Peter Karow, Hamburg

Digital Typography and Artificial Intelligence

When did typefaces become digital?

The target in 1972 : Automation of Photo Typesetting





Our desktop in 1974



Our "PC" in 1980



First Ikarus brochure, Warsaw 1975



Digital Typefaces 2. Variations 3. Interpolation 4. Rasterizing 5. Hinting 6. Autotracing 7. Grayscaling 8. Element separation

Subjects of digitizing



Results

Bitmap (left) Run length (middle) Vector (right)

PostScript (left) Elements (middle) Metafont (right)



end

Digital Typefaces 1. Formats 3. Interpolation 4. Rasterizing 5. Hinting 6. Autotracing 7. Grayscaling 8. Element separation

Range of Variations 1. Continuous Enlarging 2. Contouring 3. Italizing (not Slanting) 4. Expanding/Condensing 5. Rounding 6. Shadowing 7. Antiquing

In 1973, the first variations of typefaces were calculated as such:

> contouring and shadowing

Inline

Outline

Relief

mburgefont

It was the birth of digital typefaces.

Drop Shadow



Contouring



Relief purseio Drop Shadow doursetc Round nburgefon

"Ice Age" with variations

The font

Digital Typefaces 1. Formats 2. Variations 3. Interpolation 4. Rasterizing 5. Hinting 6. Autotracing 7. Grayscaling 8. Element separation

Interpolation of hybrids

America America America America America America

Digital Typefaces 1. Formats 2. Variations 3. Interpolation 4. Rasterizing 5. Hinting 6. Autotracing 7. Grayscaling 8. Element separation

Typical accidents from rasterizing (left)





arbitrary stem positions in double fine Target Grid stem positions are rounded exactly on Target Grid lines



blunt peaks can occur



sharp peak due to special peak positioning







curve extremes are rounded exactly on Target Grid lines as stem lines

Various resolutions



Digital Typefaces 1. Formats 2. Variations 3. Interpolation 4. Rasterizing 6. Autotracing 7. Grayscaling

8. Element separation

Basic hints in 1985

stems ٠



bar ٠

bow

٠



arch .



(half-) serifs .



extrema



inclination .

peaks

.







17 hints after the first refinements in 1987

Icon	Instruction	Meaning
I.	stem	Keeps stroke width of stems, defined by two straight vertical borders, consistent
-	bar	Keeps width of bars, defined by straight horizontal borders, consistent
C	bow	Keeps width of bow, defined by two round vertical borders, consistent
	arch	Keeps width of arches, defined by two horizontal borders, consistent
C	curve stem	Keeps width of vertical stems, defined by one straight and one curved border, consistent
n	curve bar	Keeps width of horizontal strokes having one straight and one curved border, consistent
	counter	Keeps width of white spaces (counters) consistent
	weight	Maintains canonic consistency of related stroke widths
1	slant	Keeps width of diagonal strokes consistent (diagonals)
\bigcirc	extreme	For placement of curve point lying on extremes (deepest, highest, furtherst left or right control points)
Ш.	serif	Controls horizontally drawn serifs and part serifs
7	bar serif	Controls vertically drawn serifs and part serifs
Ø	overhang	Use baselines to control arch overhangs
X	tension	Straightens shallow curves at small point sizes (Optima switch symbol)
۲	spot	Adjusts stroke width for white or black writing engines
\bigtriangleup	delta	Special instructions in TrueType to correct the resulting bitmaps at a certain point size
0	dropout	Maintains a minimum width for strokes

Digital Typefaces 1. Formats 2. Variations 3. Interpolation 4. Rasterizing 5. Hinting 7. Gray scaling 8. Element separation

Autotracing has to recognize at least the following elements:



Digital Typefaces

1. Formats 2. Variations 3. Interpolation 4. Rasterizing 5. Hinting 6. Autotracing 8. Element separation

Comparison of various point sizes

bitmapped

grayscaled

Computer-aided mathematical conversion of letter forms will swaitly 8 pt bring about a creative process permitting the generation of more and more new and attractive solutions using both letters and single word images.

Computer-aided mathematical conversion of letter forms 10 pt will swiftly bring about a creative process permitting the generation of more and more new and attractive

Computer-aided mathematical conversion of 12 pt letter forms will swiftly bring about a creative process permitting the generation of more and

- ^{16 pt} Computer-aided mathematical conversion of letter forms will swiftly
- ^{18 pt} Computer-aided mathematical conversion of letter forms will
- ^{24 pt} Computer-aided mathematical conversion of
- ^{36 #} Computer-aided mathematical

8 pt Computer-aided mathematical conversion of letter forms will swiftly bring about a creative process permitting the generation of more and more new and attractive solutions using both letters and single word images.

