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Phototypesetting and desk-top publishing systems in archaeology

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30.1 Introduction

It is the aim of this paper to give a general indication of the current situation in origination and typesetting, and to discuss the implications of these both for archaeologists, and for anyone considering the costs of getting work published. With the ever-increasing pressure to publish research results, combined with limited financial resources, typesetting costs are a major consideration, and there are now many typesetting systems to choose from, each offering different facilities and different quality output. For this reason, I will give a broad-based overview of the development of typesetting technology, from a sophisticated electronic typewriter to the modern-day laser setter, driven by a desk-top package. It should also be said at this stage that the quality of *any* typesetting system can never substitute for the quality of the material which is being produced. No amount of technology can hide badly-written or planned work, and, if prices fall, there will be even less excuse for the failure to publish the results of research.

30.2 History

Photocomposition is generally acknowledged to have started in France in the 1940s, and large, expensive systems entered the market-place with the micro-chip revolution of the 1960s. At this time, the most popular method of setting type in inplants and similar establishments was the AM Varityper type of composer, similar to a typewriter, and now virtually obsolete. Early in the 1970s, the IBM golfball Composer was introduced, and this is still in use today, although production ceased around 1980. Such machines can still be purchased relatively cheaply. The advantage of an internal memory and magnetic card storage facilities were rapidly accepted, and the Composer captured a large proportion of the inplant market at the time.

The demand for rapid production of high-quality typeset material has meant that it is computer-based phototypesetting which dominates today's market, and developments are rapidly changing the whole basis of design and page make-up. Direct entry systems became more widely available throughout the 1970s, using the method of optical setting to generate images onto light-sensitive material. Optical setters use technology similar to 'Magic Lantern' slide shows and hold pre-formed images on strips or discs located between a light-source and the photographic material. This method has limitations in character size and the number of type faces for use at any one time, as most systems can only hold a maximum of eight fonts. It is also

extremely slow. All of the technologies which have been developed to replace optical setting have utilised digital technology, and the basic changes in technology have been the transition from cathode-ray tube light sources to the third generation helium-neon lasers or fibre-optics transferring signals from light-emitting diodes. The differences are, in some cases, merely mechanical, and there are currently several well-established fibre-optic systems. However, it is laser technology which now appears to be dominating the market-place, as laser systems generally offer higher resolution and greater versatility, particularly in the area of cost-effective communications and graphics.

30.3 Recent developments in phototypesetting

Laser technology has also been utilised in recent developments in desk-top publishing, which combines micro-based packages with powerful Page Description Languages (PDLs) such as PostScript, and intelligent laser printers. Much has been said, written and demonstrated about the revolution in desk-top publishing, and most people are probably already familiar with the major packages. The ramifications of these changes are being debated throughout the pages of printing and pre-press journals, and it is generally seen as the boom area of the 1980s. Many conventional typesetting houses fear that these changes will lead to loss of business, whereas the manufacturers insist that desk-top publishing will actually create increased demand for high quality output, because of the consequent increase in aesthetic awareness. This concept is crucial to typesetting manufacturers such as Linotype Paul, who market the Apple Macintosh with either the LaserWriter or their Series 100/300 equipment.

Desk-top publishing emerged in 1985, when it became possible to increase the memory of micro-computers at relatively low cost, and there was a general fall in the market-price of business computers. Laser printers were available from 1983, but it was 1985 before suitable—and affordable—front-end systems were developed. Prototype WYSIWYG ('what you see is what you get') software such as Book Machine provided basic page make-up facilities, but it has been the advent of cheaper systems which can integrate text, graphics and half-tones which offer the greatest potential.

Desk-top publishing is aimed primarily at the office market, and is seen by many as an extension of the office word-processor and high-quality photocopier. For material which needs frequent updating, such as manuals, technical reports—and possibly interim reports or occasional papers—there is no doubt that desk-top systems and laser printers provide very acceptable output.

There *is* a great difference in quality between the output generated by a laser printer—currently 300 dots per inch, although new models can provide 400 dots per inch—and that from a typesetter, which can be over 2,500. Typesetting quality is not always necessary, however, and the costs of laser printing should be considerably less. Desk-top publishing should be suitable for limited-run text-books where phototypesetting might be prohibitive. Some of the more popular desk-top packages can only handle sixteen pages at a time, however, and this could cause problems (it should also be noted that many university mainframes offer text-processing facilities in conjunction with a commercial-size laser printer, and here the file handling will be easier). In addition, the range of graphics programs which can be incorporated by a desk-top system is still very limited. This will, no doubt, soon change, but at present there is not much scope for sophisticated applications.

It was intended to give an overview of the typesetting facilities offered in universities, but these are so disparate that there seems little point in this. Like other departments, printing units are dependent on central administrative committees for equipment grants, and equipment

is bought in a rather piecemeal fashion. Some faculties and departments have already bought their own equipment, but without a policy of standardisation: it is therefore not always possible for printing departments to provide further facilities, such as the capacity to output desk-top publishing discs through a phototypesetter. A number of commercial desk-top bureaux offer this service, but it is costly, with charges starting at about £5 per page—and this is when the customer has already made up the page. In addition, it is generally those with the highest salaries who get first access to new equipment, and this can result in the waste of a good deal of time and money.

