

FAITH AND THOUGHT

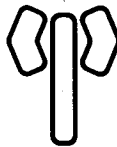
VOLUME 111 • NUMBER 1 • APRIL 1985

*A Journal devoted to the study of the inter-relation of the
Christian Revelation and modern research*

GENERAL EDITOR: Dr. A. B. Robins



Published for
THE VICTORIA INSTITUTE



by
THE PATERNOSTER PRESS

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The Use of Computers in Bible Translation

Computers continue to be more apparent than ever before. They can be seen in shop windows in the High Street and *The Times* contains listings of computer-shows being held in various cities in the U.K. The putative audience ranges from parents of pre-teen children to corporation presidents. Claims seem to indicate that purchasing the right computer will solve many, many problems forever. To some degree, that is true and has been true for over twenty years. During this twenty-year period, computers have been introduced as labour-saving devices in Wycliffe Bible Translators and the Summer Institute of Linguistics.

In general, translation consists of several steps. These include: (1) understanding the source information; (2) analysing and learning the receptor language; (3) putting the source information into the receptor language (first draft); (4) polishing the new document (revising); then (5) publishing it. Computer technology has been applied to Bible translation in reverse order: step five was addressed first, then four, then three. Steps one and two are now under consideration and implementation.

In the late 1940s, Kenneth and Evelyn Pike completed translating the New Testament into a Mixteco language spoken in Mexico. They took their manuscript to a typesetting and printing firm. Because the language was foreign to the person typesetting the text, typographical errors were made. The Pikes proofread and marked the appropriate corrections. However, when the lines containing the errors were re-set, new errors were sometimes made. When the process was finally completed and the book printed, a new prayer request was also discovered for people who were working with newly-written languages: typesetting should not depend on the reading and typing skills of any human.

In the mid 1960s, digital computers were being used in business and scientific applications. By the end of the decade even Wycliffe Bible Translators were using them to process receipts, write cheques, print mailing labels, and prepare finan-

cial reports. Missionaries who had technical skills began to investigate ways to handle huge texts, like New Testaments, using computers, so that the problems that the Pikes and others had encountered might not recur. They also reasoned that the text could be stored by a computer and then recalled as often as necessary, relieving the tedious and time-consuming business of typing and retyping.

By the early 1970s, a computer-assisted text-editing and typesetting system, named IOTA, was in operation for translators in Mexico. When the text was typed, it was being recorded on paper tape (as an interim medium) rather than going directly on to sheets of paper. Then the text that had been recorded on the tape would be printed out using a line printer and the printout given to the translator. Often, he received it in duplicate. He could proof, mark corrections, and return it to the people who operated the large main-frame computer. Someone would make the required corrections without changing the parts of the tape that were correct and the translator would receive a new printout to proof. After the text was deemed correct, a tape of the most recent text would be read by the phototypesetting machine to obtain photo-ready copy which would be used in the printing process. Now, the final book would contain the same text that the translator had approved.

In the mid 1970s, smaller computers came on the market. Translators wanted to use this new technology, but they did not want to be tied to a non-portable, main-frame computer. Walter Agee was asked to find or develop a computerised text-editing and typesetting system using one of these smaller computers. He finally found a company, NewCaxton in Pennsylvania, using Datapoint 2200 computers to typeset something: horse racing forms! After negotiating with this company, Wycliffe Bible Translators were given permission to use the text editor and two printing programs, and NewCaxton would typeset the material on their VIP phototypesetter. People in 'Wycliffe' named this the SPEED system. It permitted capturing the text on magnetic tapes (cassette), correcting it, and typesetting it. By 1976, a simple, consistent, changes program was added and by 1977, a program that read through the text, verifying that all the chapters and verses were present (or where there were problems) was developed. A short time later the consistent-change program's power was increased to allow massive re-spelling to be done quickly and easily. By 1979, a program which listed all the words with their references and two more

text editors had been added; the original editor, verse checker, and consistent-change programs improved, and the printout programs speeded up.

