NOTATE: Computerized Programs For Labanotation

Traditionally, many hours with graph paper and ruler are involved
in the creation of a written dance manuscript ('Score') using Labanotation.
Many more hours were needed before the notator could present a score
suitable for publication. Now, computers at the Weeg Computing Center at
the University of Iowa help to provide high quality notation manuscripts
far more efficiently.

Some years ago (circa 1976), work was begun at the University of
Pennsylvania by Weber, Smoliar, and Badler, and M. Brown to integrate the
use of a computer with Laban's script for writing movement. It was thought
by these investigators that it would be helpful to those unfamiliar with
Labanotation to see a visual interpretation of written 'Score'. They
thought, too, that a 'bubble man' type of visualization on a cathode-ray
tube screen would assist notators in the process of error-checking.
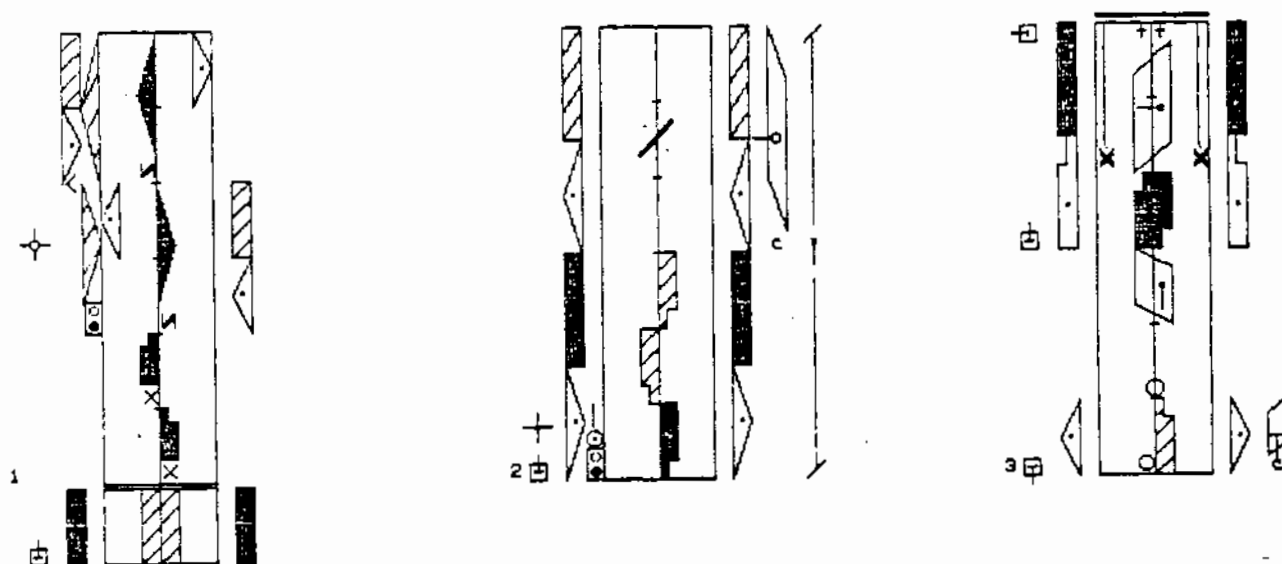

Figure 1

There were several important contributions made by this pioneering
work at Pennsylvania. For the first time, a Labanotation 'Score' could
be entered into a computer. The implications were that the considerable
analytical potential of computer technology could be used to study human
movement and that notators now had the means available whereby they could
write movement more efficiently than before. By using a single key-
stroke, an entire notation 'symbol' could be written, where in long-hand,
each character requires two, three or more strokes of a pencil or pen.
It needs to be said that an important precursor to computerized Labanotation
was the invention, by the IBM Corporation, of a 'Selectric' element for an

electric typewriter. However, on the typewriter, each symbol had to be formed by piecing together elements of each character using multiple keystrokes. The work at Pennsylvania advanced the physical efficiency of IBM's development.

But there were several drawbacks to their system: First, the programs were written in computer language, which made them difficult (at best) to transfer to other computers. Second, the amount of computer memory needed to accommodate the programs made the program difficult to transfer and very expensive to run. Third, it was found that the manner in which a Laban 'Score' was entered and stored in the computer could be much improved upon.

In January of 1978, I initiated and subsequently headed a team, together with two colleagues: Judith Allen (a certified Labanotator) and John Anderson (a computer programmer). At that time we wrote NOTATE; a package that consists of seven computer programs that were the result of somewhat different research aims and a different usage and application of the Laban script.

In work at Pennsylvania the notation symbols are primarily used as inputs; the system is a device that enables them to manipulate 'bubble man' on the screen. At Iowa, we saw our programs more in terms of opening the technology to the "average" notator. We wanted to make it easier for people who used writing all the time to compose 'Scores' (if they were dancers), or to construct texts of movement (if they were social scientists, for instance). We do not see Laban's system of notation as a secondary or accompanying feature to the visual representation of a human. We see more value in developing ways of using the script.

Personally, I am interested in computerized mathematical models of the body that might advance scientific knowledge in research and theory. I believe that the objectives we had in creating NOTATE will ultimately serve those interests. Ease of human interface with the computer was a primary aim: we tried to emulate as closely as possible the procedures used by notators while writing movement. This meant minimization of 'computereeze'.

The second aim was to write the programs in such a way that they could be installed in computers other than those at the Center in Iowa. We attempted to make NOTATE as compatible as possible with other existing systems, because this would allow texts created by other computers to be used by NOTATE -- and the reverse.

