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a naive utopianistic hope that we can make society perfect. Rather, the Christian hope believes that because of Christ's death and resurrection there is the possibility of bringing any society (at least for a time and to some degree) under the Lordship of Christ and thus in line with Christian morality. Nonetheless, Christians are also realistic and affirm that until the return of Christ and the consummation of his kingdom, any progress that we make will be both imperfect and incomplete. At this point in history however, any progress would be welcomed.

Cyber-Theology: DoingTheology with a Personal Computer

David Parker

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This important article points to the paradigm shift that is now taking part in the way we understand our theological task. The author lifts our horizons beyond using the computer as a word processor to the ever- expanding technological possibilities of multi-media operations, the range of software available and the potential for the Internet using email and web. He suggests ways in which the computer can enhance theological teaching and administration but cautions the need for skill and patience, security, privacy and copyright, the stewardship of funds, and the danger of over reliance on high technology. The Theological Commission is looking at using the Internet extensively to facilitate its activities such as publications, study units and consultations. Editor

Keywords: Technology, Christian ministry, hardware, software, program, printer, Internet, e-mail, the Web, word-processing, database, missiology, administration

INTRODUCTION

One of the greatest gifts of modern technology is the personal computer (PC), especially for theologians and others who are in the business of working with words and ideas. Personal computers, which now have enormous power compared with those available only a short time ago, have revolutionized access to and processing of information. This article[1] is a general introduction to some of the main ways a PC can be used by theological students and educators, administrators, pastors, missionaries and others in Christian ministry. It concentrates on the mainstream rather than the highly specialized applications, and makes suggestions which readers can follow up on in their own local context. The information given here applies generally to both IBM-compatible computers

[1] Acknowledgment is made of trade and brand names mentioned in this article, which are registered trademarks of their respective owners. Mention of a particular product does not imply endorsement or otherwise.

(usually referred to as the PC) and the Apple Macintosh series. The emphasis is on PCs because they are so common, and software for them is readily available; however, the Apple has special advantages in education and graphics.

I. COMPUTER ESSENTIALS

A computer consists essentially of a Central Processing Unit (CPU) which is a powerful miniaturized electronic calculator to carry out the main operations, internal memory (Random Access Memory RAM) to hold information and instructions for the CPU, disks (both fixed 'hard disks' and removable 'floppy disks') using magnetic technology similar to tape recorders to store data and programs, devices such as a keyboard and scanner to input data and instructions, a monitor (Video Display Unit VDU) to display information and a pointing device (mouse, trackball) to help control the computer.

The physical components of a computer are called hardware, while the electronic instructions given to the computer to enable it to perform some useful task are called software or programs. A computer needs some inbuilt software to set itself up properly, or to 'boot' it up initially; itthen needs an operating system (OS), usually stored on its main hard disk, to control the various functions including use of disks, keyboard, monitor, modem and printer. Finally it needs application software to carry out specific tasks such as word processing, database management or communication with another computer. Testing and diagnostic software is also useful for troubleshooting and maintaining the computer system; anti-virus software is necessary to combat these small programs which are designed to destroy data, cripple a computer or to cause a nuisance.

The first operating systems made use of typed instructions using commands such as 'copy' or 'delete'; the most well known product of this kind for PCs was Microsoft Disk Operating System (MS-DOS). There are some DOS based computer programs still in use, but most modern computers now use a Graphical User Interface (GUI); Microsoft Windows is the dominant product. In this 'point and click' system, pioneered by Apple computers and followed by Microsoft, a mouse moves a cursor (perhaps an arrow or a flashing vertical marker) to a certain area of the screen display identified by a box or image known as an icon; a button-operated switch on the mouse then activates the computer to perform the indicated operation (such as printing a document or inserting an image); the mouse is also used to select text or images for manipulation by the computer (such as converting regular text to italics or resizing the image). A GUI system is convenient to use and provides a great deal of control over data; it displays the data as it will be printed out in 'what you see is what you get' (WYSIWYG) fashion.

There are also optional peripheral devices such as printers to produce written copies of data, modems to connect the computer to a telephone line for the transference of computer, fax or voice data to and from a remote computer. Most computers today support multi-media operations, having software and hardware (a sound card and loud speakers) to play and process audio signals, especially music; other software can also be used to display graphic images, animation and video information. Compact Disks (CD), which are similar to audio CDs, are frequently used in multi-media work because they can store a great deal more information than the ordinary magnetic variety (around 500 times the average).

Technology is rapidly improving, so new features and more powerful computers are becoming available continuously, allowing more advanced software to be used; however

older, more limited machines will still perform satisfactorily with appropriate software.[2] Small portable 'notebook' computers are in common use, giving the advantage of compactness and mobility. The best of them have similar computing power to desktop models, although they are still limited by battery life which is usually only a few hours at maximum; however, they are much more expensive than desktop PCs and less flexible in regard to upgrading and expanding facilities.

