file formats will come immediately after the main text, as "normative" annexes; that is, these format specifications are an integral part of the standard, but the presentation of each is self-contained and too large to be appropriate in the main text. Finally, the rationale will appear as an "informative" annex, to present information that is not an integral part of the standard, but is intended to help a user in understanding it.

Future work

What tier will come next, i.e., what driver feature will be looked at next, is still unclear. There is public pressure to tackle the area of graphics inclusion at an early date; others want to touch areas such as page selection, etc., first. So this remains an open problem. We invite all parties to bring proposals to the committee. My personal opinion is that a proposal for a new tier received early will be handled early. So if someone is eager to see a specific topic addressed, he or she should do work on this topic and send us the result of the work. (We will be glad to acknowledge contributors.)

⋄ Joachim Schrod
   Technical University of Darmstadt
   Institut für Theoretische
      Informatik
   Alexanderstraße 10
   W-6100 Darmstadt
   Federal Republic of Germany
   Bitnet: xitijsch@ddathd21

Resources

Review of *3 : 16 Bible Texts Illuminated*

Karl Berry and Kathryn A. Hargreaves

3 : 16 Bible Texts Illuminated, by Donald E. Knuth. A-R Editions (801 Deming Way, Madison, WI 53717-1903; (608) 836-9000), 1991. ISBN 0-89579-252-4. 268 pages, paperbound.

In about three-fourths of *3 : 16*, his first book since *Computers & Typesetting*, Knuth studies — indeed gives an exegesis of — chapter 3, verse 16 of

every† book in the Bible. 59 calligraphers (from 26 countries) fill the remaining quarter of the book with their renderings of the verses. Hermann Zapf, one of the world's leading typographers, contributed the illustration for John 3 : 16 and the cover design.

The main text consists of four pages per Biblical book: a left-hand page with a summary of the book as a whole, the page of calligraphy, and two pages of discussion about the 3 : 16 of that book. In a foreword, Knuth discusses how he came to study the Bible using the statistical procedure of stratified sampling, and describes his reactions to the experiment (including a few quantitative conclusions) in an afterword. Mathematically-minded people will appreciate this novel application of statistics to the Bible. We wished we could have attended the Sunday morning Bible classes led by Knuth upon which he based the text.

The book design is attributed to both Knuth and Zapf. The typeface is Computer Modern (Knuth didn't do any of the calligraphy, so it seems only fair that all the typeset letters should be his own design). The book designers and calligraphers use up to four colors: the text is black, the name of the Biblical book is printed in rust red on the summary page, and the verse is printed in a blue-green on the left-hand discussion page, inset in the text. (It must have been a lot of fun to figure out those 59 **parshapes**.) The calligraphy also uses a light ochre. The book designers reduced the calligraphic works (or perhaps just had the calligraphers make them) so they would all fit in approximately the same rectangle, and then set the calligrapher's name and Biblical reference well underneath in sans — giving credit without detracting from the calligraphy.

We can read the title's word "Illuminated" in two different ways. First, through linguistic and historical analysis, Knuth "sheds new light on" the meanings of the Bible verses — finding humanistic interpretations that reinforce our contemporary experience. In fact, he gives his own fresh translation of the verses. (He wholeheartedly recommends this to anyone interested in Bible study.) He also gives a generous sprinkling of those personal insights for which he is well-known. Knuth's writing has the elegance to which we've grown accustomed; the book can be enjoyed even by those with no background

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† Well ..., almost every. Some books don't have that many verses. Knuth "decided to omit all such books, because they turn[ed] out to be similar to other books that are long enough to be included."

in Bible study, and even no particular enthusiasm for it.