At last, a computer could be used from the rough draft stage to typesetting. The task of typing the original draft and making corrections to that text could be done by people of average typing skill after a short training period. However, specially trained people were needed to devise the complex change tables used (a) to change the shorthand marker for each different element of text into the appropriate typesetting commands and (b) to change the spelling of words and wording of phrases. For example, the translator of the Igede New Testament (Nigeria) made a list of 209 different words and phrases that needed to be changed. When that list was 'read' by the consistent change program, it took less than four hours to apply them to the entire New Testament! It would have taken months just to find them all if the changing had been tried manually. It took another three and a half hours to make a printout of the entire New Testament for another proofing round! Note that the work was still divided between the translator, who was responsible for the text, and a typesetting expert, who was responsible for manipulating that text once it was ready for typesetting. Also, programs for language analysis had not yet been developed for general use.

In the late 1970s, several translators wanted to do linguistic analysis using a small computer, but the Datapoint 2200, with its 16k memory, mains power requirement, and cassette tapes was not deemed practical. At the same time, more companies were marketing small, more powerful, and almost portable computers. After deciding that no company was making a truly portable computer that could operate from a direct current source (a battery recharged by solar cells) *and* fit in a suitcase, 'Wycliffe' developed and field-tested a 'computer in a suitcase'. The computer grew, as more options were requested by translators, but the project was finally terminated for two reasons. 'Wycliffe' decided not to become a manufacturer, *and* the suitcase could no longer hold the computer!

However, that strong desire to change to a more powerful computer for text-processing continued to grow. The new one must allow the individual translator to obtain printouts without needing the services of a typesetting expert. It must also run the kinds of programs that non-specialists could use and understand. After much discussion, the Digital Equipment Corpora-

tion, VT103, was chosen. DEC's RT11 operating system was to be used and new special programs would be written for translators. Immediate reaction was favourable even though the VT103 was not really portable, required mains power, and used a very expensive storage medium. Soon it became apparent that the VT103 was not the final answer: portability was still an important issue, as were programs that were easy for non-computer people to use.

In 1983, Radio Shack marketed the TRS80-100, a truly portable computer. Previous small computers were being renamed 'transportable' in comparison. Then came the Sharp 5000, delighting the eyes of people in 'Wycliffe'. This new computer would fit in a briefcase and run on batteries! People within 'Wycliffe' began re-writing existing programs for it and writing new ones to solve problems faced by people doing linguistic analysis *and* translation work.

Simultaneously, people involved with preparing texts for typesetting had developed a typesetting system around the DEC 11/73. Previous programs developed for the Datapoint 2200 were rewritten for the DEC. New programs were developed to solve problems discovered over the years; problems that often caused lots of retypesetting. (Some of these were due to the different appearance of the text once it was set in type rather than output by a line printer.) This latest computer and these programs could reduce the processing time by fifty per cent.

Also by this time, Computer-Assisted Dialect Adaptation (CADA) had become a reality. CADA is not machine translation. It is a program which accepts as the input a text from a source language and generates that same text in a closely-related target language according to the linguistic rules supplied by someone who is familiar with both languages. It was not designed for translating German into Mandarin: it assumes the two languages are very closely related and have the same world view like Central Cakchiquel and Eastern Cakchiquel. For example, the Central Cakchiquel word *yech'obon* becomes *nqulnucun*. It does so because the following are defined:

- y*, the continuative, becomes *n*;
- e*, third person plural agent, becomes *qul*
- ch'ob*, THINK, becomes *nuc*
- on*, actor emphasised, becomes *un*.

Note that CADA does not provide a finished, polished translation; but it does supply a very good rough draft!

In 1985, computers are being used in 'Wycliffe' for business purposes, for text processing and typesetting, and dialect adaptation.

Linguistic analysis programs for field use are still being developed. This seems to be the next frontier. The translator (linguist) needs to be able to analyse the various non-scripture texts prior to beginning translation work. His goal is that the scriptures make sense in the culture for which he is translating.