Application Software

Commercially available software ranges from relatively simple, stand-alone programs designed for a specific limited function (such as making back-up copies of data on a floppy disk for security) through to integrated suites covering a large number of functions or highly customised applications designed for complex business situations.

The most common packages are manufactured in large numbers by major suppliers and sold around the world, often in various versions taking account of languages and other local requirements. Software comes on CDs, or less commonly on the older magnetic disks, together with instructional manuals; increasingly, new software and especially upgrades and new versions are available on the Internet (see later). All software needs to be installed on to the computer and configured before it can be used. Modern software may occupy many megabytes of disk space and require high power computers to run successfully.

Good software companies usually supply assistance for the user through careful design and testing of the program, clear instruction manuals and help screens available while using the software; after sales service is also important, but it is often costly. Technically speaking, it is easy to copy software from another computer or from original disks, but the practice is illegal as it breaches copyright (the same as in printed matter); some software companies prosecute offenders, seeking heavy penalties through the courts to stamp out the practice, arguing that illegally copied software costs the producers heavily in loss of revenue.

Printers

Printing of documents is usually as important as creating them. The most common older computer printer, known as the dot matrix printer, uses a series of fine moveable pins (9, or 24 for higher quality) in the printhead to form letters; as the head passes across the paper, the pins are actuated and pressed against a ribbon, producing the imprint on the paper in much the same way as a typewriter. They are fast, reliable and economical to produce and maintain; while still in use for certain applications, they are rapidly becoming obsolete, producing less attractive output than their competitors and being unsuitable for use with GUI interfaces.

For low volume use, inkjet printers, which deposit fine drops of ink on the page in the shape of the letter or image, are most popular. They work equally well for colour as for black and white, and are inexpensive to buy. Using good quality non-porous bond paper, they can produce surprisingly good results, although not all ink is waterproof; using special paper and ink cartridges, colour photograph quality printing can be achieved. However, inkjet printers are not ideal for large fonts or dark images which require lots of ink.

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[2] At the time of writing an average level PC will have a high level Pentium or Pentium II CPU with 32 megabytes of RAM, 2.5 gigabytes HDD, 15 inch monitor, 24 speed CD ROM drive and sound card and run Windows 95. Note that memory and storage is measured in gigabytes and megabytes; giga = 1,000 million; mega = 1 million; byte = the unit of computer data. A standard 3 inch floppy disk holds 1.44mb of data.

The laser printer is the heavy duty office standard. It works on the same process as the photocopier by using electrostatic principles to place small particles of carbon on the paper in the required patterns; the carbon is fixed in place by heat and pressure. The laser printer is more expensive to purchase than the inkjet, but it is cheaper to run; colour laser printing is very expensive. Lasers are good for high volume work, but may need extra memory to cope with large andcomplicated page layouts and graphics.

Both inkjet and laser units can produce camera-ready copy for offset printing, and of course are excellent for photocopied productions in association with desk top publishing and high-end word processing software.

Keyboards, Scanners and OCR

Entry of data to the computer is usually carried out by a keyboard which is similar in layout to the standard typewriter; the computer keyboard has several extra keys, some of which are numeric keys like a calculator and others are used to control various functions of the computer.

Electronic scanners, either flatbed (like a photocopier) or smaller hand held units, are now also in frequent use. They take an 'electronic photo' of the original which, with suitable software, can be inserted into another document, printed out or edited to enhance, resize or modify the image; even low level software gives a great deal of control over the colour and content of the image, enabling a piece of art-work to be re-shaped or unwanted features cropped from a photograph before use. A scanner can also be used in conjunction with a suitably equipped computer as a fax machine and as a copier. Photographic images can also be obtained directly from a digital camera which uses computer techniques instead of chemistry to record the image.

Another process, optical character recognition (OCR), can be applied to text documents which have been scanned into the computer; this converts the image into a series of characters which the computer can handle in the same way as if they had been entered using the keyboard. Scanners with OCR software therefore can be used to eliminate the need for laborious re-typing of data. High quality scanners and software can successfully convert even poor originals, and maintain paragraphing, fonts and columns, thus lessening the need for further editing.

II. INTERNET

The Internet is the latest growth area in computing. Its huge popularity around the world can also be harnessed for theological work.

The Internet is essentially the linking together of computers and networks of computers around the world. It began as a network of military computers, and it was set up in a decentralized form for security reasons. Thus, not being a hierarchical system, there is no one with ultimate control of the network or of the data that is stored on the computers connected to it. To connect to the Internet, computer systems must, of course, support the common technical protocols which allow the exchange of data, and some countries limit access according to their own internal policies. But otherwise, each person or institution connecting to the Internet is responsible for content and access. Data on the Internet may pass through many links and computers before it reaches its final destination, which poses problems for security and privacy.