Computer-aided mathematical conversion of letter forms

10 pt will swiftly bring about a creative process permitting the generation of more and more new and attractive

Computer-aided mathematical conversion of

12 pt letter forms will swiftly bring about a creative process permitting the generation of more and

... Computer-aided mathematical con-

- 16 pt version of letter forms will swiftly
- ^{18 pt} Computer-aided mathematical conversion of letter forms will
- ^{24 pt} Computer-aided mathematical conversion of
- ³⁶[™] Computer-aided mathematical

Comparison of script typefaces

bitmapped

grayscaled

Des Theres System war der Stefang für eine neue Dimension in der Miedergabe von Schriftzeichen. Es wird weiterhin sei neue Stewendungsgebiete ärthetisch ein warafreie Schriftzeichen verlangt werden. Ein auf einem Chip gespeichertes Afrika bet von hoher digitaler Genauigheit und Formgualität wird uns dann helfen, viele der jetwigen, oftmals recht primitiven Schriftzeichen auf unseren Sichtzeräten

Das JfarusSyltem war der Anfany für eine neue Dimenflon in der Wiederyabe von Schrift zeichen. Es wird weiterhin feinen Linfluß geltend machen, wenn für neue Anwendungfgebiete äfthe tisch einwandstreie Schriftzeichen verlangt werden. Ein auf einem Chip gespeichertes Alphabet von hoher digitaler Gennigkeit und formqualität wird uns dann helfen, viele der jetzigen, oftmals recht primitiven Schriftzeichen auf unferen Sicht geräten und auf Computeraußrucken in schöne Schriftzeichen zu verwandeln, in Alphabete, wie wir sie feit Jahrhunderten durch die hohe Cuo lität der Gutenbergischen Druckfunft gewohnt find.

Hornowzeff

Das Skarus-System war der Anfang für eine neue Dimension in der Wiedergabe von Schriftzeichen. Es wird weiterhin sei nen Einfluß geltend machen, wenn für neue Anwendungsgebiete ästhetisch einwandfreie Schriftzeichen verlangt werden. Ein auf einem Chip gespeichertes Alphabet von hoher digitaler Genauigkeit und Formqualität wird uns dann helfen, viele der jetzigen, oftmals recht primitiven Schriftzeichen auf unseren Sichtgeräten

Das Farus System war der Unfang für eine neue Dimension in der Wiedergabe von Schriftgeichen. Es wird weiterbin seinen Einfluß geltend machen, wenn für neue Unwendungsgebiete äfthetisch einwandsfreie Schriftzeichen verlangt werden. Ein auf einem Chip gespeichertes Ulphabet von bober digitaler Genauigfeit und Sormqualität wird uns dann belfen, viele der jetzigen, oftmals recht primitiven Schriftzeichen auf unseren Bichtgeräten und auf Computerausdrucken in schöne Schriftzeichen zu verwandeln, in Ulphabete, wie wir sie feit Jahrbunderten durch die hobe Qualität der Gutenbergischen Druckfunst gewohnt find.

Horman Zapf-

Digital Typefaces

1. Formats 2. Variations 3. Interpolation 4. Rasterizing 5. Hinting 6. Autotracing 7. Grayscaling 8. Element separation Element separation on 3 levels:

 \rightarrow elements

 $\rightarrow \rightarrow$ strokes

 $\rightarrow \rightarrow \rightarrow$ parts



Advantageous reasons for using element separation:

1. Saves money

2. Avoids arbitrary effects of handwriting

	# being different	# being real different (4% deviation)	
Kanji	7000 (x.3)	7 000	
Elements	21 000 (x 3.3)	17 000 (80%)	
Strokes	70 000 (x 3)	14 600 (23%)	
Parts	210 000 ▲ Showing 4% deviation due to handwork (h) and digitisation (d)	6 600 (5%) ▲ Regularized to keep out effects of h & d	
Needed memory	Image 6.3 MByte Instructions 2.0 MByte Administration 0.14 MByte Total ~ 8.5 MByte	Image 0.26 MByte Instructions 0.13 MByte Administration 1.126 MByte Total ~ 1.5 MByte	

Digital Typefaces is understood. But, what means...

digital text?

