Using Interactive Movable Type to Capitalize on the Capabilities of the Human Brain

In the future most of the text that is consumed will be text that has been set in *interactive movable type*, a new kind of movable type that will employ a software invention, *the mudoc software.* The mudoc software will be used to prepare most of the text that will be delivered in digital publications. (It will also be employed in setting much of the text that is delivered in print-on-paper publications.) Because it is easier to say and to read, the four-syllable term, "*muvable type*," is often used in lieu of the eight-syllable term, "interactive movable type."

Text set in muvable type can be assimilated more easily and more rapidly than conventionally delivered text. Muvable type enables readers to make better use of their perceptual and cognitive capabilities than they can with text displayed in the conventional way, that is, as lines of print presented in static displays. Increasing readers' capabilities through the use of muvable type – along with ready access to great collections of affordable text – may soon bring about universal literacy and a many-fold increase in the consumption of text around the world.

Interactive movable type is described and demonstrated in a movie entitled "MuvieTime" at mudoc.com and at YouTube.com. It is also available on DVD for $10 from The Mudoc Corporation at 616 East Julie Drive, Tempe, AZ 85283-2914. Viewing MuvieTime before proceeding further in this paper will facilitate your understanding of the information and ideas that are discussed below.

One of the abilities of Homo sapiens that distinguishes them from the other species on our planet is the ability to develop, acquire, utilize, and analyze verbal information. The invention of movable metal type in the fifteenth century made it possible for many members of our species to use that ability to communicate with large numbers of other members – and to learn from the reports of the experiences of many other members. Printing presses with movable type greatly increased the consumption of text around the world and brought about the transition from the Middle Ages to the modern era.

While the use of movable type in printing presses made the production of print-on-paper publications much easier, there were many other factors that continued to limit their consumption. The great multiplicity and variability of the languages that had been developed limited the potential audience of each publication. While printing presses increased the number of publications, the great majority of the people never learned to read and write. With the illiteracy and the widespread poverty that existed in most population groups, few publications from

the early printing presses achieved wide circulation, in spite of the fact that they were easier to produce. Bibles and other religious works were the most common type of printing press products. Scholarly works had much smaller distributions.

Other factors that limited the consumption of text in print-on-paper publications were the psycholinguistic factors. The practice of printing text in lines of print that had usually been employed before the development and use of printing presses became the standard method of displaying text in printed publications. Linear typographies require readers to severely constrict their visual fields when consuming text. When reading text displayed as horizontal lines of print, as we do with English, readers must learn to limit their vertical spans of apprehension to the single line they are reading and to blind themselves to the lines above and the lines below the line they are reading. (The same kind of problem exists with those languages that are displayed in vertical lines of print.) In addition, when making successive fixations along lines of print, readers must make overlapping fixations to avoid gaps in the messages. The need to overlap fixations further reduces the efficiency of readers in assimilating printed text. With the limitations that are imposed on readers of linear text, only a small portion of their visual capabilities is utilized.

Vision is Homo sapiens' primary sense. As far as we know, it is the universe's most powerful natural information processing system. Each human eye has about 125 million photoreceptors (rods and cones) that collect data and transmit that information to the visual cortex of the brain through the optic nerves, each of which has over one million nerve fibers. The neural impulses processed in the over half billion neurons in the brain's visual cortex comprise about two-thirds of all the impulses processed by the brain of a normally sighted person. Homo sapiens second most powerful sense, hearing, is another powerful, but somewhat simpler, system. The brain's auditory cortex has about 100 million neurons that process sound impulses delivered through the 30,000 fibers in each of the auditory nerves. Considered separately, our visual and aural systems are powerful information processors – and, when effectively coordinated, each sense can support and amplify the power of the other, especially in the processing of verbal data.

Unfortunately, the methods of writing and reading that we now use often make our visual systems and our aural systems work at cross-purposes. For most readers of text in phonographic languages, such as English and the other Indo-European languages, reading is primarily a listening activity. Their visual systems are subordinated to their aural systems. The words delivered to their visual cortexes from their eyes are translated into speech sounds – and they, in effect, listen to themselves read. It is estimated that about 90% of readers of phonographic text are, to a greater or lesser extent, "listening readers." With many of these readers,

you can hear them reading – or at least see their lips move. But, even if you can't see or hear them reading, electrodes attached to their larynxes detect micromovements, indicating that they are, to some degree, translating the text to speech and are "listening" to themselves read. Only about 10% of the readers of English text don't produce such micromovements. They learn to interpret text directly as visual data without being impeded by the visual-to-aural translation process. Such "visual readers" tend to become the most proficient readers and achieve the highest levels of comprehension. In comparing listening readers with visual readers, it might be said that, while listening readers read at the speed of talk, visual readers read at the speed of sight.