The Internet extended rapidly from its original functions, particularly into university, research, scientific and government areas. In recent years it has been opened up to private users through Internet Service Providers (ISPs) working with telecommunication corporations in their own countries, who are in turn linked with the rest of the world; the

ISP sells Internet access to private consumers who either dial up through the normal telephone network or, in the case of larger institutions, make use of fixed data lines that have been connected to their premises.

For Internet access, a consumer needs a reliable phone line, a computer equipped with suitable software and a modem and an account with an ISP. ISPs may impose an initial set up fee, and then charge for time used and sometimes for the amount of traffic passed; there are usually discounts for bulk purchase and higher volumes. If the ISP is not within a user's local call area, then the consumer will need to pay long distance telephone toll charges as well. Larger institutions may have a network of computers through which Internet access is gained. This network may operate on the same kind of technology as the Internet, when it is called an Intranet. There is now a trend for a closer integration of the Internet with the PC so that using data and applications on the desktop computer or the local Intranet is indistinguishable from the Internet itself.

When a computer is connected to the Internet, either temporarily by dial-up access or by a permanent link, a number of different operations can be carried out. For example, files can be transferred to or from another computer using File Transfer Protocol (FTP), live communication can be made using Internet Relay Chat (IRC) which is like a telephone party line or a CB radio link. The user's computer can become a terminal of a remote computer using Telnet. But perhaps the two most popular functions are e-mail and the World Wide Web (WWW).

E-mail

E-mail is a system of sending messages from one computer to another using a system of unique addressing which enables the network to route them correctly to their destination. (For dial-up systems, e-mail is held on the ISPs computer until the subscriber logs on to read it.) An E-mail address consists of an identifier, often related to the subscriber's name, followed by codes to identify the computer, its network and its country (USA has no country identifier), separated by the symbol '@'. For example, the address John.Smith@ supplier.com.au is the computer in the name of John Smith connected to a (hypothetical) Australian commercial network; other types of networks are indicated by net, gov, edu, mil. However, it is not necessary to know anything about the location or nature of an e-mail to send messages.

E-mail is quick, simple and economical, especially in comparison with ordinary mail; messages may be written in whatever style the author wishes, provided the rules of 'etiquette' are observed. E-mail messages can be sent to more than one recipient simultaneously; received messages can be forwarded on to other addressees either intact or in edited form, and they can be inserted into wordprocessing and other documents and printed out or processed as required. In addition, any other kind of computer files (documents, images, programs etc) can be linked to e-mail messages as 'attachments' and transmitted with them to the recipient; this provides a rapid and economical alternative to sending the files by other means, such as on a disk through the post.

A popular specialized form of e-mail known as 'mailing lists' allows a message from one person to be sent to all the others who have enrolled for that particular list; another form, called 'newsgroups' places a message on a forum or kind of electronic bulletin-board which anyone who logs onto the particular newsgroup can read. There are very large numbers of these groups in existence, discussing a vast range of mainline and fringe topics; new groups are being set up continuously. While many of them operate at a popular level or are frivolous (or worse), they are very important in academic circles where they function as extended seminars for discussion and channels for obtaining

scholarly information. They can also be used to handle business, such as organizational arrangements for international meetings.

The Web

The World Wide Web (WWW or The Web) has become the most popular form of Internet usage, absorbing many of the functions which were previously handled by separate applications. The principle is simple: using appropriate software the user's computer can request a particular file or 'page' from a remote computer and display it on the local monitor. This file can contain text, graphics, animation, video and sound in any combination. It can also contain hyperlinks which are electronic addresses which, when activated, are interpreted by the software as instructions to retrieve a file from the nominated address. Pages can also contain response forms and 'mail to' hyperlinks which automatically activate e-mail software ready to send a message to the nominated recipient; they can also give instructions to the computer to transfer a file from a remote location. Web pages can be very attractive, making full use of colour, graphics and multi-media techniques, thus bringing together computer expertise with printing, design and layout arts; Web page design is a rapidly developing enterprise.

Each page is identified and located by a Web address or Uniform Resource Locater (URL) of the basic form: http://www.yourinstitution. com.au (often the initial http:// is omitted) Thus the publishers of this journal have as their Web address, www.paternoster-publishing.com while the sponsoring body, the World Evangelical Fellowship Theological Commission can be found at http://www.WorldEvangelical.Org/ noframes/2theol.htm

The software used to access Web pages is called a Web browser; the two commonly used are Netscape Navigator and Microsoft Internet Explorer. The browser recognizes the particular code (HyperText Mark Up Language or HTML) in which the pages are written, and displays them appropriately. The browser also enables pages to be saved on the local computer for later use; they can also be printed and inserted into other documents. Reading Web pages that are full of graphics can be time consuming on a slow modem connection, so browsers (and some Web sites) offer a text-only alternative; unfortunately, many Web designers think only of the higher performance users and often include necessary information in graphical form.

