PostScript, **QuickDraw**, TEX

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Abstract

How can graphical material best be incorporated with TEX? The author's experience with TEX on the Macintosh, interpreted through PostScript or **QuickDraw** (as the printer decrees), has driven him remorselessly towards an heretical view—that TEX must be dissected, and re-assembled as a context-free grammar, with presentation in DVI format. For only in that way can TEX and graphic meet on equal terms .

Because of the very problem addressed here—the lack of an agreed standard for marrying graphic with TEX—this article differs substantially from the corresponding talk. For that talk was, in effect, a practical demonstration of TEX on the Mac, and a comparison of **QuickDraw** with PostScript as graphical interpreter. This article might perhaps better be entitled "Some Thoughts Occasioned by an Experiment in PostScript, **QuickDraw** and TEX."

Introduction

The incorporation of graphical material into TEX is the principal and perennial preoccupation of the TEX community. Knuth has taught us how to use the *quill*. Now, like those medieval monks who penned the Book of Kells, we wish to illustrate the text.

But wait! Why do we always speak of incorporating graphical material into TEX? Why shouldn't we, conversely, incorporate TEXnical material into graphics? Why not — those of a sensitive disposition should avert their eyes at this point — why not 'encapsulated TEX'?

A Word of Thanks

The mathematical community owes Donald Knuth an immense debt of gratitude. He has lifted a grievous load from our shoulders. TEX is our washing machine, microwave oven and dishwasher, all rolled into one.

But debtors were always ungrateful. ("Arthur Guinness has been very good to the citizens of Dublin," the pompous speaker intoned. "And the citizens of Dublin have been very good to Arthur Guinness," piped up Brendan Behan from the rear, a pint in his hand.) In the spirit of that ancient adage, let us proceed to bite the hand that feeds us...

The Grand Panjandrum

TEX is a black box. We feed it with our ideas — fragmentary and ill-formed. We crank the handle, and lo and behold! — our thoughts emerge (quite slowly) from the other end, if not laundered, then so beautifully presented we almost blush.

It is true that Knuth, like a good magician, throws open the box with a flourish — "Look, no tricks!" He even tells us what all those knobs are for. Then, just as we begin to get the hang of it, the lid crashes down on our fingers.

Who does not recall those dread words at the opening of `tex.web` — *Unless your name is D. E. Knuth....* (The words conjure up the image of an ancient Registrar timidly asking, "If I might be so bold as to enquire, Miss, why do you want to change your name to Donald Knuth.")

But I propose that we bite the forbidden fruit, that we disobey the Master. In these days of recombinant DNA, could anyone balk at recombinant TEX?

TEX as a Language

TEX is a two-headed monster — it is a language, and it is a program for interpreting that language. And the program, like the Queen in *Alice in Wonderland*, is the final arbiter. If it says we are talking nonsense, then we *are* talking nonsense.

I'm reminded of the early days of UNIX and C, when the answer to the question, "What is −5/2?" was, whatever the Ritchie compiler said it was.

Then came context-free grammars, and Backus-Naur, and `yacc`. And they begat Johnson's portable C compiler. And the modern world was born.

Let me put my plea plainly (or should that be lplainly). TEXackers of the world: give us `tex.yacc`.

Wouldn't this express the *true* meaning of TEX? To see its anatomy dissected in that way — with `hboxes` packed recursively into `vboxes`, and `vboxes` into `hboxes`, and so *ad infinitum* (like Jonathan Swift's fleas).

The Grammar of LATEX

Is it fanciful to see in a LATEX document style the germ of a context-free grammar? Couldn't we express it most succinctly as a `yacc` file? Its central section might start something like this:

```
DOCUMENT: HEADING TEXT REFERENCES
  ;
HEADING: TITLE AUTHORS INSTITUTION
         DATE ABSTRACT
  ;
TITLE: title_tok string
  {
    output("\begin{center}
            \font\largebf");
    output(yytext);
    output("\end{center}");
  }
  ;
AUTHORS: /* empty */
  | AUTHORS AUTHOR
  ;
```

Euromath, Grif and TEX

At this point, I should confess that my inspiration is drawn from a bizarre project sponsored by *Euromath,* a consortium of West European Mathematical Societies.

Euromath has contracted Gipsi, a French software house, to develop a 'mathematical editor'. More precisely, Gipsi has undertaken to extend an existing editor — called *Grif* — to include mathematical formulæ, as well as simple graphics[2]. This editor is to interface in some as yet unspecified way with TEX — or more probably, with LATEX. At the very least, we are promised a TEX-driven editor and previewer.

[2] For further information on Grif, contact `paoli@gipsi.gipsi.fr`.

The relevance of this project to my argument is that Grif envisages the document before it as a context-free grammar. (Gipsi uses the term 'structured information', but it comes to the same thing.)

Unfortunately, the project is doomed to failure, in my view, because Euromath has agreed, for its part, to produce a definitive analysis of mathematical expressions... In other words, it must define a context-free grammar which will include within its ambit everything that any mathematician might say. On that happy day, which will probably occur about the same time as the state withers away, Gipsi will take the grammar as basis for its mathematical Grif.

Encapsulated TEX

But if Grif — or Euromath — could lower its sights, and accept that its task was ended when a mathematical formula was encountered;

And if TEX could come off its high horse, and accept that a single formula in an alien environment was an object worthy of its attention;

Then the two might marry, and be fruitful, and make Euromath happy.

In conclusion, it seems appropriate to speak of 'encapsulated TEX' in this context, by analogy with encapsulated PostScript. For while common-or-garden PostScript defines a whole document, like TEX, encapsulated PostScript describes an isolated graphic — a Mandelbrot set, or a picture of Marilyn Monroe — precisely as required, in fact, for incorporation into TEX.