How We Handicap Readers

The text delivered through today's print and electronic media is limited by a wide array of perceptual, linguistic, and technological obstacles that thwart consumption of that text. Some of these obstacles are described below, along with methods that might be used to reduce or remove them.

1. **In delivering conventionally printed text we compel readers to restrict their vertical spans of apprehension**. When reading text printed in the linear typography, readers must focus their attention on the line they are reading and ignore the lines above and below. While reducing our vertical span of vision in this way demonstrates the great capability and flexibility of our visual information processing systems, limiting ourselves in this way is unnecessary. With text set in interactive movable type readers can use the mudoc software to have the text presented as muglyphs (word-clusters) up to five lines high. The mudoc software will enable readers to take off their self-imposed vertical blinders and to process text far more efficiently.

2. **In delivering text arranged in lines of print we require readers to make overlapping fixations as they move their eyes along each line**. When performing "inclusive reading" (that is, where every word is seen and perfect comprehension is possible) each fixation must overlap the preceding and following fixations to avoid missing words. This means that, in addition to limiting our vertical spans of apprehension, we also, in effect, reduce our horizontal spans of apprehension. As a result, the average reader of English acquires only slightly over one word per fixation. Single words have limited meaning by themselves. Only when words are related to the other words in the text and their context becomes clear can full and accurate comprehension be achieved. Consuming text as a word-by-word activity is far less efficient and effective than consuming text as a series of meaning units (logically-related groups of words), which can be done with the mudoc software.

3. **In teaching people to read we teach them to "listen" to themselves read**. In learning to read phonographic languages such as Spanish, Russian, and German, and partially-phonographic languages such as English and French, most people develop a strong association between the words in text and their corresponding speech sounds. Thus, when performing inclusive reading, about 90% of these readers take the information in as visual sense units – but then translate, to a greater or lesser extent, the words in the text into speech sounds. Such subvocalization subordinates our dominant sense, vision, to a secondary sense, our sense of hearing. About two-thirds of the neural input processed by the human brains of normally-sighted individuals are visual impulses. Only a few per cent are auditory impulses. The human eye collects data with the 125 million or so photoreceptors in its retina and transmits the data to the visual cortex via a million nerve fibers. The human ear has about 20,000 sensory hair cells that send data through the auditory nerve to the auditory cortex of the brain. The 10% of readers who interpret text directly as visual data tend to become the most proficient readers. The mudoc software will help users get away from reading at the rate of speech. It will help its users learn to perform reading more as a visual activity – and less as a listening activity.

4. **The irregular relationship between the printed words and the speech sounds of partially phonographic languages such as English and French makes text more difficult to learn and to read**. In English there are more exceptions than rules for the pronunciation of its words. The many different ways that letters and letter-combinations are pronounced is often confusing to readers, especially for those readers who listen to themselves read. The inconsistent relationship between words and their corresponding speech sounds makes English harder to learn and use than fully-phonographic languages (that is, languages with consistent relationships between words and speech sounds). Reading English text is further complicated by the large number of homophones (different words that sound the same) and homographs (different words that look the same) found in that language. An interesting collection of homophones and homographs (*bow*, *bow*, *bow*, *bow*, and *bow*) can be seen at http://mudoc.com/crwr/crwrscr5.htm. Hundreds of other homophones and homographs can be found in any English dictionary. The tools of the mudoc technology, particularly simultext (with digitized speech) and the mudoc reference substructures, will help readers deal with these problems.
5. **The hundreds of natural human languages that are now in use function as linguistic islands that isolate and insulate their users**. While there are good things to say about the great diversity of human languages, facilitating the spread of knowledge is not one of them. Human interaction and mutual understanding is severely hampered – and animosity is often generated – when individuals cannot communicate effectively with others because the others are using "foreign" languages. A related problem is that in many natural languages very little is published, thus, while the users may be literate in their native language, little printed text is available to them in that language. Being captive of a language that has few publications severely handicaps the users of that language. A possible solution to the problem is a new kind of language, a computer language that can be used like a natural language – a perceptually efficient language that, with the help of computers and reference substructures, can be easily learned and used by everyone. The Mudoc Corporation has started designing such a language, a language it calls "*Easy*." *Easy* will be proposed as the official common language of the European Union and other geopolitical groups. If such actions are taken by nations and nation-groups, *Easy* could become the world's lingua franca.
6. **Each of our natural languages presents its own set of difficult and vexing problems if software is to be developed for processing, manipulating, and presenting text in that language**. Our natural languages were all developed before the advent of digital computers, thus no one foresaw and prepared for the problems of computerizing the languages. These problems are especially difficult when dealing with highly irregular and complex languages such as Chinese and English. The few natural languages that receive support from well-endowed universities, governments, corporations, or other organizations have software developed that facilitate the efforts of their users. But with many languages, little software exists. For those who are entrapped in languages with little computer support, a computer language like *Easy* will provide another linguistic domain where they can compete effectively with those who use natural languages supported with highly-developed software.

7. **The perceptually ineffective systems of symbolization that have been developed for our natural languages make poor use of the perceptual and cognitive capabilities of the users of the languages**. The systems of writing devised for the natural languages we now use were not designed to capitalize on the great perceptual and cognitive capabilities of their users. While the human visual system is (as far as we know) the universe's most powerful natural information collection and processing system, the capabilities of this system were little understood when our written languages were developed. The primary concerns of the developers of our written languages were those of the writer, not those of the reader. Consequently, our immense perceptual capabilities lie largely untapped with the natural languages we now use. But, with our present understanding of our visual processing capabilities we are now able to develop languages that will enable us to make better use of those capabilities. We are now capable of developing a language like *Easy*.

In summary, because of the many obstacles that face readers and potential readers, the consumption of text around the world is severely limited. There are great numbers of people who are illiterate and consume no text at all. There are great numbers of people who literate or semiliterate, but have little access to print and/or electronic publications. And even among those who are highly literate and have virtually unlimited access to published information, the consumption of text is a fraction of what it could be if the information was delivered in ways that capitalized on the tremendous perceptual and cognitive capabilities of the human information processing system.

It is now within our power to change these conditions. Tools of information technology that are now being developed could bring about a fully literate world within a decade or two and could propel humankind into an era of superliteracy. A preview of some of these tools is available at http://mudoc.com/mission.pdf.