Pages at a given site can be associated together like a book, with the first page in the series usually being referred to as the Home Page; they can also have links to any other Web pages. Pages are usually made up and tested on a local computer and then up-loaded to the ISP's computer which may be located anywhere in the world.

HTML pages can be composed manually using very simple text editing software, but the task can be greatly simplified by specialized software which controls the creative process and manages the pages efficiently to ensure consistency and proper links between them.

In a typical Web site, a theological institution may have a Home Page introducing the school, with opportunity for enquiries using e-mail and response forms; there will also be several subsidiary pages complete with illustrations giving information about courses, staff, buildings etc. It therefore acts as an electronic version of the conventional school catalogue. There can also be texts of lectures, academic papers, reports and other documents, perhaps with video clips or music and links to the pages of the sponsoring denomination, the accrediting association, other similar institutions and academic journals.

The school's academic journal could be available on the Web site, presenting either extracts of previously published articles or a full electronic magazine (or e-zine) with introductory cover pages, indexes, and footnoting and the same kind of editorial control

that would apply to the conventional printed version; the advantage of electronic publishing is that there are no printing or postage costs and the material can be updated quickly; the content and usefulness of the e-zine can be greatly enhanced by providing hyperlinks in the text and notes to other documents and Web pages, such as those related to the theme of the article or other works by the same author.[3]

The site could also be linked to the school library with its catalogue accessible on-line and a system of ordering books for loan or requesting xerox copies of journal articles by mail or fax. Some sites offer links to local tourist and civic organizations so prospective students and supporters can learn about the context in which the school operates.

The Web is very useful for disseminating information in attractive forms, either with pages of information for direct reading or by providing details of sources of information as a bibliography or by links to other Web pages. Many missionary and educational bodies, churches and para-church organizations have found Web pages to be ideal for promoting their activities. Some commercial organizations protect their data with passwords which are available only after paying a fee for access.

For users, the Web can be seen as a giant encyclopaedia, with information on virtually every topic available somewhere. Because anyone with Internet access can provide information, the reliability and quality of the material found on the Web varies with the integrity of the supplier. However, the huge range and amount of material and the decentralized nature of the Internet makes it difficult to locate the required data. To assist with this task, 'search engines' have been set up which function as subject catalogues; the user enters a topic or name into an input form, and the search engine responds with a list of matching Web pages. Some engines work on a subject basis while others search Web pages directly for words matching the required topic. So it is necessary to understand the methods employed by the particular search engine to gain good results.[4]

With skill and patience, it is possible to use the Internet to great advantage, but care must be taken regarding issues of security, privacy and copyright.[5]

III. OTHER COMPUTER APPLICATIONS

Word Processing

Word processing software is likely to be the most commonly used by theologians. The standard commercial packages now available such as Microsoft Word, Corel WordPerfect and Lotus Word Pro, are extremely powerful; they offer a whole range of features from the basic editing operations (such as copy, move, delete and font change) through to mail merge, graphics, desk-top publishing (DTP) and Web publishing.

These word processing packages have excellent page layout and graphics features which make them useful for the production of notes, charts, diagrams and other teaching aids for photocopying or overhead transparencies. They are also powerful enough to produce booklets and other small publishing projects using photocopiers or the off-set

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[3] For an example of an e-zine, see TC- the Journal of Biblical Textual Criticism at www.press.umich.edu/jep/03–01/TC.html and for a full listing of academic journals on the Web, http://info.lib.uh.edu/wj/webjour.htm

[4] Some search engines are Altavista, Lycos, Yahoo, Hotbot. Most browsers have pre-installed links for searching; many ISP home pages also provide a range of search opportunities.

[5] For more information about the use of the Internet, see Quenten J. Schultze, *Internet for Christians* (Muskegon, MI: Gospel Films, Second Edition 1996) and his Web site (which includes a virtual appendix to the book) at www.gospelcom.net/ifc

process; specialized Desk Top Publishing (DTP) packages are also available at modest prices which provide more precise control of layout.

There are also more limited versions of these and other applications which offer fewer features at reduced cost and often with several different types of application integrated into one package for easier use; requiring less experience to use effectively, they are often bundled with software pre-installed on new computers and are sufficient for many situations.

Database Management and Spreadsheets

Database management programs are also useful aids for theological work. They function essentially as an electronic version of the familiar card index system; computerisation gives much greater power and convenience for sorting, finding and displaying information. Database programs can be obtained in a general form which are easy for beginners to use; more advanced packages feature fully programmable software, while some installations are highly customised for a specific situation.