A further major disadvantage to desk-top publishing systems is that page lay out is a skilled and difficult task, and many people do a bad job. There are so many options available on desk-top publishing systems that many pages are very much over-designed, using too many of the graphic tools offered. Many advertisements show beautifully designed and produced pages, but they do not mention that these were produced by a highly trained operator. Programs such as Aldus's PageMaker are easy to use, but it should be stressed that the screen is not the place for design, and that styles should be carefully thought out in advance.

It is, however, certain that this is the direction in which typesetting hardware will develop, with comparatively cheap computers linked to laser phototypesetters and providing text/graphics integration and page make-up. These will then replace the current generation of dedicated typesetting terminals, and will hopefully provide greater versatility and greater potential for sophisticated graphics programs. For the moment, desk-top publishing is most useful as a *tool* used in conjunction with existing systems. The cheaper desk-top publishing programs lack the control of traditional typesetting front-ends, and it is only recently that essential typographical facilities such as kerning, condensing and hyphenation, have been introduced. From a more basic point of view, very few typesetters (and users in general?) feel happy using the gimmicky pull-down menus and icons which most desk-top programs provide. After years of coding basic typesetting formats and using *X* and *Y* coordinates to gauge the dimensions of a page, the new WYSIWYG screens are very disconcerting. This is something which will easily be overcome, of course, and the advantages for forms and tabular work are obvious. Another major advantage is that the number of Page Description Languages currently in use is limited, and this might have the effect of ensuring that there will be a greater degree of compatability between the hardware produced by different manufacturers.

There are already a number of systems at the top end of the market which provide all the advantages of desk-top publishing with the typographical refinements of typesetting terminals, but these are outside the budget of all but the largest commercial organisations. For the majority of small printing units, the purchase of a Raster Image Processor (RIP), the necessary interface between a desk-top system and a typesetter, is something which requires careful forethought. More expensive equipment, such as the scanners necessary to digitise art-work and half-tones, cannot be justified. For these reasons, the applications which small operations can find for desk-top publishing are limited at present, although future prospects are an entirely different matter. With easier communications, falling hardware prices and a greater flow of work, the typesetting and printing services which we can offer might be considerably extended.

Future possibilities in this field are exciting, and for organisations able to make the necessary financial outlay, the technology is already available. For the rest of us, it is a case of patching together the equipment and software as we can afford them. If predictions about the impact of desk-top publishing prove to be correct and the demand for high-quality output increases, then the price of equipment should fall, and the possibilities will increase. These include the use of colour or colour separations, the ability to make plates without the intervening

camera stage, and higher-quality scanners for art-work and half-tones. Current developments in Intelligent/Optical Character Recognition mean that text can be scanned from type-written or typeset text with greater accuracy than previously, although there is still considerable scepticism about this method of text-entry.

The greatest expansion at the moment, however, is in captured text, particularly that which has been pre-coded, so that a simple filter-table can translate these codes or 'flags' into typesetting commands. As typesetting front-ends move more into the PC-market (particularly IBM-compatibles), this operation is increasingly straightforward. Codes are very simple, as they are defined by the user, and inserted where there is to be a change in style—for instance the change from a roman to an italic font, or the style of a particular level of heading. Simple tabular work can be coded, as well as all accents, superior and inferior characters and indents. As long as this is done correctly, it will greatly reduce costs.

Until recently, the most important instruction for anyone sending work on disc was that it should *not* contain any word-processor formatting, as these unprintable characters can cause havoc in the host-terminal, and are at best merely stripped out. Programs are, however, now available—although not commonly used as yet—which can translate word-processor commands into the equivalent typesetting commands. This general system of typesetting is the most functional and easily available option for the majority of customers. It means that costs can be cut and that much of the control of formatting passes to the customer, but the skilled part of the operation is still in the hands of people trained in design and lay-out. It also means that the most sophisticated technology can be used, if the order is placed with a large enough organisation.

For example, for many typesetting houses, the real test of typesetting software lies in pagination. Most front-end systems will offer typesetting facilities with *some* pagination, while many page make-up programs offer pagination with *some* typesetting. The results can be horrible. It must also be remembered that desk-top systems are *not* large-scale composition programs, although some of them can cope with very large files. The major bookwork programs, such as those sold by Pagitek, use scores of penalties which the program will avoid when setting a chapter. It will only stop for direct intervention if there is no 'solution' for the chapter within the specified penalties. Penalties may include such typographical sins as short line-breaks, widows/orphans, successive hyphenations, or a page-break within two lines of a heading or sub-title. These programs can squeeze or stretch the white space on any page in order to find the best lay-out for the whole chapter, and can cope with multiple-column work, as well as footnotes, figure captions and indexing. Again, the cost of such systems are frequently prohibitive, and the throughput of bookwork must be very high to justify the purchase of the system. It is only major organisations who can afford these, and here any centralisation of typesetting work would be helpful.

The greatest savings could be made by deciding whether typesetting is really necessary, and, if not, by getting work produced on a laser printer. If it could be organised, the cheapest way of getting work typeset (and then printed) would be to arrange for a number of orders from one region to be placed with a single large firm—preferably one which deals with large volumes of text—and to send work as coded captured text. In this way the most expensive technology could be used at the lowest cost. Communications become easier all the time, and a company which was assured of regular work would arrange discounts. Co-ordination is the largest problem, but if this could be overcome, the economic benefits would be substantial.

The technology for typesetting and printing is developing so fast that reasonable-quality output can be available for even the smallest journal. As was said at the outset, however, it is

the *content* of the journal/book which should be of the highest quality, and production should merely complement this.