, with mixtures of typefaces and type

sizes to differentiate the image. Sensational and other news was boosted with striking headlines. This verbal exuberance also found a natural expression in the title-piece designs of the late sixteenth and seventeenth centuries.

As a German invention, and therefore at first produced only in the German language, the early newspapers were set in typefaces of the Gothic style, with Fraktur types predominating on both title and inside pages. Other typefaces used were the Round-Gothic and Schwabacher.

As in books, so in newspapers, initial letters were an important element in design. Gothic capitals, in particular, lent themselves admirably to the job of typographical emphasis.

In non-German speaking countries, too, book typography was taken as the model for the newspaper. Towards the end of the eighteenth century, with the growth of the industrial revolution in England and the political revolution in France, there are clear changes in the appearance of the newspaper. New techniques and methods of production, political and social restructuring, brought changes all over Europe, and these naturally found expression in newspapers as well. A rapid succession of events and achievements led to the publication of many hundreds of newspapers and pamphlets; this was the beginning of the new century, which made the newspaper into a mass medium.

The first major innovation based on these events was an enlargement of the type area, since larger and heavier printing presses had made possible the use of larger sheets. This led to multi-column layout, which was already adopted by many newspapers before the middle of the eighteenth century.

If we now go briefly into the technical development of letterpress printing, composition and type design in the nineteenth century, the subject is all the more interesting in view of the close, reciprocal relationship between the further development of the newspaper and that of printing and composition. The growing mass medium of the newspaper became, in fact, the initiator of newer, faster and better methods of production. *The Times* newspaper of London played an important role in this development.

Beween 1785 and the end of 1787, *The Universal Daily Register* became established as the leading London daily paper. After three years of publication the title was changed and *The Times* began its history with the

first issue on the first of January, 1788. A pioneering spirit and the quest for quality by its founder and his successors made the newspaper into a by-word for high quality, and its progress, with the associated link between newspaper and printing developments, forms a remarkable story.

Before the turn of the century, when the young *Times* already had the largest circulation of any London morning paper, the Englishman Charles Stanhope brought the often-tried further development of the medieval wooden press to a successful conclusion (1800), and the first examples of his metal press were installed at Printing House Square, the Times printing office. A larger page size soon allowed *The Times* to go from four to five columns per page.

In the early years *The Times* continued to use the same Caslon Old Face as its predecessor *The Daily Register.* Following a trend of the time, a new text face was adopted in November, 1799. This was a Modern face, which, printed on relatively coarse paper and set in a slightly larger point size than the old Caslon, together with broken hairlines, brought no advantage to the reader. The probable intention at Printing House Square was to show readers that the paper was moving with the times.

With the first *double cylinder press*, the German inventors Koenig and Bauer brought the development of the letterpress machine to an entirely new stage. *The Times* supported the development and construction of this fully mechanized, steam-driven machine and was the first printing establishment to put it into use, with the issue of the twenty-ninth of November, 1814. The new printing technique was revolutionary, since it brought a five-fold increase in speed of output. A comparison between the new type reproduction quality and the quality of the image used before 1814 shows that the new technique produces a typeface which is bolder in design and the ink load is heavier.

At the same time, and at short intervals, at least three new types for body text and commercial announcements for *The Times* were tried, followed by a further change two decades later. All the typefaces concerned are of the Modern style. Their designs, in some cases, are quite similar. They differ most in the variety of weights, and sizes.

A further look at nineteenth century newspapers, outside German-speaking areas, shows the almost exclusive use of Modern for newspaper setting. Some

examples include: *Le Moniteur Universel* of Paris, 1813, set in the French Modern of Didot design; the *Gazetta di Genova*, 1820, set with the highly contrasted Bodoni Modern and openly spaced; *Le Monde* of Paris, 1866, shows that later in the century and particularly in France, condensed Modern versions with large lowercase x-heights were quite common; *The Daily News* of London, 1883, used a very typical English Modern of round and open appearance. The accentuated hair-line and serif stroke thicknesses give a general impression almost like an Ionic or Clarendon typeface.

The Modern style was the fashionable text type of the century, being produced by practically all typefoundries in extensive programs of point sizes. When printed with care, it has a pleasant appearance and good legibility; but this was exactly its problem, as a text type with marked contrast of strokes, for an area of use where bigger and bigger daily runs were constantly required. A relatively coarse paper surface, and constantly re-used types, together with badly balanced printing pressure, resulted in unsatisfactory quality of reproduction. Later on, in the second half of the century, the quality improved distinctly, partly owing to improved methods of composition.

With the construction of its own new printing press, a four-cylinder machine, in 1828, *The Times* increased its production speed to 4000 impressions per hour. 'Appetite comes with eating,' as the French say, and before the middle of the nineteenth century *The Times* set up another record in mechanical invention; a rotary 8-cylinder machine was installed which made possible an impression speed of 10,000 per hour.

Invention continued to flourish at Printing House Square, and after successful trials in stereotyping, *The Times* changed over to printing from curved stereo plates, on very large rotary machines, in August, 1858. The early stereotype technique with its indirect type reproduction through *papier maché* moulds must have had a negative effect on the most typical characteristic of the Modern, which is the marked contrast of strokes. Therefore, from this date on, serifs and hair-lines became thicker as they were in previous faces, and the entire aspect is not far from a Clarendon or even Egyptian design.

The next important innovation occurred ten years later with a further in-house development – the web-fed rotary machine. From December, 1869, machines known as *Walter presses* printed *The Times* from

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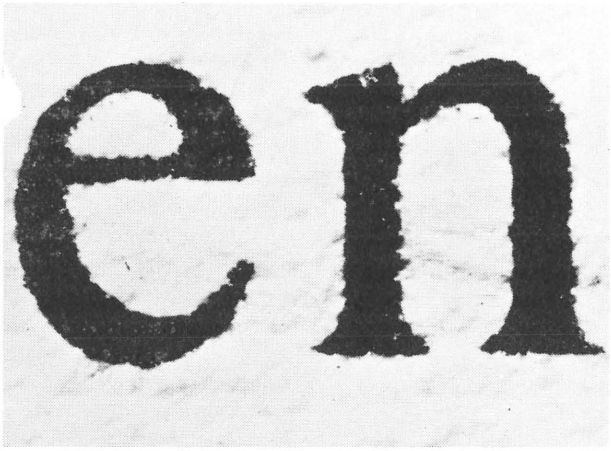


A comparison of the reproduction quality between the original type design and digital form reproduction in an offset printed newspaper.

paper in reels. The years following the installation of the Walter Press saw the utilization of a typesetting machine, introduced to Printing House Square by the German Karl Kastenbein. This was a keyboard composing system, enabling type to be composed by means of metal character magazines, filled by hand. With a specially developed type-caster *The Times* obtained brand-new types every day. There is no doubt that the new method of composition greatly improved the quality of the type as reproduced in the newspaper.

Out of more than 20 patents and makes of composing machine, the Monotype and linecasting machines emerged towards the end of the nineteenth century, with their famous representatives Mergenthaler Linotype (1886) and the Monotype Corporation (1897). The history of the two firms concerns us not so much on account of the world-wide acceptance of their reliable products, as because of their engagement in the field of type-design and typography.

The Monotype and Linotype companies came into being at a time towards the end of the last century when there was a new appreciation of older values and new artistic and formal guidelines were beginning to be defined by reform movements. Within this new direction, both firms were pioneers in the creation of newspaper typefaces.

To accept this responsibility was easier in that the previous century had brought few innovations in the field of text-type design, and a vacuum existed in face of the tremendous achievements and discoveries of technology and industry. Most of the typefoundries of the time were rather concerned with out-bidding one another in the production of new display faces of all kinds, and out of this great number, there emerged only very few remarkable novelties, which made typographical history.

What interests us here in particular is the typefoundries of England, which created certain trends in contemporary type design with a series of Clarendon and Ionic faces. As we will now see, these trends had a great influence on the newspaper faces of the twentieth century.

In 1894, the American Linn Boyd Benton created an important new text face for *Century* magazine, and in our opinion he thereby initiated the first impulse in the field of type design for newspaper setting. Influenced by the English Old Style faces, Benton designed his new typeface with bolder serifs and hairlines, thus

achieving a rather blacker overall image compared with the magazine's former typeface. Century Old Style first appeared in print in 1895.

With some modification, the face was later adapted for newspaper setting by Mergenthaler Linotype in 1904 and the Monotype Corporation, as No 211, in 1934.

If we now compare these two versions with the original *Century Magazine* typeface, we note that there are marked differences, which are due not only to the modifications made in the meantime by Benton himself, or to the technical implications of mechanical composition. Quite apart from Benton's own corrections, a genuine insight into the design of newspaper text faces had been achieved. In the search for usable models from the nineteenth century, Ionic and Clarendon faces had been rediscovered. The influence of these models, or the growing insight into the matter, was based on the recognition that more robust typefaces with stronger serifs and hairlines and thus a stronger overall image, as shown by the Ionic and Clarendon families, are more suitable for newspaper setting.