Digital Text 1. Context based character choice 2. Kerning **3. Optical Scaling** 4. Paragraph composition (hz-program) 5. Chapter composition 6. Digital ads

hz-program



hz-program

Digital Text

1. Context based character choice 3. Optical Scaling 4. Paragraph composition (hz-program) 5. Chapter composition 6. Digital ads

Theoretical aspects of kerning





Kerning of various point sizes

	without	with
6 pt	Television	Television
12 pt	Television	Television
36 pt	Television	Television
72 pt	Television	Television
	₩âÿôuŧ	Wayout

Kerning can also be used for overlapping and blending

überdecken verschmelzen overlapping blending

Digital Text

1. Context based character choice 2. Kerning **3.** Optical Scaling 4. Paragraph composition (hz-program) 5. Chapter composition 6. Digital ads

Optical scaling of text fonts has these characteristics:

An enlargement of the point size by a factor of 2 reduces stem widths and spaces by approximately 7%.

These characteristics are reversed for bold faces. ^{48 p} | Hamburgefons Hamburgefons 40 p Hamburgefons 32 pHamburgefons 28 p Hamburgefons 24 p Hamburgefons 20 p Hamburgefons 16 p Hamburgefons 12 p Hamburgefons 10 p Hamburgefons 9 p Hamburgefons 8 p Hamburgefons

Digital Text

1. Context based character choice 2. Kerning **3. Optical Scaling** 4. Paragraph composition 5. Chapter composition 6. Digital ads

Paragraph composition with the hz-program

His Secret

Hyphenation turned off.

To the left the hz-program: 38 lines. last lines of paragraphs ok.

To the right today's software: 40 lines, short last lines. larger spaces.

What makes the Gutenberg Bible the unattainable masterpiece of the the unattainable masterpiece of the art of printing? The printing on his art of printing? The printing on his handpress? Can't be really, because of handpress? Can't be really, because of today's standards, the inking was not of today's standards, the inking was not extraordinary quality. We could order of extraordinary quality. We could hand made rag paper also in our day. order hand made rag paper also in our Maybe the secret of his beautiful pages day. Maybe the secret of his beautiful is in the proportions of the columns on pages is in the proportions of the the paper. But this we are also able to columns on the paper. But this we copy. Therefore only the composition are also able to copy. Therefore only is to be considered closely.

How could Gutenberg get those closely. even gray areas of columns without disturbing or unsightly holes between words? His secret: the master achieved this perfection by applying several characters of different width combined this perfection by applying several with many ligatures and abbreviations out of his type case. He finally created combined with many ligatures and 290 characters for the composition of abbreviations out of his type case. the 42-line Bible. An enormous time He finally created 290 characters for consuming job to realize his idea of the composition of the 42-line Bible. good typographic lines: the justified An enormous time consuming job to lines of even length, compared to the realize his idea of good typographic flush-left lines of the works of the lines: the justified lines of even length, famous mediaeval scribes.

unusual ligatures and abbreviations, scribes. today we can't apply this old principle for contemporary composition. Now unusual ligatures and abbreviations, we can get help through the versatility of modern electronic software and for contemporary composition. Now formats like the Multiple Masters to we can get help through the versatility receive a perfect type setting in our of modern electronic software and production, to achieve Gutenberg's formats like the Multiple Masters to standards of quality: The hz-program, receive a perfect type setting in our named after Hermann Zapf.

What makes the Gutenberg Bible the composition is to be considered

How could Gutenberg get those even grav areas of columns without disturbing or unsightly holes between words? His secret: the master achieved characters of different width compared to the flush-left lines of But with Johannes Gutenberg's the works of the famous mediaeval

> But with Johannes Gutenberg's today we can't apply this old principle production, to achieve Gutenberg's standards of quality: The hz-program, named after Hermann Zapf.

 \leftarrow too short

 \leftarrow a creek

 \leftarrow too short

*hz-*program for magazine work

In 1996 the *hz-*program was implemented by Adobe for their program InDesign.

Hermann Zapf 1986:

Magazine Composition

left two columns:

hz-program (most left) compared with today's software,

narrow columns, hyphenation **on**.

right two columns:

hz-program compared with today's software (most right),

narrow columns, hyphenation off which is unusual and used as a test.