Management of personal research notes, student records and library catalogues are typical uses for a database program. Administrators will use them for keeping track of church members, staff and students; data fields can be set up to cater for whatever information is needed, such as names, addresses, positions held, interests; photographs can be scanned in and attached to each person's record, and the phone, fax and e-mail contact details in the database can be linked directly to the local computer and its modem to eliminate the need for manual dialing. A database can be used in conjunction with word processing to produce personalised form letters and mail labels through the mail-merge process.

Spreadsheets, which are a type of database set out in a grid of columns and rows, are particularly useful for numerical and financial data because formulas can be inserted into the cells to perform calculations. They lend themselves well to statistical work, and can produce a wide range of charts for presentation of data.

Converting files from other systems is now common, which means that in addition to typing or scanning your own document, you can make use of one created on another computer and sent on a disk, transferred by e-mail or down loaded from the Web; it can then be edited as required, replacing or moving text, adding foot/end notes, highlighting text and background in various colours for emphasis, checking grammar and spelling and formatting it. In addition, data can be transferred from one application to another, making for more convenience and efficiency. Thus a chart can be created in a spreadsheet, and then used (and updated if required) in a word processing document or published on the Web.

Specialised Word Processing and Databases

Typical home and business word processing packages can support different language fonts, including the biblical languages; some can even move the cursor from right to left as appropriate. However, for the serious student, there are specialized packages designed for scholarly use which have superior language and editing facilities.[6] One disadvantage with specialist word processors, however, is the possibility that their data files may not be compatible with other mainstream systems making transfer of material and general flexibility of the computing system difficult.

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[6] One of the most powerful is Nota Bene, currently in a DOS version; some of its once special features are now common in Windows-based word processors but a Windows version is due soon. Infomatics 285 West Broadway Suite 460, New York NT 10013 (www.notabene.com)

Another feature of academic word processing (either in specialized programs or as add-ons to standard packages) is the ability to manage references and bibliographies efficiently. The most common principle used is inserting a code into the document wherever a reference is required; when the reference software is run, the codes are replaced with full data about the book or journal article drawn from a database of information which has been prepared in advance. The data is set out according to the format of the nominated style (MLA, Chicago etc.) Furthermore, all the references are scanned and a bibliography of cited works (in appropriate format) is placed at the end of the document. Over time, the user can build up a very large database of bibliographical material. The system relieves a great deal of tedious re- typing; in some cases, it is possible to download bibliographical material from library catalogues and publishers' databases which eliminates the need for manual entry. In others, the user's research notes can be managed in a database form and inserted into text documents with ease.[7]

Other packages specialize in linking word processors to the text of the Bible, either in various contemporary translations or in the original and/or ancient languages complete with the appropriate fonts. The simplest function of these packages is to act as an electronic concordance, locating the occurrences of particular words or passages and either studying them on the screen or inserting them into a document such as a lecture outline or a sermon. The user may select any of the Bible versions installed on the computer, and perform powerful searches which are capable of identifying combinations and usages not possible in a printed concordance.[8]

While the results of such operations may be enlightening, some limitations of computer Bible study should be noted. First of all, where transcription from older sources is involved, particularly in ancient languages, the computerised text may not be totally error free; this should not be a problem with modern versions. Then the computer is limited to searching on precise words or character strings; this means it will miss synonyms and related words unless separate searches are made for them, and it will be difficult to make significant searches in the modern non-literal translations in which a great of paraphrasing takes place; the same applies to dynamic equivalence translations. One solution to this is to use some kind of thematic or topical indexing, but this is one step

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[7] For a page showing details of various Bibliographical Software Packages by John G. Norman, see http://www-writing.berkeley.edu/chorus/eresearch/essays/known.html

[8] For reviews of some packages, see *Bible Archaeology Review*, (May/June 1997) 54–64 and www-writing.berkeley.edu/chorus/bible/index.html. Some well known packages are:
Bible Windows (Silver Mountain Software, 1029 Tanglewood Cedar Hill TX 75104–3019 USA; http://www.silvrmnt.com)
Bible Works for Windows (Hermeneutika Software PO Box 2200 Big Fork MT 59911–2200 USA; www.bibleworks.com)
Gramcord and Accord (for Mac) (Gramcord Institute, 2218 NE Brookview Dr., Vancouver, WA 98686 USA; www.gramcord.org)
IVP Study Bible (Lion Publishing, Peter's Way, Sandy Lane West, Oxford, UK, OX4 5HG England; www.lion-publishing/co.uk/lion-pages/page_3.html)
Logos Bible Software (Logos Research Systems, 2117 200th Ave W., Oak Harbor, Washington 98277–4049 USA; www.logos.com)
NavPress Wordsearch (NavPress Software, 1934 Rutland Drive, Suite 500, Austin, TX 78758–5418, USA; www.gospelcom.net/navsoft)
Nelson's Electronic Bible Reference Library (Nelson/Word Electronic Publishing, 501 Nelson Pl., Nashville Tn 37214 USA; www.nelsonword.com/library/ihtml)
Quickverse (Parsons Technology, 1 Parsons Drive, Hiawatha, Iowa 52233 USA; www.parsonstech.com/infocentral/media)
Word Study Bible (AMG Publishers; 6815 Shallowford Road, Chattanooga, TN 37421 USA; www.gospelcom.net/amg/html/publishers.html)

removed from the biblical text itself. Another popular solution is to key the biblical text to the numbering system used by Strong's Concordance, thus identifying the word in translation with its biblical original.[9]