This view was given clear expression in 1925, when Mergenthaler-Linotype issued its Ionic specially designed for newspaper setting. One year later the typeface was put into use for the first time, at the *Newark Evening News*. With its powerful image, strong serifs and relatively large lower-case x-height, it obtained wide acceptance, especially in the United States.

As the first genuine newspaper typeface, Ionic was soon very successful everywhere, and rated as highly legible on account of the advantages mentioned; but precisely because of its large lower-case character image and the resulting, relatively wide lower-case alphabet length, it eventually became critically judged by newspaper people. The text had to be leaded between the lines; and, in addition, the narrower column width, which had in the meantime been generally adopted by newspapers, required typefaces with narrower character widths.

Linotype's response was to design a new face *Textype*, issued in 1929. Compared with Ionic, the reaction was very marked, since the lower-case alphabet length is much less and the character image considerably smaller. We are not sure about the commercial success of this type, but it is significant that Linotype brought

out yet another new typeface for newspapers only two years later.

This was *Excelsior* (1931), which shows considerable differences in character width and size compared with Textype. With Excelsior, Linotype achieved a very successful extension of its existing typeface library. Today, this typeface is still being used. Probably because of a positive echo to this type edition, the Linotype Company felt compelled to issue further news text typefaces four years later.

And with *Opticon* and *Paragon,* whose alphabet lengths showed further increase, until they finally reached that of Ionic again, the firm introduced seven new typefaces for newspapers by the end of the nineteen-thirties. Thus, in conjunction with its setting system, Linotype was a prolific and important contributor to this class of faces.

If we compare a few letters from the Linotype faces of the twenties and thirties with one another, we see that, with the exception of Caledonia which is Modern in design, these body types follow the Ionic model, by and large, and differ from one another only in a few details of form. Only the lowercase x-height and the alphabet length or stroke weight show some clear difference here and there.

In the meantime, other manufacturers of composing machines and printing types followed on, and by the late fifties the number of available faces had grown to about twenty. In relation to this considerable number, most of the faces concerned show little or no innovative or individual design features and they differ little from their predecessors. This gives the impression that no real research was carried out into newspaper typefaces at that time. Considered as a whole, these alphabets typify the same concept and formal language which were already in force for the design of the first newspaper face.

We may now ask: What was it that made the success of an Ionic, an Excelsior or other newspaper faces of similar character? Basically, our view is as follows. The first of these faces were pioneer achievements, if only because during more than 130 years, the general appearance of newspapers had been stamped by virtually only one typeface family, the Moderns. Therefore, to challenge the reader's attachment to a traditional visual image with a completely new typeface presented a risk, whose acceptance called for more than merely commercial considerations. Furthermore, we

find that the Ionic design, with its various derivatives, was the adequate answer to the techniques of rotary letterpress printing, owing to its generally powerful stroke thickness.

What astonishes us as designers, however, and leaves some particular questions open at the end of these comments, is the fact that, at a time when experiments were being made with typefaces for the private presses, at the Bauhaus in Germany and for other areas of printing, there were no real innovations in the field of newspaper type design, with only one sole exception. This single exception, of significance in the history of design, took place at *The Times* in Printing House Square.

Up to 1909 there were no further innovations of importance in the Times printing office. In that year, the first Monotype machines were installed there, giving the occasion for the cutting of a new text type for the newspaper; but the only significance of this type is that it was cut specially for the new method of mechanical composition. Its design was highly traditional and it is a close approximation to the design originally cut by William Miller in 1813. From 1909, the Times was set in this Monotype face for two decades – in other words, *The Times* of the mid-twentieth century was not yet prepared to give up its Victorian inheritance.

This was soon to change, for the *Times New Roman Adventure* began on twenty-ninth of October, 1929. On that date *The Times* published a special issue devoted to *Printing in the Twentieth Century*, which contained an article by Stanley Morison – a critical statement in which he not only complained that the Times text face had remained the same between the previous printing supplement of 1912 and the present one, but also that no constructive suggestions had emerged from the account of the difference between eighteenth and nineteenth century newspaper typography. He also regarded newspaper typography, in comparison with contemporary book typography in general, as inadequate. This judgment also applied to *The Times*, although it had always been in advance of other newspapers throughout its history, both in its typographical appearance and in its nature and position.

The management of *The Times* reacted promptly to this criticism and Morison strongly advocated the view, to a group of senior executives, that the newspaper's text type had to be redesigned. For the first time in the history of type design, a research study was then

commissioned by a company with a scope and depth which has never been surpassed to this day.

Commissioned to undertake the task, Morison, in his long and extensively illustrated printed memorandum, explained all the aspects which had to be taken into account in the design of a new typeface for newspaper setting. His arguments impressed the special working committee to such an extent of the need to create a new typeface, that Morison was immediately entrusted with the job. The result is well known.

Under the working title *Times Old Style*, the Monotype Corporation cut the future 9-point body size in April and printed the first trial proofs. The final form of *Times New Roman* was worked out over the following eighteen months by means of corrections and wide-ranging tests. The complete typographical change-over of the newspaper was completed during the weekend of the first to the third of October, 1932.

We all know of the success of the Times New Roman. For example, about 70 percent of the daily newspapers in Switzerland use it today. Whatever the reasons for this success may be, or what set up this milestone, in the typeface creation of the present century, they partly led back to a happy combination of the following circumstances:

- the far-sightedness and determination of the client;
- the technical and manual competence of the manufacturer;
- and the professional skill, historical knowledge and sense of form of the designer.

If we value Times New Roman on this occasion, it is not only because of its design. We are far more interested in the thoughts and considerations, the studies and clarifications, which led to the company's achievement. We find this procedure exemplary and also unique, especially in terms of today's newspaper press.

With this important example in mind, we would like to make the point that genuine, basic typographical research is also capable of bringing out long-lasting achievements in quality. And also, that such research work must be undertaken and supported, not only by individual designers or schools of design, but also, and increasingly, by industry. We may now ask:

- What has happened since Times New Roman, especially in Europe, became the most used text face?
- And where do we stand today, in newspaper typeface design, in the light of this example?

There is food for thought when we consider *further developments* in this sector, with reference to our own and future times.

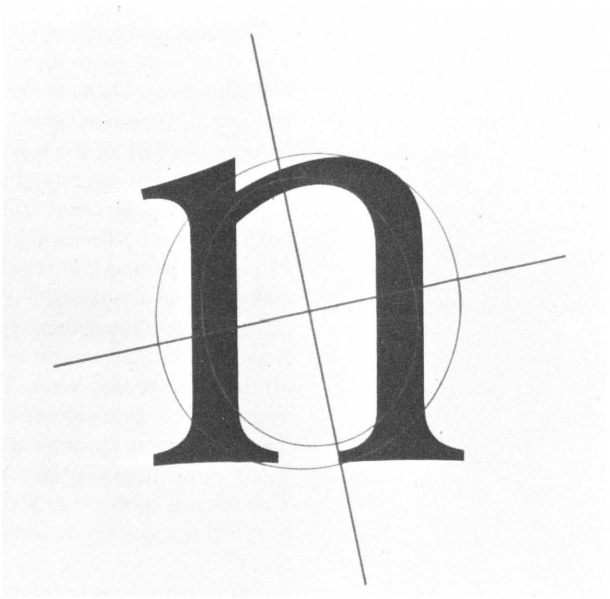
- Times of great enchantment and deep anxiety about micro-electronic techniques;
- Times when we feel obliged to produce more, more quickly, and – at all costs – more cheaply.

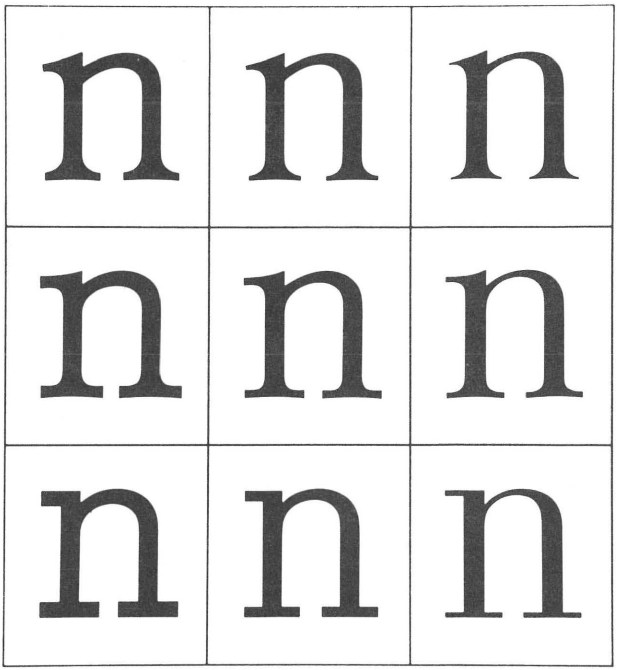
In a brief review, the years from 1960 to 1972 show us about ten newspaper faces, issued mainly by the Linotype and Intertype companies. In their formal concept, most of them derive from the traditional designs of the Twenties. A number of them were drawn by well-known designers, and there is no doubt that professional knowledge and design sensibility underlie these efforts. Two examples from the group, *Linotype Modern* (1969) and *Olympian* (1970), have an individuality in their formal details which distinguishes them from the Ionic and Excelsior group. We do not know how far research work was undertaken with regard to the practicability of the two typefaces, but we are sure that something completely beyond the designer's control must have happened between the original design and the way in which the two typefaces appear in newspapers. For example, Matthew Carter surely did not design something like an 'Olympian 1/4-Bold Condensed' to go with the 'Olympian Roman.'