Writing is the visual Writing is the visual reproduction of the reproduction of the spoken word, its pri- spoken word, its mary objective being primary objective to convey a text to being to convey a the reader without text to the reader difficulties, or dis- without difficulties, traction, and with- or distraction, and out disturbing the without disturbing flow of reading with the flow of reading unnecessary embel- with unnecessary lishments. The letters embellishments. have no self-fulfilling The letters have no purpose, neither are self-fulfilling purthey a medium for pose, neither are self-presentation of a they a medium for designer. Everything self-presentation of which makes reading a designer. Everydifficult or time-con- thing which makes suming, or is detri- reading difficult or mental because of its timeconsuming, or unsual form, has to is detrimental bebe avoided. cause of its unsual The new technical form, has to be apossibilities of type voided.

composition - with The new technical all its limitations - possibilities of type also determined the composition - with form of the letters. all its limitations -The infinite possi- also determined the bilities provided by form of the letters. today's electronics The infinite possibiare used for example lities provided by to develop types of today's electronics our time, without are used for example historical hangovers. to develop types of Ideally, the hz-pro- our time, without gram comprises (1) historical hangkerning on the fly, overs. Ideally, the (2) optical spacing, hz-program com-(3) expanding and prises (1) kerning condensing plus opti- on the fly, (2) optical cal scaling from Mul- spacing, (3) expandtiple Master fonts ing and condensing and (4) justification plus optical scaling per paragraph. It is from Multiple Masthe non-plus-ultra in ter fonts and (4) justypography. tification per paragraph. It is the nonplus-ultra in typography.

hz; 10 hyphens, Today's software: 3 lines less 12 hyphens, 3 more lines, bad in line 11 and 12 Writing is the visual Writing is the visual reproduction of the reproduction of the spoken word, its spoken word, its primary objective primary objective being to convey a being to convey a text to the reader text to the reader without difficulties, without difficulties, or distraction, and or distraction, and without disturbing without disturbing the flow of reading the flow of reading with unnecessary with unnecessary embellishments. The embellishments. letters have no self- The letters have no fulfilling purpose, self-fulfilling neither are they a purpose, neither are medium for self- they a medium for presentation of a self-presentation of designer. Everything a designer. which makes reading Everything which difficult or time- makes reading consuming, or is difficult or timedetrimental because consuming, or is of its unsual detrimental because form, has to be of its unsual form, has to be avoided. avoided. The new technical The new technical possibilities of type possibilities of type composition - with composition - with all its limitations all its limitations -- also determined also determined the the form of the form of the letters. letters. The infinite The infinite possibilities provided possibilities by today's electronics provided by today's are used for example electronics are used to develop types for example to of our time, develop types of our without historical time, without hangovers. Ideally, h i s t o r i c a l the hz-program hangovers. Ideally, comprises (1) kerning the hz-program on the fly, (2) comprises (1)optical spacing, kerning on the fly, (3) expanding and (2) optical spacing, condensing plus (3) expanding and optical scaling from condensing plus Multiple Master fonts optical scaling from and (4) justification Multiple Master per paragraph. It is fonts and (4)the non-plus-ultra justification per in typography. paragraph. It is the non-plus-ultra in

> Today's software: spaced out words are worst typography, line 14 has a ligature!

typography.

Digital Text

1. Context based character choice 2. Kerning 3. Optical Scaling 4. Paragraph composition (hz-program) 5. Chapter composition 6. Digital ads

2 pages:

before Paragraph hyphenation

First part of paragraph

For over 2,000 years the tools of thought have changed little in essence; basically it has been ink, paper, and the means of applying one to the other. But the computer will surely give intellectual activity a new shape. The question is, what shape will emerge? And what form for the printed word? There are now more than five million computers in the United States, and for some time the amount of computing power has been doubling every two years. The average computer user now has access to information that would fill the Library of Congress and can control as much computing power as a large university computing center. Will this reduce the need for books, or make it unnecessary to print and distribute books in the ways of the past? There are laser printing units using xerography that can print a complete book from the digitised type page stored in disk memory banks. Such a custom book printer can churn out pages, verso and recto, at the rate of a leaf every second. A complete book of 124 pages would be ready for binding in sixtytwo seconds. It takes little imagination to envision a bookstore of a decade hence filled with 'sample' volumes only. One would need only to pick a title and the book would be printed and bound on the spot. Such a bookstore could readily keep on hand three or four times the number of titles now stocked

at a fraction of present costs, since there would be no shipping charges, no overstock or understock problems, and no returns. Recently the Library of Congress has been working

with publishers on a pilot project to test the use of optical discs for the storage and dissemination of journals and periodicals. The material would be copied onto twelve-inch discs that can hold up to 20,000 pages on a side. A reading machine would enable the user to read the material on the disc and give a command to the machine to print out the material on a connected high-speed printer.