One problem with computer generated graphics (as with the texts generated by NOTATE) is that they require special graphics terminals that are capable of generating continuous lines in other directions than the usual horizontal lines -- common in most 'alpha' and 'numeric' graphics terminals. The sets of commands possible to send a graphics terminal are, unfortunately, different among different manufacturers. This means that the majority of graphics projects become 'device-bound' at some stage. The extent to which a program is 'device-bound' is therefore a function of one's choice of terminal. The important point is how much of the command resides with the terminal and how much resides in the program.

Our choice was made in favor of a Hewlett-Packard 2648A Graphics Terminal and a 2631G Graphics Printer. There were several reasons for this: compatibility with other computers, local maintenance, selective editing features. After these decisions were made, NOTATE got underway with the first programming task: choice of the symbol-set.

The symbols we chose are a sub-set of those given in Hutchinson (1970: 499-509). There are over one hundred available in NOTATE. There is enough flexibility in the program to allow for all the symbols in Hutchinson's Glossary, but we started with the more commonly used ones, with the idea that we would add others as and when they were needed. At this writing, our symbol-level is roughly equivalent to an intermediate level notation as it is taught by the Dance Notation Bureau in New York.

In the creation of the staff for NOTATE (an expanded staff is used), we used straightforward vector drawing and based our work on the parameters of the needs of specifically dance notators: that is, beats per measure, number of measures displayed. Additional programs were written to draw the symbols on the staff.

At this time, the size of the symbols used on the computer are closely related to time duration. For the notation of dances, of course, the length of the written character is determined by the time involved -- and NOTATE is primarily for dances. However, in our present re-programming plans, we have realized that we must give equal emphasis to the needs of the non-dancers. NOTATE now stores a written character of 1/8" size that has a "scale factor" of 1.
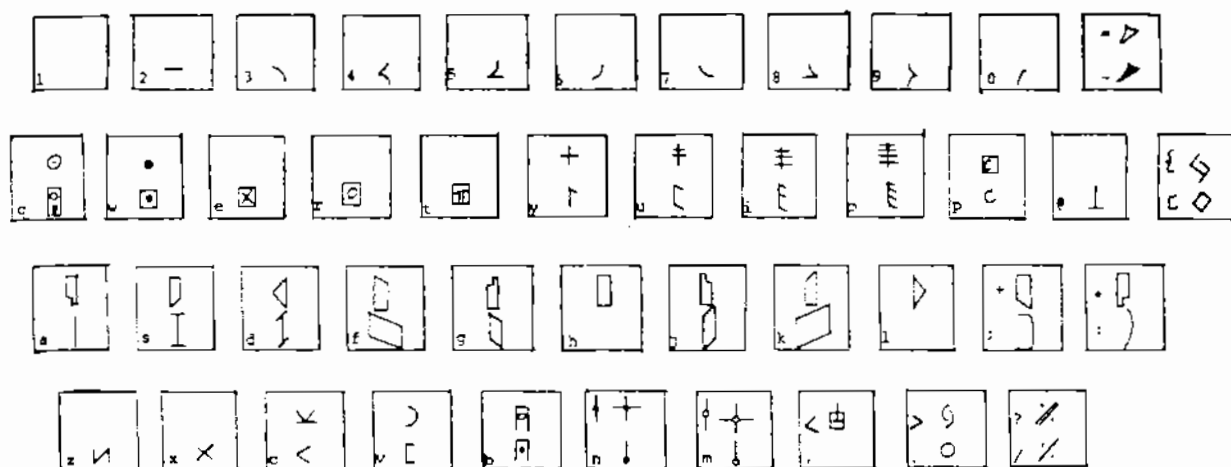
KEY ASSIGNMENTS

Figure 2

A symbol is called to the display screen by a key-stroke. The key assignments are shown in Figure 2. The notator is then asked to specify the parameters particular to that symbol. For example, a direction symbol would require which staff column the symbol is to be placed, the measure, the beat of the measure where the symbol is to begin, the level of the symbol, and the time duration in beats or decimal parts of beats. This last provides some interesting possibilities.

Traditionally dance meter uses whole, 1/2, 1/4, 1/8, 1/16 notes, etc., which expressed decimally would be .5, .25, etc. Now it is possible to express time duration in any decimal factor such as .1, .16 or 3.62 units of duration. The units are immaterial to the computer and are left to specification of the notator. This aspect of computerized notation may or may not be useful to a dance notator. However, notators of other kinds of human movement might find this attribute very useful. For example, in notating the martial arts or other similar movement pieces, the metrical unit could be left unspecified and a single standard length of symbol could be used. On the other hand, if the precise time of movement duration is important, such as 2.01 seconds, this can be recorded.

There are some other interesting potentials for computer applications to Labanotation. Once a score is stored in the computer it is accessible to various types of error checking and analytical methods. Manuscript error checking is an extremely time consuming, but obviously very important operation: a computer could scan an entered manuscript and display the sections that were in error. NOTATE already has an editing facility used to change or correct manuscripts. This could be used by the notator to correct the errors displayed by the computer. The real difficulty, of course, is how to avoid making notators entirely computer-dependent.

The computer can provide other avenues of investigation: for example, two movement sequences could be notated on the computer. The computer could then be asked to compare the two and display any similarities or differences found. Cross-cultural analysis of movements could thus be assisted by the computer displaying the areas of similarity or difference in the two movement manuscripts. Some work in this area is in progress by Sealey and Dr. Drid Williams, but the results are not yet ready for publication.

The potential for computer assisted movement analysis is great. By combining the power of a computer with other technologies, such as video tapes, video digitizers, and computer graphics, more avenues of movement investigation can be opened that were never before available. This is a development that is both exciting and interesting; however, advances in technology in this -- as in any other field -- are problematical because it is often the case that the technology itself is so overwhelming (if not 'mystifying') that its users fall into the trap of believing that the potential knowledge connected with the data that is processed by the computer resides in the machine and not the people who use it.

David Sealey

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