Results like these two examples are fully representative of the quality of everyday typography in the newspaper of today. This is all the more a matter for concern in view of the fact that here, without any doubt, qualified typeface design has been really deformed by modern high-performance technology.

In order to face up to this critical situation, we must thoroughly reconsider the assumptions of type design today. To summarize and conclude, we would now like to systematically examine and illustrate, from the historical and technical development of the newspaper and its typefaces, the criteria and factors which influence the qualities of form and legibility of a newspaper face.

If we start with the layout of the front page of a newspaper, we see at once that the visual image is marked by a number of typographical layout factors which form the different typographical structure of a newspaper. These include the assembly of pictures and text, the relation between headlines and body type, the choice and mixture of the various typefaces and the number and arrangement of columns.





To vary a form or its formal details like serifs, is part of the design process when defining formal and aesthetic aspects of a final design.

Examining the body typefaces rather more closely, a number of other typographical factors come into consideration. These include column width and its relation to type size, space between lines and the character width of the typeface, and not least, such factors as word-spacing and justification of the lines.

Admittedly, all these factors have no direct connection with the design of the typeface, since they can be controlled and regulated by the typographical designer and the typesetter, but they do have a decisive influence on the readability of a newspaper face and must be included in any such investigation. This applies all the more today, when it is precisely in the field of newspaper typography that modern electronic text and data processing systems are making the control of these typographical quality factors more and more difficult. This view is quite clearly confirmed by the large number of inferior typographic products to be seen on the newsstands.

Let us now turn to the basic element of a newspaper's typographical structure: the image of the body type letterform. In order to judge all the factors which influence the characteristics and qualities of the type image, we must classify them into two different criteria of quality:

We distinguish between the design quality of the typeface, meaning the qualities of its æsthetic form, and its reproduction quality, meaning the qualities of its technical use.

Design quality, or the æsthetic factors of a type image, can be classified, investigated and judged by the following formal criteria:

1 The character of a type-form is substantially marked by the formulation and development of its stroke-endings: the stroke-end form, with or without serifs. The different visual appearance is clearly seen in the word-image. Even relatively fine differences in the shape of the serif have an important influence on the overall character of a type image. The formal principle of a typeface is, broadly speaking, derived from one of two historical models: first, the more dynamically conceived Renaissance roman letters, derived from the broad pen of Italian manuscript writing, and second, the more static and constructively developed form of neo-classical roman. Examples of these two alternative principles of form are Garamond and Bodoni, both historical typefaces in modern versions.

The modulation of strokes, the relation between

powerful and fine parts of the stroke, between emphasized basic strokes and serif forms, is another element in shaping the formal character of a typeface.

As a synopsis of all these design elements which mark the character of a type-form, we can use a *morphological box* to register the modulation in the vertical from dynamic to static, and in the horizontal from strong to slight contrast of the stroke.

This scale of serif forms can be supplemented by a corresponding scale of sans-serif type-forms to provide a comprehensive morphological graphic representation of typeface characteristics.

2 As a further factor in design quality – we must investigate the formal proportions of the type image. The weight of a typeface, and thus its blackness, or *color* on the page, are influenced mainly by the thickness of its strokes. The stroke-weight in relation of the *counter*, the white part of the sign, produces the image-weight. Relatively small deviations in stroke-weight have a decisive influence on the image-weight, the color of a text-face, which may range from almost Light to almost Bold.

The proportion of letter-width to letter-height produces the image-width – a narrower or a wider letter-form. In this case, too, quite small differences in proportion produce very different type-images.

And finally, in the proportion of x-height to total type-height, the image size, we have a type-image criterion which is still disputed today with regard to readability. A smaller x-height harmonizes with the ascender and the greater white space between the lines emphasizes the line-image of the typeface. A greater x-height certainly produces a relatively more open letter-image at the same point size, but the line-image tends to get lost within the compact typesetting structure, often at the cost of legibility.

3 Character width, the consecutive rhythm of the typeface, is of particular importance. The rhythm of a typeface can be judged from two different viewpoints:

- on the one hand by the balanced or unbalanced sequence of vertical main strokes, that is to say the stroke-rhythm,
- and on the other hand by the relationship between letterspace and counters, that is to say the *white-rhythm*.

In addition to these two elements of rhythm, a number of other factors have to be borne in mind in the organization of the character widths of a typeface. The

5th atypi working seminar 1983
stanford university california.
typefaces for typewriters and
for word-processors, which in
combination with the development
of new copying and duplicating
techniques will certainly not be
limited to the revolutionising
of office information. ag/cm

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stanford university california.
typefaces on the video screen:
beyond the use of screen type-
faces in phototypesetting and
computer bureaux, everyone will
very soon be confronted with the
type-forms of these new media
through teletext and videotext.

Many-sided design problems exist in today's mass-communication, e.g., office information or letterform on video-screen.

width of a typeface is also substantially dependent upon its formal character: a serif face has a different rhythm from a sans-serif, the rhythm of a condensed face differs fundamentally from that of an expanded face, and different optical criteria apply to the organization of the character width of a bold face, from that of a light face.

And last but not least, the type size must be taken into account in the specification of the character width. In metal setting, it was possible to design and cut the various sizes individually, so that the whole range of sizes was matched to the optical needs of legibility in stroke weight and character width.

In phototypesetting systems there is often only one original image, whether negative or digital, for the projection of each sign, if not in all sizes, then at least over a large range of sizes. However, phototypesetting does make it possible to alter the set width under software control as a compensation for the invariable letter image. By this means, small sizes can be made more open and therefore more legible, and large display sizes narrower and more compact. But if this electronic facility is used to manipulate set width irresponsibly, as is all too often the case today, the rhythm of the typeface and its legibility are destroyed.

In listing all the factors of design quality in a typeface, we wanted only to demonstrate how many-sided and complex are the design criteria which must be taken into account in any newspaper typeface project. No less many-sided and important is the reproduction quality of a typeface, the criteria of technical reproduction and its influence on the final form of a face as it reaches the reader.

In connection with the design of Times New Roman, Stanley Morison established the fact that type design and production should be considered as a single process, reaching back from the printing press to the drawing board.

This idea is all the more topical today in view of the fact that the rapid technical development of the setting and printing process practically forces us to rethink the assumptions of typeface design. In this connection we would now like to consider a number of technical factors and their considerable influence on typeface quality.

In conventional metal setting, the design and production of a printing type were closely linked with the handwork of the punch-cutter: from the type drawing to the punch and the matrix, then from the

matrix to the cast type. The composed type, that is the letterpress form, is inked and pressed into the paper. Relief and *ink squash* are the characteristic marks of letterpress printing. Excessive inking, bad impression setting and cheap paper quality can greatly deform the original type-form.

In conventional phototypesetting, the film negative replaces the metal matrix as the original image-carrier. The character is exposed on film or photo-paper and (for offset printing) etched into a metal plate, inked up and indirectly transferred via a rubber blanket to the paper. The ink lies flat on the paper, without any squash. The reproduction quality of the type will mainly be influenced by the quality of the printing paper. In the photographic process of typeface exposure, film development and finally the transferral to the offset-plate, careless operations and unfavorable technical conditions can equally well damage the original image to a great extent.

The digitization of printing characters for the CRT and laser typesetting processes brings new problems to the reproduction of forms. Technically speaking, the reproduction quality depends mainly on the *raster* or grid density in relation to the type size, that is to say on the fineness of digital resolution of each type form. A relatively fine resolution makes the grid pattern almost invisible to the naked eye with a type size of 9-point. Nevertheless, a certain distortion of the original may still be perceptible. In offset printing, a grid pattern becomes homogeneous with the structure of ink and paper. However, if a digitized typeface is printed with a traditional newspaper rotary press using Nyloprint plates, as is internationally very common today – the original letterform is often distorted almost beyond recognition.

A similarly disastrous result for the typeface is experienced in rotogravure printing. The CRT grid pattern and the gravure dot pattern, between them, often leave little that is recognizable from the original type image. If the reader then has poor lighting conditions – or less-than-perfect vision – or is travelling in a swaying tram or train, then there is no more pleasure in reading a newspaper.

We may have exaggerated slightly, but if you believe that you have only been shown extreme and rare examples of bad reproduction quality – please make your own comparisons to see how one and the same typeface, printed in various well-known and respected

newspapers with the most modern technique, finally reaches the readers.