What does this technology have to do with books as we know them? There are many predictions abroad today the shape of things to come in a computer age that is just emerging in the first

flush of a new day. Books are only one means of disseminating information and cogitative writing in the midst of an increasing plethora of electronic options. Even the Congress of the United States seeks guidance. A recent Congressional resolution has asked for a study to explore the influence of the computer and video technologies on books, reading, and the printed word. An advisory committee, meeting at the Library of Congress, was told by Sen. Charles Mathias, Jr, to «set no limits to your vision for perhaps the future of the book is not as solid as it might appear». The committee is exploring four specific questions: What difference does it make that the forms and functions of books are changing? How do technology and literacy affect each other? Who is responsible for stimulating reading and the reading habit? How is publishing facing the challenges of new technologies?

Location for hyphenation

The results of this study will be issued in, have you guessed it, a BOOK, entitled «The Book in the Future», to be presented by Librarian of Congress Daniel J. Boorstin to the Congress no later than December 1, 1984. Perhaps that is when we shall all learn what the outlook will be for this seemingly endangered species, or at least the official outlook.

Meanwhile, we who are gathered here today have the greatest vested interest in the book of the future as well as of the past: scholars, students, librarians, booksellers, publishers, and printers.

Henry Stevens of Vermont, the nineteenth-century bookseller, once said, «Books are both our luxuries and our daily bread. They have become to our lives and happiness prime necessities.» I have pondered this saying often – «Books are both our luxuries and our daily bread». It has become a kind of motto, one that I believe is most apt for a printer... Books embody all the humanising arts that make thought tangible and give form to ideas, so that mind can touch mind over vast distances and through the ages of time itself.

Roderick Stinehour, April 1984, proceedings of the American Antiquarian Society, Vol. 94, Part I.

Second part of

paragraph

2 pages:

after Paragraph hyphenation

First part of paragraph

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Roderick Stinehour, April 1984, proceedings of the American Antiquarian Society, Vol. 94, Part I. Second part of paragraph

Hyphenation at a punctuation sign

Paragraph-fit

	When writi of words wi
Widow paragraph	dark, conse earlier time
(last line too long)	length, an a Gutenberg o and spaces,
	plication. A
	a typeset lin
	time by allo
	or more cha
	piece of typ
	for example
	number for
Widow paragraph	using lower
(last line too long)	available to
	Gutenberg
Orphan paragraph	acters were
(last line too short)	42-line Bibl
	Naving rev
a second second	can clearly
	likely he we
Same and	ligatures, o
	«fit» to the
	a spacing p
A State of the second	for replacin
	in keeping
	ine was to
1000	his 42-line
Orphan paragraph	art It is avi

Ideal

shape

paragraph

(last line too short)

500 years ago, Johannes Gutenberg entered into direct competition with renowned scribes. His goal was to set his type as the scribes wrote.

ing by hand, it is practical to vary the width ithout the writing appearing too light or too quently disturbing a reader's eye. In much es, handwritten lines were rarely of equal art which began with the type of Gutenberg. employed intelligent methods to adjust lines such as the cutting of several purches for ths of characters, depending upon their aplarge variety of ligatures and abbreviations epared to fill space according to demands of ne. These same ligatures saved considerable owing compositors the luxury of setting two racters plus the following space with a single e. In examining his alphabet below we see, , two choices for lower case a, and the same lower case b, not to mention eight ligatures. case b. A large number of abbreviations are save even greater space than do ligatures. had cast four abbreviations, looking like difted b characters. A total of 290 unique charrequired in an alphabet to typeset the entire

viewed the font available to Gutenberg, we imagine how he must have worked. Most ould have set a line of type without use of or abbreviations. If there was a reasonable line, he moved on to the next. If, however, roblem arose, he would scan the possibilities ig, say, abbreviations to increase readability with reading habits of that time. When a o long, he could consider also ligatures or characters. Figure 4 illustrates a portion of Bible, a representative sample of his printing ident that his lines were left with «no remainart. It is e ders».

500 years ago, Johannes Gutenberg entered into direct competition with renowned scribes. His goal was to set his type as the scribes wrote.

When writing by hand, it is practical to vary the width of words without the writing appearing too light or too dark, consequently disturbing a reader's eye. In much earlier times, handwritten lines were rarely of equal length, an art which began with the type of Gutenberg.

