Sustained dashes combine Morse Code with word prediction and can improve row column scanning

This text provides some background information about my research. For more videos see www.depratendecomputer.nl/someothervideos.htm and www.depratendecomputer.nl/somevideos.htm.

In the nineties I researched into AAC, Augmentative and Alternative Communication. What fascinated me was whether to have a conversation with switches and synthetic speech implies one needs stored text in the form of phrases, stories, macros and text prediction. This question, I reasoned, merits laboratory work with healthy test subjects. An interesting book about Alternative Access states '*caregivers who consider to advise scanning... are well advised to try to scan a single page of text themselves*' (Anson, 1997). Following this advice, and shocked how frustrating scanning can be, I experimented with many different types of scanning matrices, changed their behaviors, changed their contents, and measured and modeled all kinds of things. I measured clicks and pauses per character, made grammars of what users go through and designed and implemented several alternative scanning methods.Also, using myself as a test subject, I carefully measured input rates.

One switch passive row-column scanning, where the machine moves the focus, is extremely slow. Two switch active row-column scanning, where the user may move the focus, is significantly faster, as long pauses are replaced by much shorter clicks. It takes some service to adapt pause time and takes time to learn well. To combine with frequency optimized matrices takes more effort as users need time to decide where the next character is. With both systems errors can be extremely annoying. Morse Code takes even more time to learn but is faster than active scanning, needs fewer clicks and pauses per character, automates on the word level and can be done blindfolded.

I applied what I had learned in a speaking editor with stored text and was able to have simple conversations with two speaking computers, one of them accessed by Morse Code plus word prediction. Interestingly, abbreviations were used more often than word predictions, that were hard to combine with Morse Code. Phrase prediction, with an algorithm that I was very proud of, was hardly used. The algorithm worked, is called 'fluc=first letters upper case' and uses a peculiar kind of logic called ordered predicates. But often a reasonable phrase would not be present and the text prediction distracted. I published, in 2000, about this editor and about reuse of previously

entered text.

Later I discovered two-bit quartering, grouped scanning with a small subset of Morse as intermediate code to move and at the same time shrink the focus. It is a bit faster than row column scanning, was optimized in many different ways and can be combined with word prediction and with stored text using extra codes. Because it does not automate the same way that Morse Code does, and seems harder to do and more error-prone if done blindfolded, it must be slower on the long run. If it is faster for novices is unsure, because Morse Code presented on screen can be easily looked up and may be rapidly memorized as well[1]. Again, after much hard work, a report was made, and put on my website as few journals showed interest.

About two years ago I found a better and presumably new way to combine Morse Code with word prediction using sustained dashes. Sustained dashes are faster than numerical codes and allow to relax a bit while coding. Perhaps, I thought, they may speed up input if you are slow and need a long pause at the end of each code. This is not self evident because word prediction tends to distract and therefore need not speed up input rate. In fact, it may even slow it down, if few long words are entered or are correctly predicted. Slowing down is almost to be expected as there are many long words in the language and as most words are rather short. But with some adaptations to the word predictor it did work, and seems of merit in conversations when the same words are repeated often.

I again wrote a report, put on my website. It analyzes sustained dashes and includes considerations about design, mathematical models, details about word prediction, abbreviation expansion and learning by a friend who learned to use Morse code in conversation and in less than twenty hours. As it happens, writing about the pros and cons leads to new ideas and a funny example is that with three switches one may also access the word prediction with 'discrete sustained dashes' and no timers at all. This might be of value to people with athetosis. It also describes a special form of row column scanning that employs an empty column, to reduce errors, and the same word prediction as Write Easy does. This system is rapidly learned and rather fast as well and may use sustained dashes to support two dimensional scanning with a single switch. The report is intended as a design rationale to record what, when, why and what for. Several people helped to get it right: Marjan Sipma Flokstra, a former locked-in patient who helped with the redesign, David Colven, John Paulin and Heidi Koester, who gave helpful criticisms, Maarten Wang, a speaking but athetoid test subject, and Sem van de Pol, the friend who helped with the last series of experiments.

To see sustained dashes, click first on www.depratendecomputer.nl/quickbrownfox3.mp4

1 There are subtle differences between some method being learned and learning to do it well. Though some people can reproduce Morse Code in a few hours practice, they may need considerable training before it becomes really fast, and almost subconscious.

then click on www.depratendecomputer.nl/quickbrownfox4.mp4. The second video also shows an error corrected with a special kind of sustained dash, that repeats backspaces. Neither video shows what can be achieved in clinical practice. Also, they represent what can be done when the same phrase is repeatedly entered by a healthy test subject. The word predictor adapts and suggests the correct word(s), so input rate in conversations must be *lower*. The software can be downloaded and runs under Windows with cheap synthetic speech. Called Write Easy, it can be accessed by keyboard, mouse and switches and allows to reproduce experiments because it logs clicks, keystrokes and the like.

I do not claim that sustained dashes speed up input for people who spend hundreds of hours to learn Morse Code well. Neither do I claim that Morse Code can or should replace scanning or eye-gaze or low-tech. But I do expect that many can learn to encode with acceptable effort, that the average switch-user will use and will appreciate sustained dashes if this technique is made available, that some may have conversations with it *without* stored text, and that both continued laboratory work and clinical research are reasonable things to do.

Amsterdam, April 8th, 2010

Joris Verrips, MD
j.verrips@planet.nl

References

Anson, D.K. 1997. Alternative Computer Access, a Guide to Selection. Davis Company, Philadelphia.

Sustained dashes. Verrips, J., 2010.