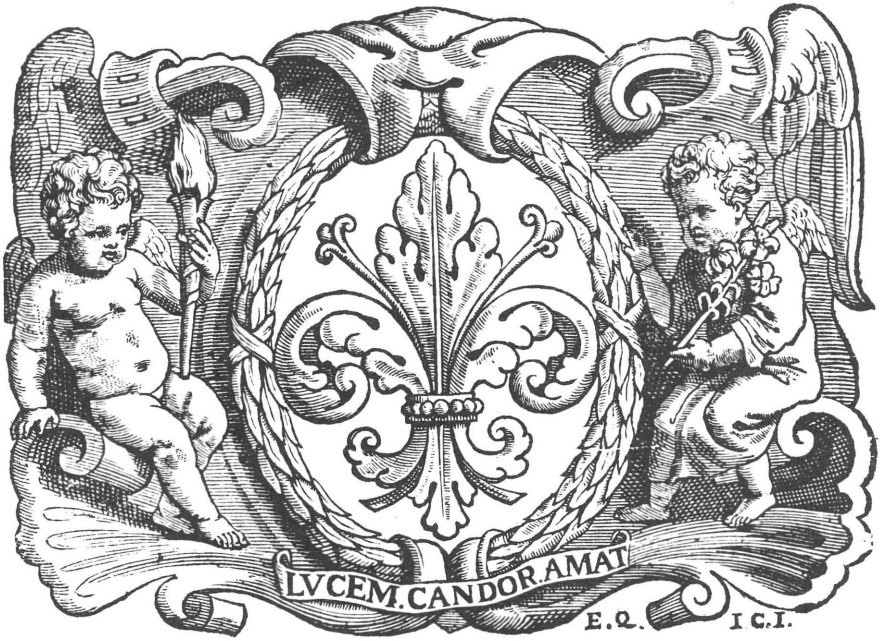
Hot-metal composing machines have now been out-of-date for some time, while CRT and laser typesetting systems become more refined and productive from year to year, but we still have to judge the quality of the type in newspaper printing very critically. The often poor readability of many newspapers stands in unhappy contrast with the technical development of newspaper production.

As we have seen, the æsthetic and technical criteria of this quality are so many-sided and complex that only a full collaboration of all departments of research and industry in the production of type and print – including scientists, technicians and designers – can lead to new answers for the newspaper typefaces of the future. By this token, as we said at the start, it is quite unthinkable to present design suggestions alone, nor do we wish to offer any prognosis concerning possible future solutions, but we would simply like to invite you to consider a few open questions from the problems demonstrated:

- Will the old-established newspaper typefaces from the days of the mass-media pioneers, such as Excelsior or Times New Roman, still be favorites in 50 years?
- Will sans-serif faces drive serif faces out of newspapers in the future? Faces such as Univers, perhaps, with its open and austere image, or more dynamic textfaces such as Syntax?
- Or perhaps will there be new possibilities in the marriage of the best qualities in serif and sans-serif forms?
- And last, will the type forms of the TV and video screens have a detrimental influence on newspaper typefaces and perhaps lead to the acceptance of quite unconventional forms?

Like these few questions relating to the case of newspaper typography, there are many other questions open in many other areas of basic research concerning letterform design in the past, present and future.

This paper was originally delivered in a primarily visual format, using a double projection system of one hundred and eighty 2 1/4 inch slides.



The printer's mark of The Guinta Press. Antwerp.

The State of the Art in Typeface Design Protection

Edward Gottschall

Why protection—who needs it?

Unauthorized copying of typeface designs is prevalent today thanks to the ease and low cost of duplicating designs and fonts photographically or digitally. Copying deceives the typeface user, robs the designer of the rewards of his or her creativity, and cuts into the sales and profits of typeface manufacturers who have developed, promoted and invested in a new typeface design. It can also result in inferior art being sold to the user. Piracy, unethical copying, or whatever you wish to call it, also discourages designers from spending their time, effort and talent on a design when they fear much of their reward may be siphoned off by the copyist. All this is true of both text and display typeface designs. Some type manufacturers have eliminated or greatly reduced their releases of display faces since they are the least profitable and the easiest to copy.

The U.S.A. Scene

There is no effective protection for new typeface designs in the United States. In June 1976, a new copyright bill was passed and it became law in January 1978. The original bill had two titles. Title I effectively updated the old law in view of the new technologies in many areas. The old law neither specifically protected new typefaces nor precluded them. The new law (only Title I of the 1976 bill became law) precluded coverage for typeface designs since it was presumed they would be covered to a different degree in Title II which dealt with the design of useful articles, such as television sets, toothbrushes, typefaces, etc. But Title II never became law, thereby omitting specific protection of typeface designs in the 1978 law and

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that is where we are today. A few feeble attempts were made to remedy this injustice but none succeeded. A mid-1983 phone check with the Office of Copyright indicates no progress is likely in this area in the foreseeable future. Recently, protection for computer software was written into law. Although the digital descriptions of typeface fonts are covered by law, the actual typeface designs are not.

Theoretically, one can get protection under design patent regulations and also have recourse to the courts via the common law regulations concerning unfair competition. In the latter case, one usually tries to prove deception (palming off a copy as an original) or misappropriation of property that rightfully belongs to someone else. In practice, neither design patent regulations (which require too extreme a degree of novelty to be commercially useful) nor the recourse to the courts have proven effective. Unfair practice suits have proven costly to pursue and difficult to win.

The International Scene

Industrial designs, including typeface designs, are protectable in various degrees under two international conventions, an international agreement and a variety of federal laws in many countries.
The two conventions and the agreement are:
The Paris Convention for the Protection of Industrial Property (1883).
The Hague Convention concerning the International Deposit of Industrial Designs (1934).
The Vienna Agreement for the Protection of Typefaces and their International Deposit (1973).

The Paris Convention makes it possible for non-nationals to protect a new typeface design for up to 15 years in France. Non-nationals can file for protection and filing fees and costs are nominal. The United States is a signatory to the Paris Convention but, since it has no typeface design protection laws of its own, companies in the United States must seek protection in one or more of the other signatory states. The criteria for protection are novelty and originality in Germany and novelty in France as determined by an expert. No prior test is given to a design submitted for protection. The questions of novelty or originality will be raised only in the course of an infringement proceeding by an adversary. The protection is against unauthorized reproduction. Filing for protection must be done before the design is released to the public.

The Hague Convention offers 15 years of protection and a single filing covers Egypt, West Germany, Belgium, Monaco, Morocco, The Netherlands, Switzerland, Spain, Surinam, Tunisia, Vietnam, France, Indonesia, Lichenstein, Italy, and East Germany. A company not based in one of these countries would have to establish a subsidiary in one of them. The expenses and tax considerations for such a company might make protection under the Hague Convention cost more than it is worth. Criteria for protection are novelty and originality as determined by expert testimony. Filing for protection must be done before the design is released to the public.

The Vienna Agreement: In many respects the Vienna Agreement for the Protection of Typefaces and their International Deposit (done at Vienna on June 12, 1973) offers the best protection for typeface designs. The problem is that as an international agreement it is not effective. Five signatory nations are required to make it effective so that a single filing would obtain protection in all signatory nations. Only two, West Germany and France, have signed it to date and the prospects for three more signing in the near future are dim. The Vienna Agreement offers 25 years protection for new faces (file before releasing to public). The criteria for sustaining protection are novelty and originality as determined by an expert. Although lacking sufficient signatures to be internationally effective, the terms of the Vienna Agreement were written into German Federal law July 6, 1981. The law is known as the Schriftzeichengesetz (Type Design Law). It was made possible by a revision of the 1876 law. France has also incorporated the terms of the Vienna Agreement into her Federal law.

Significantly, through the Paris Convention, non-nationals of West Germany and France can file for protection of new typeface designs in either or both countries. This newly won protection for new typeface designs in two major markets has implications that stretch far beyond the borders of the two countries.

Most companies that might appropriate other people's designs and which would have an important impact on the market would be the large companies now coming into the type field. No doubt some of these companies will be completely ethical. All are new to the graphic arts field but some don't know the ethical standards of it.

But, such companies are in an international business and it can be very effective to shut them out of one or two major markets. West Germany and France are such major markets. We have found in our discussion with some of these companies, who ask us directly, 'Why should we bother to license this when we could copy it?' that we have to tell them that they may not be able to market new typeface designs in West Germany or France unless typefaces have been properly licensed. This creates more problems for them than they want, and they agree that it is easier to license a face.

To determine all the routes to design protection under various laws in different countries one would have to conduct extensive research. By way of example, in West Germany, in addition to the Type Design Law referred to above, there is copyright law, a Trademarks Law, and a law against unfair competition. Moreover, to assist in the interpretation of the laws, there is the Vienna Agreement and the Code Morale of the Association Typographique Internationale, (ATypI).

Trademark registration

Many countries have laws permitting the registration and protection of tradenames and trademarks. Such registration (virtually all ITC tradenames are registered in the United States and are being protected abroad as well) forces unethical copyists to use other names for the copied designs. This makes the copies more difficult to sell since the new name must be promoted and established and because of resistance by ethically conscious buyers and type specifiers.

What is new?
What is original?

At a spring 1983 meeting in Frankfurt a five-person committee wrestled with definitions of novelty and originality and related matters. The objective was to establish guidelines for the trade and possibly the courts. Although the discussions were concerned with the new German Type Design Law, the meeting had international significance and is summarized here. When the report of the meeting is finally edited and approved, it will be submitted to the ATypI for possible adoption.