Gutenberg employed intelligent methods to adjust lines and spaces, such as the cutting of several punches for varying widths of characters, depending upon their application. A large variety of ligatures and abbreviations were also prepared to fill space according to demands of a typeset line. These same ligatures saved considerable time by allowing compositors the luxury of setting two or more characters plus the following space with a single piece of type. In examining his alphabet below we see, for example, two choices for lower case a, and the same number for lower case b, not to mention eight ligatures using lower case b. A large number of abbreviations are available to save even greater space than do ligatures.

Gutenberg had cast four abbreviations, looking like different accented b characters. A total of 290 unique characters were required in an alphabet to typeset the entire 42-line Bible.

Having reviewed the font available to Gutenberg, we can more clearly imagine how he must have worked. Most likely he would have set a line of type without use of ligatures, or abbreviations. If there was a reasonable «fit» to the line, he moved on to the next. If, however, a spacing problem arose, he would scan the possibilities for replacing, say, abbreviations to increase readability in keeping with reading habits of that time. When a line was too long, he could consider also ligatures or condensed characters. Figure 4 illustrates a portion of his 42-line Bible, a representative sample of his printing art. It is evident that his lines were left with «no remainders».

for last lines

Typesetting without 'paragraph-fit'

Area of 'good' lengths Typesetting with 'paragraph-fit'

Text before chapter-fit

annes Gutenberg

500 years ago, Johannes Gutenberg entered into direct competition widow paragraph with renowned scribes. His goal was to typeset as the scribes wrote. When writing by hand, it is practical to vary the width of words without the writing appearing too light or too dark, consequently disturbing a reader's eye. In earlier times, handwritten lines were rarely of equal length, a new art which began with the type of Gutenberg. orphan paragraph

Gutenberg employed new and intelligent methods to adjust lines and spaces, such as the cutting of several punches for varying widths of characters, depending upon their sensible application. A large variety of ligatures and abbreviations were also prepared to fill space according to the demands of a typeset line.

These same ligatures saved considerable time by allowing composito the luxury of setting two or more characters plus the following space with a single piece of type. In examining his alphabet we see two choices for lower case a, and the same number for lower case b, not to mention eight ligatures using lower case b. A large number of abbreviations are available to save even greater space than do ligatures. widow paragraph Gutenberg had cast four abbreviations, looking like different accented b characters. A total of 290 unique characters were required in a single alphabet to typeset the entire 42-line Bible.

Having reviewed the font available to Gutenberg, we can more clearly imagine how he must have worked. First, he would have set a line of type without use of ligatures, special widths or abbreviations. If there was a «fit» to the line, he could move on to the next. If, however, a spacing problem arose, he scanned the possibilities for replacing, say, abbreviations to increase readability in keeping with reading habits of that time. When a line was too long, he took also ligatures or condensed characters. His lines were left with «no remainders». Of course it is not possible today to use the variables available during Gutenberg's time. Would ligatures be practical as devices to adjust spacing in text? Experiments have been carried out. In 1991, Hermani

Zapf designed ligatures for the typeface Zapf Antiqua. widow paragra It has been concluded that new ligatures for character pairs like ba, be da, de etc. tend to disturb legibility today, and moreover, word rocessing programs could not elegantly handle them.

After Gutenberg

Developments mechanized printing even more with the manufacture of hot metal type. Typesetting became, so to speak, less material to a large degree with the introduction of photo typesetting techniques in recent years, and further abstracted today, with electronic typesetting developed by Rudolf Hell with his Digiset 1965 and desktop creek publishing, invented by Adobe, Aldus and Apple, the 3 A's. Italic font typesetting was a continual problem with hot metal type. As a rule, you lived with whatever spacing came about through normal character spacing unless a luxurious budget would allow special hand setting or the use of special matrices. Hot metal type presented no basic problem in correct design o

various bodysizes, since separate «punches» had to be cut for every different size anyway. This was, and is still, called «optical Scaling». Smaller size type was tighter and more detailed than smaller sizes. widow paragra Photo typesetting provided a linear scaling for small to large size characters. This step backward was given rise largely to commercial considerations; marketing coupled with user ignorance made optical scaling's demise a short event. A positive characteristic of photo typesetting was a freedom from restrictions on spacing and kerning. widow paragra Digital typesetting evolved from photo typesetting. Cathode ray tubes were used initially, then highly focused laser beams traced text forms onto film or paper. Essentially, with few exceptions, former creek restrictions concerning character fitting in em boxes, numbers of glyphs in a font, as well as kerning problems became meaningless. widow paragra Prices of equipment dropped significantly due to the fact that various manufacturers contributed their «piece of the puzzle» to the overall systems. Equipment used today is comprised of products from many uppliers, i.e. PCs, laser printers, typesetters, PostScript, applications

meaning that he is not disturbed during reading. The well-known rules of good typography can and will be kept as they are delivered by hannes Gutenberg.

widow page

with existing software show 19 deficiencies of typesetting.