Most packages also offer other related functions. The text can be hyper-linked to reference material such as a Bible dictionary, atlas, concordance, lexicon or commentary; by selecting a particular verse, word or theme in the biblical text, the computer will locate related information in the supporting works; this information can be displayed, inserted into the word processing document or printed for further study. Packages which link with standard scholarly reference material can be extremely useful because of their efficient search capacity; linking to collections of sermon illustrations and music is appealing for preachers and worship leaders. However, the devotional and older popular material which is often available in large quantities on CD is of dubious value.

More advanced packages work directly with specialized forms of the Hebrew and Greek text, which have grammatical information attached or tagged to each word. This means that the parsing of each word may be displayed, or in other cases, it is possible to search for and display words according to their lexical and grammatical forms; thus a search could be made for the occurrences of a certain inflection or Greek word (whatever the actual inflection) or the various instances of a particular syntactical construction involving either specific words or generally. As in many of the cases already cited, the computer is able to combine searches according to Boolean logic (AND, OR, NOT etc) and by proximity (finding instances of hit terms within a certain number of words of each other).

While direct links to computerised forms of lexicons, exegetical and grammatical dictionaries and similar reference works can be highly valuable, it should be noted that grammatical information provided in the tagged biblical texts is only as reliable as the decisions of editors who created them; it is important to understand the principles employed in the construction of a tagged text before it can be used reliably. Furthermore, the features of the search software need to be taken into account.

Other more specialized computer applications can be mentioned briefly. Textual criticism lends itself to computerisation on the grounds that manuscripts can be grouped into families on the basis of the degree of agreement between them as revealed in their variant readings. Computer programs can be devised to carry out the mathematical work of discovering the patterns amongst the variants, relating the various manuscripts to each other in a hierarchical pattern and printing out the results in chart (family tree) form. The results reported for this experimental work appear promising, but much more work needs to be done on both the application and theoretical aspects before it can be considered as a reliable procedure. But as B. Fischer has observed, the complexity of data involved in NT text criticism is so great that computerised assistance is virtually mandatory.[10]

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[9] Harry Hahne, 'Interpretive implications of using Bible-search software for New Testament Grammatical Analysis' presented at the Annual Meeting of the Evangelical Theological Society, 24 Nov 1994, on www-writing.berkeley.edu/chorus/bible/essays/ntgram.html. See also Alan F. Segal 'Electronic Echoes: using computer concordances for Bible Study', *Biblical Archaeology Review* (Nov/Dec 1997), pp. 58–60, 74–75. For links to Bible texts at the Center for the Computer Analysis of Texts at the University of Pennsylvania, see http://ccat.sas.upenn.edu/teachtech/resources.html

[10] See James D. Price, 'A computer aid for textual criticism', *Grace Theological Journal 8.1* (1987), 115–129, for an outline of the principles involved and a somewhat dated review of literature; for an example of the procedure, see idem, 'A computer-aided textual commentary on the Book of Philippians', *Grace Theological Journal 8.2* (1987), 253–90.

Computers are also used extensively to assist in translation work by groups such as the United Bible Societies and the Summer Institute of Linguistics (SIL). Typical applications include desk-top publishing and computer-typesetting of translated Scriptures and literacy materials; word processing, complex text formatting and editing of the manuscripts (often using non-Roman alphabets); graphical speech analysis, language and vocabulary analysis, dictionary and concording utilities and computer-aided translation.

IV. COMPUTERS AND THEOLOGICAL EDUCATIONAL

Computers have become important in most forms of education, with governments and private institutions investing large sums of money in training, software development and equipment. Theological education can also benefit from this technology, but care needs to be taken to sift out the more ephemeral material, and to avoid problems of copyright and plagiarism which arise from the ease with which material may be accessed and processed.

At the simplest level, there is the creative use of computers to produce course material, both printed and electronic. Then computer-aided- instruction can assist with the learning of certain types of material, especially biblical languages by offering a type of electronic flash card which is useful for drill and testing.