The members of the ATypI Working Group are: Dr. Walter Greisner, Managing Director, D. Stempel AG, Chairman; graphic designer Max Caflisch; Edward Gottschall, Executive Vice President, ITC; Professor G. W. Ovink and Professor Hans Peter Willberg. The following summary is based on the first draft of the minutes of the ATypI committee meeting.

Definitions suggested at the Frankfurt meeting

New At the Frankfurt meeting, it was suggested that a new typeface design, even very slightly different from a pre-existing typeface, is considered new as long as it did not exist before. Even if a designer recreates an existing design without foreknowledge that it existed elsewhere, the design can be considered new. A typeface is considered new when the design elements which make it original are not known to experts in professional circles at the time of its filing for registration. Under the terms of the German Typeface Design Law a typeface is judged new or original on the basis of its overall appearance. If a design is original it is also new. However mere novelty does not make a design original.

Original It was also suggested at Frankfurt that a type design be considered original if its distinctive features, which establishes its aesthetic value, exhibit the result of an individual's creative activity, exceeding in its level of creative design the average skill of type designers and the work of an ordinary craftsman. An original typeface, then, exhibits a greater difference from existing designs than does one that is merely new.
The ATypI Working Group also considered six degrees or levels of originality and is considering different levels or duration of protection for four of them. The first two, (exact copies and copies with only cosmetic changes) would not qualify as original nor do they deserve any protection. In German law, levels of creativity play a secondary role, but establishing such levels could offer guidelines to the experts and the courts. Although the French require only novelty, they recognize degrees of novelty and appear to use the word novelty the way German law regards originality.

Experts Experts, or professional circles, are those who are fully conversant with the design, production and use of printing types.

Parameters of Originality A number of parameters that characterize originality were also proposed at the Frankfurt meeting. They define the elements of a letter design, or the variables that can be manipulated by a letter form designer. It was agreed, and is part of the German law, that the ultimate determinant of originality is not in any one or any combination of elements but in the overall appearance of the design. Nevertheless, it is the originality in handling one or several elements, or in achieving a new combination of elements, that can lead to a truly original overall appearance. Some of the elements that contribute significantly to the overall appearance are as follows:

- Relationship of such elements as x-height, ascenders, descenders, and capital height.
- Shaping of curves (inner and outer shape) and of straight strokes.
- Form of serifs and/or joins and "feet".
- Specific characteristics that distinguish the alphabet as a whole.
- Distinctive special features in single characters, as the lower case "t" in Futura, for example.
- Extension (normal, condensed, expanded).
- Fatness (color, weight).
- Relationship of basic lines to the hair lines.
- Letter extension—how it fills allotted space.
- Relationship of Roman to Italic—(angle variation) difference in color or weight.
- Relationship of weights within the family.

Viewing Size It was agreed that to properly evaluate the degree or lack of originality expressed by a typeface's overall appearance the design should be viewed in a size and manner consistent with the way(s) it would be used.

Walking a Tightrope One objective was to define originality so as to admit truly original faces to some degree of protection while denying protection to copies and near copies.

An ATypI Clearing House Consideration is being given to establishing an ATypI committee of experts that could give some pre-court advice and guidance as to the probable level of originality of a new design. Since designs can be registered without having to establish their originality, this committee would simply advise the designer or owner of a new face as to its probable success in withstanding a challenge.

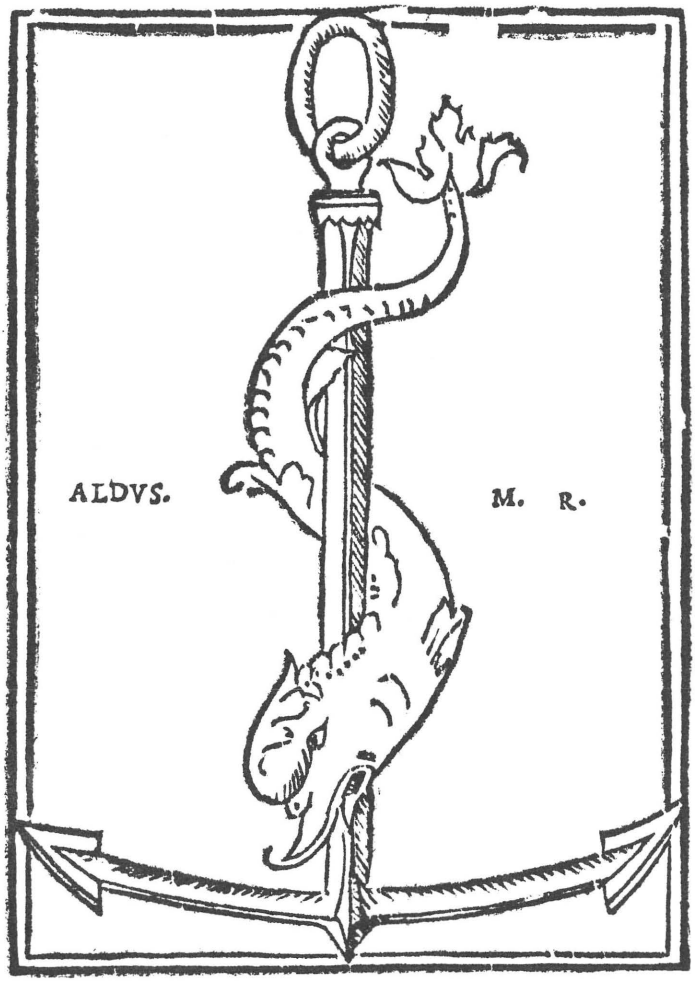
A Copy It can be assumed that a typeface is a copy if, when compared in its overall appearance to a known and protected typeface, it does not exhibit distinctive design features which relegate the similarity of other characteristic features to secondary importance.

Electronic scrambling

An excellent means of protecting a design from being copied is to electronically scramble the information in such a way that only the originator or an informed recipient can unscramble it, read it, and use it. Such techniques are currently employed by a number of typesetter manufacturers to protect their libraries from being unethically copied and sold by a copyist. A number of systems for achieving this exist and new patents for ways to protect data in computers are being developed. A recently patented scrambling/unscrambling method uses a key of 16 selected digits. The key is known only to the originator and an informed recipient. Without it the stored data remains scrambled and useless. For all practical purposes, this is a high degree of security and can protect all designs—the old with the new.

Conclusion and outlook

There is no immediate prospect of United States law being changed to afford protection to typeface designers nor does it seem there is immediate prospect of the Vienna Agreement securing the minimal five signatures to become internationally effective. In Japan and Great Britain no meaningful progress is being made toward protecting new and/or original typeface designs. Protection of new typeface designs currently afforded by national laws and the Paris and Hague convention signatories is all we have or are likely to have for a while. However, this protection can be real and, as more and more new faces are registered in Germany, France and elsewhere, the value of the protection will increase to all concerned. Also, in the United States, one still has recourse under common law on grounds of unfair competition and misappropriation.



The printer's mark of Aldus Manutius. Venice, 1450–1515.

Abstracts—French

John Dreyfus *Un nouveau tournant dans le dessin des caractères*

Au cours de ma vie professionnelle le dessin des caractères a pris deux tournants: d'abord celui de la photocomposition, dont Charles Peignot a si bien perçu les avantages et les inconvénients qu'il a aussitôt fondé l'Association Typographique Internationale; ensuite, l'apparition des machines à écrire électroniques, du matérial de bureau pour le traitement de textes, des lettres transfert et des systèmes vidéos; le tout faisant appel à de nouveaux dessins de caractères. A présent, il se dessine bien plus de caractères pour les ordinateurs que pour les presses et l'avenir est aux caractères numérisés, aux techniques nouvelles et à une plus étroite collaboration entre ingénieurs et dessinateurs de caractères.

Hermann Zapf *L'avenir des caractères et l'approche scientifique*

Depuis une vingtaine d'années les techniques ne cessent de changer dans le domaine du dessin de la lettre. Tous ces changements, surtout l'imagerie électronique, ont contribué à changer mon attitude et ma façon de penser. Mais je reste convaincu qu'il nous faut respecter les formes classiques et qu'il ne suffit pas de reproduire purement et simplement ces produits de la gravure manuelle par le moyen des techniques de numérisation. Ces techniques nouvelles appellent des dessins nouveaux obtenus par les moyens actuellement disponibles.

Donald Knuth *Les leçons tirées de l'expérience Metafont*

L'auteur raconte ses expériences avec son système METAFONT pour le dessin des caractères. Il commence par le prototype en 1977 et décrit les étapes successives qui le conduiront en 1984 vers un système entièrement différent. En annexe, une meta-description de la lettre A dont Summer Stone a fait le logo du Séminaire ATypI et qui montre comment ces formes peuvent être définies en termes d'ordinateur.