The other way we can read the title's "Illuminated" is in the sense of "illuminated manuscript". Manuscript books from the Middle Ages were handwritten and illuminated by monks (although they sometimes used outside illuminators). As in *3:16*, the monks used black ink for the text and a red ink (made from clay) for titles. Gold, red, and blue were the illuminators' favorite colors. Instead of gold leaf, the book designers use an ochre ink. Knuth chooses to "illuminate" his text not with illustrations and decorations subservient to it, but with calligraphic renderings of the verses. That calligraphy is commonly used today for producing religious artifacts is not lost on us, but Knuth is more likely incorporating in *3:16* two of his areas of interest — theology and typography.

Many of *3:16*'s calligraphers "illuminate" their verses in a straightforward way using literal illustrations: Ismar David (p. 19) uses a pyre for a verse about burning offerings, John Prestianni (p. 27) a map for a verse about to whom God assigns what territories, Satyanarayan Mallayya Wadisherla (p. 47) an eye (elegantly drawn by extending the letterforms) with a teardrop for a verse about a man sobbing, Andrzej Kot (p. 55) a fish for a verse about the promise of a dry riverbed being filled with water, Allen Q. Wong (p. 63) a pomegranate-decorated pillar for a verse about such, Lili Cassel Wronker (p. 131) a broad-leafed branch for a verse about a plant springing up to shade Jonah's head.

We think the real power of calligraphy, however, is that calligraphers can use graphic manipulation to "illuminate", if you will, a text's meaning(s); for instance, they can (1) modulate letters in regards to weight, color, shape, drawing quality (i.e., rough, smooth, quickly executed or carefully rendered) or rendering method (traditional broad-edged pen, brushes, drawing, or cutting), or (2) choose particular letterforms that evoke either historical (e.g., ecclesiastical or avante-garde) or formal (e.g., delicate or bloated) meaning. They can also arrange things in an evocative composition or manipulate the background. When they do this, we can *see* the words in addition to reading them — and calligraphy becomes a *visual language*. Some of *3:16*'s calligraphers do this:

R. Williams (p. 11) gives the word 'troubles' in his verse an unstable baseline, and 'desire' a decorative style. Fritz Eberhardt (p. 75) evokes shredded clothes by rendering words about such using a dry pen. By putting hands atop the outer stems of the verse's first letter, 'W', Luigi Cesare

Maletto (p. 79) evokes a supplicant with arms outstretched skyward for Job's wish he'd never been born. Kris Holmes (p. 83) configures her night prayer verse (the familiar "Now I lay me down to sleep ...") in a circle, evoking daily repetition of such. Sheila Waters (p. 91) uses a rough chiaroscuro to darken the background for the two instances of 'wickedness' in a verse about the abundance of evil in the world. Georgia Deaver (p. 107) uses violent brushstrokes to slash out the 'V' starting the lamentation "Viciously he ground my teeth on gravel ...". Steven Skaggs (p. 119) renders a block of intertwining repetitions of the word "orgies" for a verse about such. Peter Fraterdeus (p. 127) uses all caps for the command "LISTEN TO THIS", round, fat brush-painted letters for the words "you fat cows of Bashan", and gold background for words of warning directed at some affluent women. Karlgeorg Hoefer (p. 143) puts words about terror on heaving baselines and words about calm waiting on smooth, straight ones. Timothy R. Botts (p. 167) renders in elongated, thin red strokes, words about baptism with fire. Alfred Linz (p. 179) uses as background what looks like either an aerial photograph or a close-up photograph of a rock and rough, broken letters (graffiti left behind?) for a verse about a "trail of wreckage and misery". Neenie Billawala (p. 203) incorporates "staff" lines (which can double as typographic rules) and handwritten "musical notes" into a verse about singing. Margo Snape (p. 207) puts a verse discouraging sexual immorality on a gold background marbled to evoke licking flames. Leonid Pronenko (p. 215) puts (almost) each word of a verse about the mystery of true religion on a piece of torn paper reminiscent of ransom notes pieces. He emphasizes the word 'mystery' both by making it heavier and by splitting it across two pieces of paper. Jean Evans (p. 235) reduces letterforms to geometric black shapes, making the words hard to read — a modernist play on the verse's "making his words hard to understand" and "people distort his words". Rick Cusick (p. 243) splatters with ink a verse about metaphoric spitting and lashes out the word "spit" with quick, rough penstrokes.