Many reference works are now available on multi-media CD, bringing text, maps, photographs, sound and video clips together; this medium lends itself to historical and cultural subjects in biblical, historical and missiological areas. Standard works such as Bible dictionaries, atlas and commentary sets can be searched quickly and efficiently, while most creeds, confessions and other church documents are available in computerised form for study.[11]

Topical productions are gradually making their appearance; for example, a CD devoted to the Dead Sea Scrolls provides an ideal introduction to the subject with the text and images of the scrolls themselves, videos and animated reconstructions of the Qumran settlement, lectures by recognized scholars combined with standard material on the history, background and content of documents.[12]

A number of commercially produced databases are also available which are useful for theological work. For example, the Religion Database, published by ATLA, is the electronic version on CD ROM of the index to articles and book reviews in the leading theological periodicals; this index has been available in printed form and on a dial-up database for many years. The CD-ROM contains powerful search software, the index of more than 900,000 articles from almost 1400 journals dating from 1949 along with citations from multi-author works and additional data, including Doctor of Ministry dissertation titles. Several subsets of the full CD, focusing on specific areas of study are also available at

[11] Some contemporary reference works that are available on CD include: Anchor Bible Dictionary, Bible and Christianity (Lion), Evangelical Commentary of the Bible (Elwell), Evangelical Dictionary of Theology (Elwell), Expositor's Bible Commentary, New Bible Atlas, New Bible Commentary, New Bible Dictionary, New Interpreter's Bible. The Sage Digital Library is a very large collection of Bibles, commentaries, reference and theology books including the Ante-Nicene and the Nicene and Post-Nicene Fathers, Josephus, many of the Puritan and Holiness writers and scores of others; www.sagelibrary.com

[12] 'Dead Sea Scrolls Revealed' from Logos Research Systems; Parson's Technology publish 'A Walk in the footsteps of Jesus.'

reduced cost.[13] The well known Religious and Theological Abstracts is also available on CD-ROM, with the advantage of abstracts as well as bibliographic information.

The entire corpus of ancient Greek literature up to 600 AD is available on a CD ROM, published under the Thesaurus Linguae Graecae (TLG) project based at the University of California at Irvine, School of Humanities. With suitable search software, this opens up enormous possibilities in the comparison of the NT and other early Christian documents with the ancient world. Similarly, Latin literature well into the history of the church is also available.

Theological work will also benefit from the many other secular CD database indexes that are in common use; those in the area of education, sociology, philosophy and other areas in the humanities are likely to be the most fruitful. General purpose reference works are now also readily available on CD, including the famous *Encyclopaedia Britannica*; these are often associated with Web sites which provide current information to update the CD.

Church growth and missiology can profit from mapping cultural and demographic information available from a variety of sources, especially on CD from government and similar public agencies and the Internet.[14]

A good deal of information directly related to theological work is available on the Web, including publishers' promotional material, details of schools and colleges and their faculties and courses, catalogues of university and seminary libraries, contemporary and traditional texts and electronic magazines. News groups and mailing lists can keep students and faculty up to date with current discussion on topics of interest, while home pages of various types of religious and other organizations will provide a window on the contemporary religious and social world. There are scores of special interest sites and discussion groups in areas of faculty expertise and in cross-disciplinary interests.

Distance education can be enhanced greatly by the use of computers and the Internet. There is a steady increase in the amount of course material available using these means, while some seminaries are offering complete programmes. This involves not only publicity, enrolments, and display of requirements for courses along with bibliographic and other resources, but presentation of course content, and submission and return of assignments by e-mail, discussion groups, and posting of grades. The whole system makes up what is called the 'virtual campus'.[15]

Administration

Computers can be greatly useful in the administration of a church, mission or theological institution, and they can assist pastors and administrators personally. Personal computers in large offices are frequently linked by a Local Area Network (LAN) which makes applications, data and peripherals available to any computer in the system, thus saving on expense and enhancing productivity. Using suitable software, computers can also be operated remotely over a telephone line. Thus a field worker could access data on the office computer from a distant location by dialling in on a nominated phone line; Web

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[13] American Theological Library Association, 820 Church Street, Suite 400, Evanston Illinois 60201–5613; http://atla.library.vanderbilt.edu/atla/market/cg98rdb.html. The complete list of journals indexed is available on http://atla.library.vanderbilt.edu/atla/market/riojrnls.html

[14] Global Mapping International, 7899 Lexington Drive Suite 200A, Colorado Springs, CO 80920 USA. (www.gmi.org)

[15] For a recent discussion of this trend see 'Distance learning to the rescue?' (*Christianity Today* 17 Nov 1997 p. 68), and for some examples, www.trinitysem.edu and www.online.georgefox.edu

sites provided by the organization will be of increasing assistance to field workers and clients.

In addition to word processing, DTP and database work already mentioned, accounting software is perhaps the most useful application in administration. It ranges from the simplest packages suitable for personal and family budgeting to the sophisticated systems which meet all the standards of professional chartered accountants. Well designed finance software enables trained but otherwise unqualified staff to carry out day to day book-keeping with accuracy and convenience.