Page 5

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software, fonts, scanners, and other operating software. widow Remaining from Gutenberg's day, a tool is missing permitting bad hyphenation utomatically justified column setting of text in the even gray value *à a Gutenberg», eliminating those annoying «rivers» and «creeks» o white across a printed page.

We should be aware of that computer publishing did nothing else than copying analogue photo typesetting so far, and that photo typesetting was copying hot metal printing in essence before. In all its consequences unfortunately copying was too slavishly.	creek
After Gutenberg, hot metal printing as it existed in the first half of this century, was driven by accelerating the conversion of news into printed information which could be distributed broadly. Hot metal printing had to get quicker, but also could escape from Gutenbergs standards easily. We as daily consumers were not punishing the publishing companies, we were happy to get the news fast and enable.	creek orphan paragraph
Then photo typesetting replaced hot metal printing. It did the typesetting conveniently, could even let touch and overlap characters, and after a short period typeshops were growing and offered job	
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they installed the historical constraints involuntarily. All these kinds of copying and stepping into the boots of the predeccors reminds to the beginning of the automobil industry. The first mobiles they did were coaches! The thought was to replace the horses. Well done, but narrow minded. Later, people saw that they were able to do mobiles independently from former models.

The Aims

We can program a progress and keep the rules. Basically, we know how far we can go by our typographical training.

We have in our hands the fine tuning for fonts which was achieved with Multiple Masters by Adobe Systems Inc., but also have in hands

the fine tuning of other ingredients such as pointsize, column width, leading, spacing, kerning, and hyphenation. We have an enormous computing power available. We can calculate

the size of books, pages, and paragraphs in advance and make decisions on the results, e.g. whether to shorten or to lengthen them in order to achieve more reading comfort. Nobody could do this before. We can apply millions of variations which only computers can do because it is not costing our sweat and time. Recently, somebody expressed it: they eat only electricity, but no spaghettis. Inexpensive computers will do a lot of virtual trials of typesetting and

can let us choose from the best and most convenient solution for a given text to form pages and chapters. Since and before Gutenberg typographers, printers and designers were

always concerned with the answer to following questions: What helps the flow of reading? What is the best way to layout a text for the

reader? The answer seems to be simple: · write with no hyphens,

· layout justified text,

· start each page with a paragraph,

• start a chapter recto, and

• end it verso.

We can apply many subtle changes which the reader can't recognize (club line) 5 pages produced

Page 3

Page 2

widow

Text after chapter-fit

Johannes Gutenberg

500 years ago, Johannes Gutenberg entered into direct competition with renowned scribes. His goal was to typeset as the scribes wrote. When writing by hand, it is practical to vary the wridth of words without the writing appearing too light or too dark, consequently disturbing a reader's eye. In earlier times, handwritten lines were rarely of equal length, a new at which began with the type of Gutenberg. Gutenberg employed new and intelligent methods to adjust lines and spaces, such as the cutting of several punches for varying widths of characters, depending upon their sensible application. A large variety of ligatures and abbreviations were also prepared to fill space according to the demands of a typeset line.

These same ligatures saved considerable time by allowing compositors the laxury of setting two or more characters plus the following space with a single piece of type. In examining his alphabet we set two choices for lower case a, and the same number for lower case b, not to mention right ligatures using lower case b. A large number of abbreviations are available to save even grater space than do ligatures.

Gutenberg had cast four abbreviations, looking like different accented b characters. A total of 290 unique characters were required in a single alphabet to typeset the entire 42-line Bible. Having reviewed the font available to Gutenberg, we can more clearly

The provided and the standard of the standard

Page 1

Remaining from Gutenberg's day, a tool is missing permitting automatically justified column setting of text in the even gray value a la Gutenbergs, eliminating those annoying «rivers» and «creeks» of white across a printed page.