With the availability of text set in interactive movable type many more readers will become visual readers – especially those who first learn to read with text set in this new movable type. These readers will be much less inclined to develop the delimiting habit of converting printed text to speech sounds. Muvable type will help sighted readers learn to optimize their particular visual and aural capabilities when consuming text – and, when reading, to subordinate their sense of hearing to their sense of sight.

Text presented to readers as meaning units (the logical word groups that comprise sentences) will help listening readers reduce the subvocalization carried out in the reading of linear text. Reading mutext will help them learn to make better use of their visual capabilities, especially as they learn to apprehend larger and larger meaning units. In human speech the basic sense unit is the word. With text set in the mu typography, the basic sense unit is the muglyph, word clusters that are usually comprised of two or more related words. Conceptually, mutext sentences are series of "thought units" instead of strings of related, but individual, words. Word-by-word reading, with the required constriction of our vertical spans of apprehension and the necessity of overlapping fixations along a line of print, reduce our text processing efficiency to a small fraction of our potential capabilities.

The subordination of one's sense of sight to one's sense of hearing is not the only impediment to reading that handicaps readers of phonographic languages. The complete passivity and inflexibility of the words printed on paper (or static reproductions of such documents displayed on a screen) is another handicap imposed on these readers. To process the static text that is laying on the paper in a state of "rigor mortis" readers must cope as well as they can with whatever capabilities they possess at the moment and whatever supporting tools they have at hand. On the other hand, interactive movable type will enable each reader to design each document to capitalize on his or her own particular perceptual and cognitive capabilities – whether those capabilities are extremely limited or extraordinarily extensive. And, the reader will be able to modify the

design of the document at any time and in any way desired. In contrast to the one-size-fits-all character of print-on-paper documents, each digital document delivered with muvable type will be tailor-made to suit the unique capabilities of the individual who is consuming it.

A number of other obstacles prevent readers of linear text from attaining high levels of efficiency. These obstacles are outlined in "How We Handicap Readers," (http://www.mudoc.com/handicap.htm), a Web page at mudoc.com. This page includes statistical data about the extent of illiteracy in the less-developed countries, including Afghanistan, Pakistan, and Haiti. Two newly posted pages at mudoc.com are "A Practical Plan for Pacifying Pakistan and Afghanistan" (http://www.mudoc.com/Pplan.pdf) and "Building a Healthy Haiti" (http://www.mudoc.com/HaitiLin.pdf). These pages offer proposals for the implementation of national information dispensary systems in those nations to bring them to full literacy at costs they can afford.

Readers of *mudocs*, digital documents set in muvable type, will have another great advantage over readers of conventional text. Mudocs will be read on top of *mudoc reference substructures*, reference libraries that will include millions of documents that will be immediately available to the reader. Any word found in a mudoc can be immediately researched in the reference substructure that is supporting the mudoc. The reader can find any kind of information desired about any particular word, including such information as pronunciations, definitions, grammatical characteristics, etymology, examples of use, and, when they exist, synonyms, antonyms, homophones, and homographs. Other information about the word that may be available in a reference substructure could be pictures, drawings, maps, charts, tables, voices, music, sound effects, video clips, computer graphic representations, and other descriptive information.

In short, interactive movable type and the other tools of the mudoc technology could change the role of Homo sapiens on our planet. At present we are a species that is only partially literate and that makes very limited use of our powerful natural information processing systems in dealing with our problems. The mudoc tools could enable us to acquire whatever knowledge and information is needed to turn our planet into a prosperous, healthful, non-violent, and self-sustaining place to live. With the mudoc tools we may be able to realize the kind of "Life in a World of Superreaders" that is described at http://mudoc.com/crwr/crwrscr8.htm.

NOTE TO READER: In addition to the Web pages that are listed on the mudoc.com home page, a number of unlisted documents are available at that site. One such document is "Some comments about the promise of the tools of the mudoc technology" which is available at http://mudoc.com/plaudits.htm.