Knuth's illuminations of the verses reveal to us what a complex, multilayered book the Bible is, whose understanding requires much work on the part of the reader. Historically, it has produced a range of interpretations. Calligraphy can also layer meaning and form, requiring the reader/viewer to sort things out; for instance, Robert Borja (p. 35) cuts up the background of his rectangle with color to get a sword-shape for a verse about such. He also plays on the word 'double-edged' by mirroring on

the left side the darker text (which is about a sword strapped onto a right thigh) on the right. Both the Bible and calligraphy can require us to participate in the interpretation, and the reward for doing so is a satisfaction worth seeking.

◇ Karl Berry
135 Center Hill Rd.
Plymouth, MA 02360
karl@cs.umb.edu

◇ Kathryn A. Hargreaves
135 Center Hill Rd.
Plymouth, MA 02360
letters@cs.umb.edu

LaTeX for engineers and scientists

Book review by Nico Poppelier

LaTeX for Engineers and Scientists, by David J. Buerger. McGraw-Hill, 1990. ISBN 0-07-008845-4. 198 pages, paperbound.

Although the LaTeX manual is a useful book, it is not suitable as an introduction, as a book for beginning users. *LaTeX for engineers and scientists* by David J. Buerger, published last year, at first sight appears to be a good introduction. In the preface the author writes: '[this book] was written to provide a fast and easy way to learn how to produce technical documents with LaTeX.' And indeed, *LaTeX for engineers and scientists* is a book that doesn't frighten readers by its length and is easy to read. It describes BibTeX and MakeIndex, it gives exercises – with answers – that are really not bad, and it contains an index – although I find that a bit short – and a glossary.

Unfortunately my general opinion about this book is not positive: both the contents of the book and the quality of the book as a printed product leave a lot to be desired.

My overall impression of the contents of the book can be summarised in a few points.

• The author has not quite grasped the concept of a document style and the separation between logical and visual structure, two fundamental concepts of LaTeX.
• The author does not distinguish between LaTeX proper and LaTeX *plus* the standard document

styles. There are many document styles beside the standard ones, so this distinction is essential.
• In several examples LaTeX and TeX commands are mixed. My opinion is that in examples only LaTeX commands should be used. If the author insists on mentioning the TeX equivalents, he should explain what sort of functionality LaTeX adds.
• Some functions of LaTeX, among which at least one important function, are not explained in the book.
• Explanations in the book are sometimes confusing or sloppy. In a few cases they are even incorrect.

I will give some examples:

• In chapter 4, Formatting environments, the author starts with the center, flushleft and flushright environments, and then goes on to treat the list and quotation environments. The main purpose of LaTeX's markup instructions is describing the logical structure of the text. In a book on LaTeX, descriptions of logical design should come before descriptions of visual design.
• The custom description list on p. 28 refers to layout parameters of the list environment that cannot be found in the index or the glossary. Although the author includes in his book instructive page-layout diagrams[1] that are unfortunately absent in the LaTeX manual, he forgets to include the equally useful list-layout diagram that is printed on p. 113 of the LaTeX manual.
• The custom description list given as an example on p. 28 is a variation on the description environment described in the LaTeX manual. In this example the items are typed as \item[{\bf Fox}]; as a result there is no clear separation between form and contents. A better way would be to define the layout of the items in the definition of the customised list. That way, one only has to type \item[Fox].
• On p. 39 the author gives a table of the typeface sizes that correspond to LaTeX commands such as \small, \normalsize and \large. The correspondence given in the table is valid only for the standard document styles and not for *every* document style. By failing to make this distinction, the author suggests that the table is universally valid, which it isn't.
• In chapter 6 the author treats only the $ ... $ and not the \(... \) construction for in-line mathematical formulae. $ ... $ and $$ ... $$ give formulae in a more or less fixed layout. If one uses LaTeX's \(... \) and equation environment

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[1] Similar diagrams have appeared in *TUGboat*.

instead, the user lets the document style control the formula layout. Furthermore, the LaTeX notation for formulae has opening and closing tags that are not identical, which results in fewer errors.