Historical Paradigms

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This new technology allowed a linear scaling based only on one font for all the many possible pointsizes and played this out as its dominant feature compared with hot metal; where one had to cut new yunches for new pointsizes anyway which was a costly and time-consuming procedure. Optical scaling vanished before most of us got aware of it and had a chance of sharing its reading comfort.

With desktop publishing, computers played the role of the typesetters, At first, this new technology had to gain ground, so it did copy the pholo typesetting, therefore it applied its linear scaling. No typographic innovations took place during these first years of desktop publishing; All contributing people had enough to do with converting the existing work places, tooling, and work flows into digital. Partly, they installed the historical constraints involuntarily.

All these kinds of copying and stepping into the boots of the predeccors reminds to the beginning of the automobil industry. It has been concluded that new ligatures for character pairs like ba, be da, de etc. tend to disturb legibility today, and moreover, word processing programs could not elegantly handle them.

After Gutenberg

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Prices of equipment dropped significantly due to the fact that various manufacturers contributed their spices of the puzzles to the overall systems. Equipment used today is comprised of products from many suppliers, i.e. PCs, laser printers, typesetters, PostScript, application software, fonts, scanners, and other operating software.

Page 2

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write with no hyphens,
layout justified text,
start each page with a paragraph,
start a chapter recto, and
end it verso,

We can apply many subtle changes which the reader can't recognize; meaning that he is not disturbed during reading. The well-known rules of good typography can and will be kept as they are delivered by Johannes Gutenberg.

Page 4

4 pages produced with chapterfit software show:

no deficiencies with respect to typographic rules,

all pages end with a paragraph to avoid widows and orphans,

an even number of pages allows to start a chapter recto and end it verso.

Digital Text

1. Context based character choice 2. Kerning **3. Optical Scaling** 4. Paragraph composition (hz-program) 5. Chapter composition

Various ordinary ads



2) Energy (efficiences And- Statespace of perform a a. der Ankons einer Ots ill tei- indersampreisen. Obio 5000), die Analyse, illester Versig, Ularynehang und Verlanzenen, Stationg- Lie tang aller an Löser, An- der St. Ferson auf Binneten Andgebeen materie verster Andgebeen materie verster Andgebeen materie verster and binnet bil sistem.	thre Bade electronic for holes due bah soon und bake schaft electronic halos inter electronic action Methonicado, Sa sind arc anapitation und anapitation und singer bah sons ariss remainer for the dimensionality being the dimensionality being the dimensionality being the theory of the
Sie haben idebier wene ein wertschaft wie seschaft-	Befris mert dert får
Inden daucken min den der Baufmissehen Antall deres (Spacklöss) mit sam derten Grei Johan Ba- redurfehrungt. Sie heben Leen Baron in der Hamm B darigt anzeit beiten (Lei- blangerechnung strate Po- kenn mittele	The last on the second
min bastant dannt danner biere	Contract to a second second second

e Bas wer diet ver Hen-ing off zun setzen-sien Beste die Oct-elunder werten. Eine

noch eine Gruppe

und noch eine, von der keiner weiß, was sie hier soll

Structuring of an ad



Levels of Hierarchy

- Point anchor points, determining the shape of a contour
- Contour inner and outer contours of a character
- Character a letter or a logo
- Line one or more characters
- Group one or more lines, headlinetext and body text
- Layer one or more groups
- Graphic one or more layers
- Ad one or more graphics, the complete ad

10.10.2001 Page 2

Birth notices



Max has got a little sister from now on

Mary-Lou Wolff

The parents Emily & Peter are very happy too



Max has got a little sister from now on

Mary-Lou Wolff

The parents Emily & Peter are very happy too



Max has got a little sister from now on

Mary-Lou Wolff

The parents Emily & Peter are very happy too

The software starts with a template,

changes the picture element,

and rearranges the text lines.

Obituaries

Location where _ additional text could be generated.

No additional text has been generated:

therefore, the text below has been enlarged. Adding text and even more text and another line and still more lines lines lines we find the bodysize of the text decreased. Wir trauern um **Nicole Hand** geb. Tergani * 13. 4. 1934 + 27. 7. 2002 Wir werden sie nie vergessen.

Statt Karten

Nimmer vergeht, was Du liebend getan.

In stiller Trauer Ludwig Weide Maria Schiedel geb. Weide Markus Schiedel Lara und Sebastian

Ronnenberg, den 28. Juli 2002 Die Trauerfeier findet am 1. 8. 02 auf dem Ronnenberger Friedhof statt. Bestattungsinstitut Muster, 12345 Hannover



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