Jack Stauffacher *Le Phoenix transylvanien: les caractères Kis-Janson à l'heure électronique*

Nicolas Kis est un typographe et un savant qui vivait en Transylvanie, une région de la Hongrie, au XVIIème siècle. Il fit l'apprentissage de la gravure et de la fonderie typographiques pour mieux contribuer à l'éducation et à la culture de ses compatriotes. Ses travaux, notamment les réformes orthographiques qu'il introduisit dans la traduction de la Bible, furent mal accueillis par sa communauté qui était calviniste. C'est pour financer l'impression de la Bible qu'il se mit à graver des poinçons pour diverses fonderies. C'est ainsi qu'un jeu de matrices attribué jusqu'ici à Anton Janson, Amsterdam, est en réalité un des jeux de matrices qu'il avait frappées pour imprimer sa Bible. Ce caractères désormais célèbre sous

Translated by Fernand Baudin

le nom de Kis-Janson a fait l'objet de nombreuses copies et modifications à l'usage des techniques nouvelles. La comparaison de ces versions récentes avec l'originale tend à cerner les caractéristiques qui contribuent à la popularité renouvelée de ce caractère.

Matthew Carter *Galliard ou la rénovation des caractères Granjon*

Le Galliard a été dessiné en vue de faire revivre les caractères que Robert Granjon taillait entre 1540 et 1590. Le but était de créer un caractère de photocomposition moderne, largement utilisable parce qu'éminemment adaptable; ayant une base historique solide, mais nullement anachronique précisément parce qu'il n'en existait encore aucune version moderne. Loin d'être la copie littérale de tel ou tel caractère de Granjon, le Galliard est en réalité une réinterprétation du style Granjon.

Stan Nelson *Le moule à main, la justification des matrices, et la fonte manuelle*

Le première préoccupation d'un fondeur typographique était de produire des caractéres aux contours nets, bien alignés et bien justifiés. Pour arriver à ce résultat les principales étapes consistaient à fabriquer un moule à main exactement ajusté permettant de fixer avec précision les matrices dans lesquelles on coulait le plomb.

André Gürtler/Christian Mengelt *La recherche fondamentale et la création des caractères par rapport aux techniques de leur production de masse*

Les systèmes de composition sur écran cathodique et au laser, les progrès de l'imagerie typographique au cours des dernières années constituent une telle révolution en si peu de temps qu'il est encore bien difficile d'en prévoir toutes les conséquences. Une industrie nouvelle, spécialisée dans la fabrication des caractères est née et cependant rares sont les créations vraiment originales en matière de caractères au cours de la même période de temps sur le marché international. Tant du point de vue de la qualité que du point de vue commercial on peut se demander quel est l'intérêt d'une production aussi massive sur un marché déja saturé de caractères? Même si le dessin et la composition électroniques facilitent le travail.

Edward Gottschall *Où on en est pour la protection des caractères*

Il faut une législation pour protéger les nouveaux caractéres et pour établir qui est protégé contre les dommages causés par la piraterie et par les copies illégales. Toute protection des marques et des dessins manque et manquera aux USA. Mais en France et en Allemagne de l'Ouest cette protection existe pour les caractéres nouveaux et originaux aux termes de l'Arrangement de Vienne. Toutefois les firmes américaines peuvent se réclamer de cette législation à la faveur de la Convention de Paris et, selon les circonstances, de la Convention de La Haye. Une commission de l'Association Typographique Internationale a établi quelques directives permettant de définir la nouveauté et l'originalité d'un caractère donné. Plusieurs systèmes de protection électronique ont par ailleurs été mis au point pour la protection des caractères numérisés.

Abstracts–German

John Dreyfus Wendepunkte im Schriftschaffen

Ich habe im Laufe meiner Karriere zwei Wendepunkte im Schriftschaffen erlebt: der erste war die Erfindung des Fotosatzes, dessen Möglichkeiten, und Fallen, von Charles Peignot klar erkannt wurden und zur Gründung der Association Typographique Internationale führten; der zweite war das Erscheinen elektronischer Schreibmaschinen und anspruchsvoller Wordprocessing Geräte, die, zusammen mit Abreibebuchstaben und Video, die Notwendigkeit neuer Schriften mit sich brachten. Heutzutage werden neue Schriften mehr für die Ausgabe als für den Druck gebraucht, und neue Möglichkeiten eröffnen sich für Schriften, die besonders für computergestützte Technologie entworfen werden müssen, und zwar in enger Zusammenarbeit zwischen Engineuren und Schriftkünstlern.

Hermann Zapf Das Schriftschaffen in der Zukunft: Die Wissenschaft und Buchstabenformen

In den letzten 20 Jahren hat es dramatische Veränderungen auf dem Gebiet des Schriftschaffens gegeben. Diese Veränderungen, besonderns im computer-gestützten Schriftendesign, beeinflussen meine eigenen Methoden und mein eigenes Denken. Ich bin fest davon überzeugt, daß wir die klassischen Schriften respektieren sollten, und daß wir diese mit der Hand gechaffenen Schnitte nicht auf die neue Technologie des digitalen Schriftsatzes übertragen dürfen. Diese neue Technologie verlangt neue Designlösungen, für die man die heute bestehenden elektronischen Anlagen einsetzen könnte.

Donald Knuth Erfahrungen mit dem Metafont System

Diese Abhandlung befaßt sich mit den Erfahrungen, die der Autor mit dem Metafont System für Schriftendesign gemacht hat. Sie beginnen mit dem Prototyp des Systems in 1977 und ziehen sich durch verschiedene weitere Entwicklungsphasen hindurch, die schließlich zu einem gänzlich neuen System führen, welches für 1984 geplant ist. Im Anhang finden wir eine ausführliche "Meta-Beschreibung" des Buchstabens "A", den Sumner Stone für die ATypI Logotype entworfen hat und in der gezeigt wird, wie derartige Familien von Formen mit Hilfe eines Computers gezeichnet werden können.

Jack Stauffacher Der Phoenix aus Siebenbürgen: Die Kis-Janson Schriften im Zeitalter Digitalisierung

Nicholas Kis war ein Typograf und Gelehrter, der im 17. Jahrhundert in Siebenbürgen in Ungarn lebte. Er beschäftigte sich mit dem Druckwesen und dem Entwurf von Schriften, weil er das Analphabetentum bekämpfen und der allgemeinen Bevölkerung bessere Bildungsmöglichkeiten zugänglich machen wollte. Seine Bemühungen, besonders in der Form einer Ungarischen Bibel, der er seine eigenen orthografischen Regeln zugrunde legte, wurden von den Mitgliedern der reformierten Kirche nicht akzeptiert. Um das Drucken seiner Bibel darstellen zu können, schnitt Kis eine Anzahl von Schriften für andere Schriftgießereien. Es wird angenommen,

Translated by Inga Wennik

daß eine Serie von Matrizen, die man bislang Anton Janson aus Amsterdam zugesprochen hatte, in Wirklichkeit von Kis geschaffen worden war und die er verkaufte, um das Drucken seiner Bibel zu finanzieren. Diese Schrift, heute unter dem Namen Kis-Janson bekannt, ist oft kopiert und für neue Druckverfahren umgewandelt worden. Ein Vergleich der neuen Versionen mit der originalen Schrift versucht, die Züge der Schrift herauszustellen, die zu ihrer andauernden Beliebtheit beitragen.

Matthew Carter Galliard: Eine moderne Neuzeichnung der Schriften von Robert Granjon

Die Schriften, die Carter wieder ins Leben zu rufen sucht, wurden von dem französischen Künstler Robert Granjon geschnitten, der in der Zeit von 1540-1590 arbeitete. Mit der Galliard wollte Carter eine praktische, arbeitsfreudige, anpassungsfähige, zeitgemäße Fotosatzschrift schaffen, die auf starken geschichtlichen Grundlagen aufgebaut ist, die in keiner Weise anachronistisch ist, von der aber noch keine echte moderne Version bestand. Das Resultat ist keine wirkliche Kopie einer der Granjon Schriften, sondern eher eine Neuinterprätation seines Stils.

Stan Nelson Das Entstehen einer Gießform, das Anpassen der Matrize, und der Handguß

Das Hauptziel eines Schriftgießers ist es, saubere, scharfe Schriften, auf korrekt ausgerichteten Kegeln herzustellen. Entscheidende Schritte zur Erlangung dieses Ziels sind u.a. die Herstellung einer genauen, praezise eingestellten Gießform, das Anpassen der Matrizen und das Gießen
mit der Handgußform.

André Gürtler/Christian Mengelt Grundlegende Forschungsmethoden und Formerneuerungen im Schriftschaffen–im Vergleich mit technischen Entwicklungen in der Schriftenherstellung

Die Entwicklung von CRT und Laserschriftsatzgeräten hat innerhalb der letzten Jahre eine so rapide und revolutionäre Entwicklung in der Technologie der Schriftträger mit sich gebracht, daß deren Wirkung auf die ganze Situation in der Typografie in ihrem vollen Ausmaß noch gar nicht abzusehen ist. Parallel zu dieser technischen Revolution hat sich eine Designindustrie entwickelt, speziell für die Herstellung von Schriften, aber nur sehr wenige echte Neuerungen im Schriftendesign haben sich auf dem internationalen Fotosatzmarkt durchgesetzt. Es ist zu bezweifeln, daß die heutige Massenproduktion von allen möglichen Schriften und die unaufhörliche Übersättigung des Schriftenmarktes weiterhin sinnvoll bleiben wird, sowohl von der künstlerischen als auch von der kommerziellen Warte aus, selbst dann, wenn eine solche Produktion mit dem Gebrauch von Computern und computergestützten Zeichnern praktisch erscheint.