- In chapter 7, on p. 52, the author introduces the `\lefteqn` command without any explanation. This is a command that a lot of users find confusing: they often think that `\lefteqn` puts an equation flush with the left margin of the text.

- In chapter 8 the author gives a confusing description of the two environments `table` and `tabular`. The `tabular` environment produces a table, i.e. an arrangement of cells in rows and columns, possibly with horizontal and vertical rules[2]. The `table` environment creates a floating object, i.e. a part of the document for which LaTeX tries to find a good place to print it. In most cases, the `table` environment contains a caption that starts with the word 'Table'[3] and a `tabular` environment for the actual table contents.

> However, Buerger writes (italics mine):

> Tables *created* with the `tabbing` or `tabular` environments— ...
> The `\begin{table[ ]` or `\begin{figure[ ]` command will *create* a table or figure.

- On p. 64 the author explains the use of `\label` and `\ref`. He instructs the reader to put the `\label` command after sectional-unit commands and after the `\caption` command of a `figure` or `table` environment. However, there is no information on where to put the label in `equation` and `eqnarray` environments.

- In chapter 10, Organizing a document, the author uses in an example
`\topmargin 0mm`
`\def\BibTeX{ ... }`
instead of the LaTeX equivalents
`\setlength{\topmargin}{0mm}`
`\newcommand{\BibTeX}{ ... }`

- In chapter 10 the author fails to distinguish between LaTeX proper and the standard document styles. On p. 68 the author writes:

> Title information is automatically centered.

and (italics by the author):

> You can produce an abstract placed below the title information ... by typing the following command *before* the `\maketitle` command.

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[2] An imprecise definition of a table, I know!

[3] To be precise: this is specified by the document style, but it should be 'Table' or something equivalent.

In both cases the behaviour the author describes is that of the standard document styles: in other document styles a title could be left-justified and emphasised phrases could be printed in a boldface font. In the second case, the author is also definitely wrong since the `\maketitle` command defined in the standard document styles does not print the abstract, but only the title, author and date.

The author is also inconsistent with notation: for example, in pages vii-xiii, the table of contents, list of figures and list of tables, I found 'LaTeX', 'LaTeX' and 'LaTeX'! I sometimes got the feeling that the book was written or at least finished in some haste.

Some examples of features of LaTeX that are missing in *LaTeX for engineers and scientists*:

- The author writes that the `\include` command is similar to the `\input` command, except that it starts on a clean page. He doesn't mention one of the nicest mechanisms in LaTeX: cross-referencing between sub-documents if some of the sub-documents are excluded from the current formatting run by means of `\includeonly`.

- The only information on TeX's units was the sentence 'There are 72.27 points to an inch', and I found it in the chapter on error messages!

- One of the sample input files contains the `\;` command, without explanation and without treating other, similar commands.

So far, I have only criticised the author. However, I think the publisher of this book, McGraw–Hill, can be blamed for a few things as well. Concerning the quality of the book as a printed product: the book was produced from camera-ready pages prepared by the author on a laser printer. Computer Modern is a good typeface, if only you use it on a printing device of sufficiently high quality. Laser printer quality is, I'm afraid, not good enough and I hope this book is one of the last books on TeX-related matters produced in such a way. As for the contents of the book: it seems likely that McGraw–Hill did not ask an expert to review the book, otherwise they would have asked the author to rewrite parts of it.

LaTeX for engineers and scientists is not a bad book, but it is not a good book either. It can be used, but I can't really commend it.

Nico Poppelier
Elsevier Science Publishers
Academic Publishing Division
R&D Department
Sara Burgerhartstraat 25
Amsterdam, The Netherlands
n.poppelier@elsevier.nl