Personal information management software acts like a powerful electronic diary, keeping track of engagements, contacts, addresses and phone numbers. Presentation software prepares and controls colourful 'slides' depicting attractive images, charts, maps and other diagrams which can be used in promotional work, displays and training.

Fax software eliminates the need to have a separate fax machine, especially when used in conjunction with a scanner; combination colour printer, scanner, copier and fax machines are now readily available thus reducing the amount of office equipment needed. It is also possible to conduct telephone conversations via computer links, with television and live video. Tele-conferencing is also another high level feature which brings people together from remote locations via video or Internet links; while it may be expensive initially, if there is sufficient usage, the outlay may be compensated for by the accompanying reduction in the time and cost of travel and accommodation.

CONCLUSION

New applications are constantly being discovered to make use of the power and convenience of computers. When used wisely, they can be, like other forms of technology (including radio, audio recordings and aviation) greatly beneficial to the kingdom of God. However, issues relating to proper stewardship of funds and (over) reliance on high (and possibly, inappropriate) technology must be taken into account. Users should avoid the temptation to purchase pirated or otherwise unlicensed software; the cost can sometimes be reduced by use of shareware,[16] bulk buying, academic pricing (heavy discounts to encourage students to start with and continue using a company's products) and site or multiple licences. Tuition in the use of software and after-sale support increase the value and effectiveness of one's investment. Care is also needed to safeguard the security and privacy of data.

This article has been able only to outline some of the ways in which computers can be of assistance to those involved in theological work. Much of the material available is geared for the lay or popular market rather than the academic, and it is difficult to keep up to date in such a fast moving field. However, readers will be able to move on from the suggestions mentioned here to develop their own understanding through discussion with colleagues, the large number of books, magazines, computer clubs and courses that are available in their area, and by information available on Internet.[17]

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[16] 'Shareware' is a system of marketing software written often by small and innovative authors by which the product (fully protected by copyright and patent) is circulated freely (by disk, over the Internet, Bulletin Boards etc) so potential purchasers can try it out and then pay a modest registration fee if they wish to continue using it; sometimes 'shareware' products do not have full functionality (e.g., a limited number of uses, printing of documents disabled). 'Public domain' software has been handed over for free public use by the authors without any charge or claim on it by the author.

[17] For additional suggestions and details, see the material offered by Harry Hahne of Ontario Theological Seminary on 'Using a Computer in Biblical and Theological Studies' at his home page,

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Indian Spirituality: in Search of Truth and Reality

Kathleen Nicholls

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In this moving article the author contrasts the intense Hindu search for truth, love and reality through four millennia of Indian culture with the more recent, but equally intense, Indian Christian experience of God in Christ. The language of poetry rather than prose, of symbols rather than ideas is shown to be the most effective vehicle of this search and its anguish. While Hindu spirituality focuses on the self in search of the Ultimate Self, Christian spirituality reaches out with the love of God in love and compassion to the poor, the marginalized and all who suffer. In this context, the Cross and the Resurrection shine as light in the midst of darkness.
Editor

Keywords: Hinduism, truth, life, love, awe, reverence, Incarnation, release, deliverance, grace, symbolism, austerity, ascetism, guru

As we look back over India's history as far as the Indus Valley civilization, we are conscious of 5000 years of search—a long, long search for truth and reality.

One of the strands of this search appears in Vedic times, somewhere in the second millennium B.C. as waves of Aryans migrated to India. Ritual sacrifice was made to a variety of gods who were personifications of the power of nature which affected people's daily lives. The concept of propitiation and expiation of the deities took shape in Vedic times.

With the development of the various schools of philosophy, we see the emergence of a new concept of deity, the 'descended' or *avatar*. The *Ramayana* demonstrates ideal behaviour towards family and community in the life of the avatar: Rama. The *Mahabharata* seeks to answer the moral and social problems of thetimes. In the 'Song of the Lord' (**the** *Bhagwad Gita*), we see the first suggestion that God can love man and man love God, as Krishna, disguised as the charioteer, converses with Arjuna.

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www.chass.utoronto.ca/~hahne/harry.html and at www.chass.utoronto.ca/~hahne/scintro.htm. For some software of interest to theologians, see www.pitts.emory.edu/bob/theosoft.html. Somewhat dated printed works include Jeffrey Hsu, *A Comprehensive Guide to Computer Bible Study* (Dallas Word, 1993), and John J. Hughes, *Bits, Bytes and Biblical Studies* (Grand Rapids: Zondervan, 1987). Jason D. Baker maintains a Web page supplement to his *Christian Cyberspace Companion* (Grand Rapids: Baker, 1995) on www.bakerbooks.com/ccc. Another list of books is found at http://bible.acu.edu/ctt/ccbiblio.html