Edward Gottschall Der gegenwärtige Stand der Dinge auf dem Gebiet des gesetzlichen Schutzes für Schriftendesign

Es ist absolut notwendig, die Entwürfe neuer Schriften gesetzmäßig zu schützen und zu bestimmen, wer vor dem Schaden, der durch Raub und unehrliches Kopieren von Schriften entsteht, geschützt werden muß. In den Vereinigten Staaten sind außerdem Gesetze für den Design- und Firmenschutz erforderlich, da es dort keinen wirksamen Schutz für Designs gibt, und weil keinerlei Aussicht besteht,

daß es einen solchen in der Zukunft geben wird. Die neuen Bundesgesetze in West Deutschland und in Frankreich bieten Schutz für neue und erstmalige Schriftenentwürfe aufgrund des Abkommens von Wien. Amerikanische Firmen können sich, unter Berufung auf die Pariser Versammlung, auf diese Gesetze stützen und können, unter gewissen Bedingungen, Designschutz unter dem Abkommen von Den Hague beanspruchen. Bei einem Treffen des Arbeitskommittees der ATypI sind vor kurzem Richtlinien für die Definition von neuheitlichen und originellen Schriftenentwürfen ausgearbeitet worden. Eine Reihe von Systemen sind entwickelt worden, die Schriftenentwürfe mit Hilfe elektronischer Verzerrungen der digitalen Informationen zu schützen suchen.

Abstracts—Japanese

ジョン・ドライフス　「タイプ・デザインの転換期」

タイプ・デザインの世界で，私が経験したふたつの転換期のひとつは，国際タイポグラフィク協会を創立し，創設者チャールズ・ピーノトが明らかに気づいた，フォート・コンポジションにかかわる危険と又その機会を利用することに見通した。そのふたつに，ハイ・テクノロジの発展で，タイプ・フエスを新しく，多種類に要求される。新しい種数では，電気タイプライター，オフィス設備に用する高性能のワード・プロセサー，こすり移すレターセットとビデオ等，それぞれ常にタイプ・フエースを必要に応じている。今，新しいタイプ・フェースの必要性は，プリントよりコンピュータ・プリント・アウトの方に当てている。又もコンピューター・エイド・テクノロジーによった新たな好機は，タイプ・デザイナーがエンジニアーを通する協同作業の誕生に双方の利益に存在する。

ハーマン・ザフ　「タイプデザインにおける未来傾向」
「レター・フオムの科学的なアプローチ」

ここで，タイプデザインの分野では約20年ほど大げさな技術革新があり，この変動で特にコンピューター化したデザイン作業に対して，私自身，考えの出し方に中分気取った。私はクラッシックなタイプ・デザイン作業を尊重し，手で切ったデザインを新しいテクノロジーで開発したデイジタル・タイプセットの作業方法とは変えられないと強力に信じている。同時に，この新しい科学工業技術でも今，手にある電子装置を使って又新らたにデザイン製作の必，解決方法をまだ要求している。

ドナルド・クヌーフ　「メタフォントから学び受ける」

この書類は，作者のメタフォント・システムで，アルファベット・デザインを図形した経験を論じる。1977年のフォト・タイプ・システムから始まり，それがつぎつぎと発展の段階が続き，ここで道造られた全く新たなシステムを1984年にと計画された。

Translated by Margaret Tsai

ここにとりつけたページに，“メタ・説明”のレター'A'は，サマー・ストンの協議・記号をデザインした，それぞれの形を家族にまとめてコンピューターで作図しこなす，説明材料になる。

ジャック・ストーファー 「誠実な不死鳥のトランシルバニア人」
「キスージャンソンのデイジタル時代」

ニコラス・キスは17世紀のハンガリー地帯のトランシルバニアに住んでいたタイポグラファー(植字工)でもあり，人文科学者でもあった。彼は読み書きに対する教育を一般公衆に広げたいという要求を目的し，文字のデザインと印刷製法に深く関わりに合った。彼の努力した成果は注目されているハンガリアン・バイブルに形式され，そのバイブルに彼自身の綴字論の標準を具体化したが,改正した教会会員には残念にもみとめられなかった。このバイブルを印刷する資金を提出するため，キスは他の鋳造所に向けた活字を種数多く切った。
アムステルダム(オランダの中部の港市)のアントン・ジャンソンの手による原作母型体組は実際にキスがバイブルを印刷する資金を高める必に買った活字だと信じられる。このタイプフエスを今知れているKis-Jansonといわれ，一般に基本例としてコピーをし又は新たに印刷製法に合わせて修正し使用されている。原作の活字を新しく改作された活字と比較し特定の書体に同一のものとみなしたがる性質は大衆に続けて人気のある作品となっている。

マシウ・カータ 「ロバート・グラオンが再性したガラード・タイプの現代化」

このガラード・タイプを再生に，とり切った人はロバート・グラオンです。グラオンはフランスのアーチスト(美術家)で，およそ1540年から1590年頃における彼の仕事である。結果は先方のガラード・タイプから新たに発生したグラオン・タイプを比較的に，以前の非現代な活字を歴史上に強力性のある，もっとも独特な文体に再生した。

スタン・ネルソン 「活字鋳型の作業・
マトリックス母体合せと手鋳造」

活字鋳造は文体面をきれいに・鋭く製作するのが唯一の目的で，この面を正確に密精な文体に整列する。きわめて重大な製作段階の三つは，まったく正確に合った手型を作り，活字鋳をうまく合せて，文体を手型で鋳造する。

アンドレー・ガタ／クリスチアン・メゲ
「基本的な調査方式とタイプ・デザインによる形の革新」
対照「タイプ製造による科学工業技術の発育」

CRTとレザー・タイプ・セティング値字単位の発展により，タイプ・イメージの創作技術は，この数年，急速に大変動な経験を受けている。このあまりにも早い変動でタイポ・グラフィに

置かれる全体の周囲にも影響があり，これほどぎっしり含まれたのには握りにくい。この技術大変動と平行に，タイプ・フェース創作に特有なデザイン工業が発育したが，ある一部分の革新したタイプ・デザインの本物が国際フォート・タイプの市場に創立している。現在種類の多いタイプ・フェースが続続と市場に溢れているのは有利なのか又は感性的なのか疑わしい。

エドワード・ゴシア　「タイプ・フェース・
デザインの保護に関係する今日の状能」

一般に，新しいタイプ・フェース・デザインを海賊的な行動・非倫的なコピーによる損害なく守れる条件を法律が大いに必要となった。ここでＵＳでも，デザインとトレード名の保護を要求しているが，芸術又は商業に当てた，コンピュータ利用の製作には，たいへん実用向きであっても，そのデザインを守る必の法律は，まだ未来に置けている。他国では，西ドイツは，新しい法律が中央政府で組み立ち，フランスはオリジナル・デザイン(元版)を，ビアナ・アグリーメント(協定条件)で保護されている。この事情により，アメリカ商社達はパリー・コンベンション(集合)の法律を利用する。又、ある事情ではヘーグ・コンベンションのデザイン保護に加わっている。国際状では，最近集合した国際タイポグラフィク連合労働委員会では「新しい物」と「本物」のタイプ・フェース・デザインに関する定義により，そのガイド・ラインを設定した。各現代設備では，これまで一群のシステムが発生され，そのデイジタル・インフォメーションを電子スクランブリング経由で保護されている。

Authors

John Dreyfus Book designer, typographical consultant and printing historian, born in London, 1918. Formerly typographical advisor to Cambridge University Press and to the Monotype Corporation, and European consultant to The Limited Editions Club of New York. Honorary President of ATypI after serving as President 1968–74. Chairman of the Printing Historical Society 1974–77. Author of many books and articles on various aspects and periods of printing history.

Hermann Zapf Freelance designer since 1938. Born in 1918 in Nuremberg, Germany. Worked as a type director at D. Stempel AG typefoundry, and as a design consultant to Merganthaler Linotype Company and Hallmark International. He has taught at the Werkkunstschule Offenback, the Carnegie Institute of Technology, the Technische Hochschule Darmstadt, and the Rochester Institute of Technology. He has also lectured and exhibited widely throughout the United States and Europe, and is an honorary member of numerous typographic clubs and societies. Published *William Morris,* 1948, *Pen and Graver,* 1950 and 1952, *Manuale Typographicum,* 1954 and 1968, *About Alphabets,* 1960, *Typographic Variations,* 1964, *Orbis Typographicus,* 1980. He has been featured in the film *The Art of Hermann Zapf* made by Hallmark Productions.

Donald Knuth Fletcher Jones Professor of Computer Science at Stanford University. He is the author of a planned seven-volume series, *The Art of Computer Programming,* which will summarize much of the existing knowledge about computational methods; three volumes have been published. In 1977 he began to study ways in which mathematics and typography can be mutually beneficial to each other. This work has led to the creation of the TeX and Metafont systems for computer-aided publishing. In 1977 Dr. Knuth received the National Medal of Science from President Carter.

Lida Lopes Cardozo Stone cutter. Born in Leiden, Holland, 1954. Studied Graphic Design at Royal Academy, The Hague, 1972. Ms. Cardozo joined ATypI in 1974, and came to England in 1976 as a pupil of David Kindersley. She became CTTEE member of Wynkyn de Worde Society in 1978. In 1981 she became a partner of David Kindersley. Published *Graphic Variations* (with Kindersley), 1979; *Letters Slate Cut* (with Kindersley), 1981; *Glass and Graver,* 1983. Produced *Chesterton Tower,* published by Chilford Hall Press, 1984. Examples of her lettering on stone, glass and other materials are to be found in UK, USA and Europe.

Jack Stauffacher Born in San Francisco, California. Teacher, printer and publisher at the Greenwood Press / Center for Typographic Language, San Francisco. Awarded a Fulbright grant (1955–58) to study in Florence, Italy. Assistant Professor of Typographic Design at the Carnegie Institute of Technology for five years. He published *Phaedrus* (A Search for the Typographical Form of Plato's *Phaedrus*) in 1978, which became internationally acclaimed. Mr. Stauffacher has had a long interest in the Kis-Janson types, and has published *Janson: A Definitive Collection* in 1954, and recently co-published *Nicholas Kis, A Hungarian Punch-Cutter and Printer, 1650–1702* by György Haiman in 1983 with Gilman D. Parsons, Books, San Francisco. Mr. Stauffacher attended the *Tricentenary of the printing of Nicholas Kis Tótfalusi's Amsterdam Bible* at Debrecen, Hungary, April 1985.

Matthew Carter Type designer. Trained as a punchcutter. In a long association with the Linotype companies he designed types that exploited the advantages (and tackled the problems) of photo and digital typesetting technologies. A co-founder of Bitstream Inc., a digital type foundry in Cambridge, MA, where he has specialized in the development of type fonts for use on low-resolution computer screens and printers. Chairman of ATypI's committee of type designers and typographers.

Henk Drost Punch-cutter, type-founder, engraver. Born in Haarlem, Holland, 1932. Employed by Joh. Enschedé en Zonen, Grafische Inrichting B.V., Haarlem, since 1947. Started as apprentice punch-cutter to Paul Helmuth Rädisch. Passed the examination for punch-cutter and engraver in 1954. Members of the examination board included Jan van Krimpen (type designer, book designer and artistic adviser to the Enschedé firm) and Sem Hartz (plate engraver, type designer, designer of bank notes, stamps and books, art director of Enschedé, now retired). Mr. Drost has since contributed to the realization of various typefaces, such as Romanée and Molé. As the Enschedé foundry dwindled during the last ten years, he has had to master all other foundry activities as well. These range from type casting (including Monotype) and the production of brass rules to the engraving of lettering for buildings. At present he is training two pupils.

Stan Nelson Born in Nebraska, 1948, and grew up in Sioux City, Iowa. Graduated from Morningside College in Sioux City with a B.A., 1970. Majored in art and taught applied art at the secondary school level for two years. Mr. Nelson moved to the Smithsonian in 1972 and is currently a Museum Specialist in the Division of Graphic Arts of the National Museum of American History. The sub-specialty of printing history he has pursued is that of the history of printing type manufacture. As a result of this interest, he has been lecturing about and demonstrating early type founding techniques. He has spoken at Columbia University and meetings of the American Typecasting Fellowship (charter member).

André Gürtler Born in Switzerland in 1936. After completing his education in typographic design, he worked in the Letter Design Department of the Monotype Corporation, England and then at Deberny & Peignot, Paris. He then joined Adrian Frutiger's studio and gave courses

in letterforms at the Académie Populaire des Arts Plastiques in Paris. Since 1965, he has been a lecturer and instructor in the history of letterforms and the design of type and letterforms at the School of Design, Basel. He has also served as visiting lecturer at Yale University, and at Universidad Autónoma Metropolitana in Mexico City. He is partner in the Team '77, which deals with the entire field of letterforms. Mr. Gürtler has contributed many articles to *Typographische Monatsblätter,* including 'Contributions to Education in Letterforms', and serves as a member of the editorial team of *Typographische Monatsblätter.*

Christian Mengelt Born in Switzerland in 1938, studied graphic design for five years under Armin Hofmann and Emil Ruder at the School of Design, Basel. Since 1964 he has had his own graphic design studio and he has cooperated with different design and advertising agencies, such as GGK in Basel, Switzerland, and Mendell & Oberer in Munich, Germany. Since 1972 he has been teaching graphic design and particularly the design of letterforms at the School of Design, Basel. As a partner in the Team '77, Switzerland he deals with the entire field of typographic and letterform design. He has served as a lecturer at several seminars in Europe and the USA in conjunction with the Association of Swiss Graphic Designers and the ATypI Committee for Education and Research in Letterforms.

Edward Gottschall Editor and art director. Born in New York City, 1915. Received his B.S. from College City of New York in 1937 and his M.S. from Columbia University in 1938. He has worked as an editor and art director for numerous publications and is currently the Executive Vice President of International Typeface Corporation. He has also lectured at the Pratt Institute Evening Art School and New York University. He published *Commercial Art as a Business,* 3rd edition (with F.C. Rodewald), 1972, and has served as editor for *Advertising Directions,* Vols. 1–4, 1960–1964, *Typographic i,* 1969–1979, *Graphics Arts Manual,* 1980. He is also the author of *Vision 80's,* 1980, and *Graphic Communication 80's,* 1981.

Colophon

This special issue of Visible Language was edited, designed and produced by members of the Digital Typography Group and the TeX Project at Stanford University, with production assistance and management by the Bigelow & Holmes studio, San Francisco.

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David Siegel

Design Adviser: Charles Bigelow

Production Manager: Kris Holmes

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To display variety and creativity in digital type design, the text of each article was composed in a different typeface, on digital typesetting equipment. Some of the faces were newly designed for digital composition; some were adapted to digital from photocomposition; and others were adapted from hot-metal composition. As a link to the metal tradition, the captions of the Punchcutting Demonstration were appropriately composed by Monotype casting.

Below, for each article, is the name of the typeface, the type designer, (historical models, if any), the originating firm and date of first release, the model of composing equipment, and the typesetting firm or institution.

A Turning Point in Type Design	*Photina,* by José Mendoza; Monotype Corporation, Ltd., 1972. Composition on Monophoto Lasercomp, by Alden Press, Oxford, England.
Future Tendencies in Type Design	*Aurelia,* by Hermann Zapf; Dr.-Ing. Rudolf Hell GmbH, 1985. Composition on Digiset, courtesy of Dr.-Ing. Rudolf Hell, Kiel, West Germany.
Lessons Learned from Metafont	*Almost Computer Modern,* by Donald Knuth, (interpretation of Monotype Modern No. 8A); TeX Project, Stanford University, 1982. Composition on Autologic APS micro-5, courtesy of the TeX Project, Stanford University.
Stone Cuttings from David Kindersley's Workshop	*Méridien,* by Adrian Frutiger; Deberny & Peignot, 1957. Composition on Linotype Linotron 202, by Frank's Type, Mountain View, California.

The Transylvanian Phoenix	*Kis-Janson,* by Fred Brady & Joy Redick, (revival of types by Miklós Kis, c. 1681); Autologic, Inc., 1984. Composition on Autologic APS micro-5, courtesy of the TeX Project, Stanford University.
Galliard: A Modern Revival	*Galliard,* by Matthew Carter, (revival of types by Robert Granjon c. 1570); Linotype, 1978. Composition on Autologic APS micro-5, courtesy of the TeX Project, Stanford University.
Punchcutting Demonstration	*Spectrum,* by Jan van Krimpen; Enschedé, Monotype Corporation, 1955. Composition on Monotype, by Mackenzie & Harris, San Francisco, California.
Mould Making	*Caslon,* by Kris Holmes, (revival of types by William Caslon, c. 1734); Dr.-Ing. Rudolf Hell GmbH, 1985. Composition on Digiset, courtesy of Dr.-Ing. Rudolf Hell, Kiel, Germany.
Fundamental Research Methods and Form Innovation in Type Design	*Media,* by André Gürtler, Christian Mengelt, & Erich Gschwind; Bobst Graphic, 1976. Composition on Autologic APS micro-5, courtesy of the TeX Project, Stanford University.
The State of the Art in Typeface Design Protection	*Zapf International,* by Hermann Zapf; ITC 1977. Composition on Linotype Linotron 202, by Frank's Type, Mountain View, California.
	Composition of the Japanese abstracts is courtesy of Morisawa & Co., Ltd., Osaka, Japan.
	All other text composed in: *Syntax,* by Hans Eduard Meier; D. Stempel AG, 1968. Composition on Linotype Linotron 202, by Frank's Type, Mountain View, California.
	Printed by McNaughton & Gunn, Inc., Ann Arbor, Michigan. Text pages lithographed on Cream White Mohawk Satin Text 60 lb. with Cream White Mohawk Vellum Cover, 65 lb.