Buddhism and the Digital Age

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ABSTRACT

The digital age has come upon us, sometimes with great fanfare and other times with imperceptible changes in our lives and methods of doing things. Information Technology is perhaps the defining digital element of our time. While industrialization dominated commerce and society from the middle of the 19th century, the agents of change today are the digital and biological advances. The achievements of molecular biology in particular dominate the field of biology.[1] We are affected by these scientific developments as much as earlier generations were by railroads and the combustion engine. Information technology, that influences us so much, is difficult to study and comprehend because it is often invisible. We cannot see the electrons that store our data in a computer. Even in the biological sphere, the cutting and shifting of strands of DNA are only indirectly observed. We do not have the large smoke stacks, the rail tracks and other material manifestations before us. But visible or not, this technology has entered our lives and our bodies and all of human experience is undergoing change because of it.

This year, we celebrated the 40th anniversary of the first live pictures being transmitted from a satellite across the Atlantic.[2] In 1962, television networks in New York were able to receive an eighteen minute transmission from Europe as the first communication satellite appeared on the eastern horizon and passed below the western one. Up to that time, all television pictures from Europe were two days old. They were shipped by commercial airliners across the Atlantic. In a strange way, television had to rely on images that were dated and thus the reports were not as immediate as the voice only radio reports of the past. This all changed when the satellites could send real time images across the globe. Only visionaries could have predicted that 40 years later, we would have 24 hour links to most parts of the globe and that home computers would be used to receive information in electronic format from all of these distant places.

Just as with the industrial revolution, investors often suffer from the lack of understanding of how the new technology will be used. Many millions of stock shares were sold for railroads that failed or were never built because they did not meet the needs of users. The famous dot.com financial woes are in many ways similar. We are still finding out how to make use of the Information Technology and to determine the needs of users. The falling value of stock prices does not reflect the impact of the information technology today and in the future. Those ventures that have failed are an indication of how difficult it is to assimilate new technology into the structure of our lives. Rest assured that the Information Technology revolution continues unabated. One of the most intriguing of the new developments in the computer research field is the study of how computing itself is evolving. There are researchers such as Peter Bentley who are identified as "digital biologists."[3] He describes how microchips "evolve" from early designs that are quite often failures, to the ever changing designs that eventually succeed. Even the use of the term "computer virus" draws upon

immunology as a model for identification and correction of destructive invasions. Conversely, this has had an effect on biology where we find people who see the living organism functioning like a computer. This can be clearly noted in the recent genome project where the "biochemists now treat genes as if they were lines of code in a piece of software."[4] Instead of computers copying life, we seem to have reached a point where life is conceived as copying the computer. One of the most challenged of the new books is *A New Kind of Science* by Stephen Wolfram.[5] The developer of the widely used Mathematica software, maintains that science is approaching a dead-end. He maintains that the age of the equation has been overwhelmed by the complexity of our data. An equation can describe simple events or phenomena but when we reach to a large number of items the equations become unmanageable and fail to explain complex systems. Wolfram says, it is the software of algorithms which can do a much better job of simulating nature. His approach and one that is researched by a number of computer scientists is called cellular automata. Using rows of squares with simple rules for changes from black to white depending on the current configuration, Wolfram has shown that after many computations patterns begin to emerge. He believes that this is how science in the future must work, using algorithmic computation to understand the probability of occurrence of a molecular arrangement. In other words, the very basis of scientific knowledge and method is being reappraised in the face of the technological tools.

Buddhist studies or Buddhist education, no less than biology and physics, is faced with the challenge of the new information technology. Buddhist studies in modern European and North American scholarship has been primarily a part of the humanities, as it has also been in Asia. While social science has addressed problems that focus on particular Buddhist practices, the detailed studies of the tradition itself have been textual in nature. In part, because of this tradition, we do not find scholars who have been interested in dealing with the impact of technologies on Buddhism. That is, there is little in the way of research on the effects that resulted from and of the technological developments in the history of the religion. For example, we have little research on the changes that resulted in Buddhism when the technology of writing was introduced and written texts began to take the place of oral recitation. Prior to the beginning of the activities that produced the Chinese Buddhist canon, writing, one of man's most important technologies was found in both China and India. As a number of scholars have indicated, writing was an instrument of power, since it immediately separated the literate from the illiterate, and provided the former group with a skill that allowed them to keep records and communicate with one another over long distances. By the time that Buddhist texts were being translated into Chinese during the second century of the Common Era, China had long been a scribal culture with a close relationship between the ruling courts and those who wrote and maintained the ancient records and statecraft texts. All of the significant texts needed by the court were written down and transmitted through manuscripts. Buddhism coming from India and the nomadic regions to the West of China represented both oral and chirographic cultures. Missionaries who provided the Indian texts for the translations into Chinese, sometimes simply recited the material from memory. At other times, they read out the scripture from palm, and possibly birch bark, manuscripts. Without writing, we cannot imagine the form that Buddhism would have taken within the East Asian environment. The very spread of Buddhism was based on forms of technological developments. This raises the question of why so little has been done to study these matters. A number of

scholars have explored the issue of why humanists tend to marginalize technology. Landow in his study of the current developments which he characterizes as "hypertext", tries to explain technophobia among humanists and refers to Eisenstein's statement that it is a "venerable tradition of proud ignorance of matters material, mechanical or commercial."[6] But Landow goes further when he states, "One wonders why critical theorists thus marginalize technology which, like poetry and political action, is a production of society and individual imagination."[7]

The use of the word "hypertext" is often confusing; it means in this sense "non-sequential writing." The most important example of this is the World Wide Web that functions as one continuous linked electronic discourse. It has been described as the "most complex written artifact every produced."[8] We are still trying to understand the significance of this use of the written word.

The importance of the emerge of manuscripts within Buddhist history has been little studied and yet we are now called upon to evaluate the impact of the "hypertext" in our own time. This lack of interest in the nature of writing in Buddhism is unfortunate since it is difficult to trace the development of Mahayana, the spread of the tradition into Central Asia and China, and the history of the Theravada without reference to written manuscripts.[9] While the oldest form of Buddhist teaching and preservation was maintained orally, in time, this gave way to the written word. As far as extant evidence is concerned, it was King Asoka who first used writing within the India.[10] From him time forward, the use of writing had an increasingly crucial impact on the religions of South Asia. As Ong states:

> In an oral culture, to think through something in non-formulaic, non-patterned non-mnemonic terms, even if it were possible, would be a waste of time, for such thought, once worked through, could never be recovered with any effectiveness, as it could be with the aid of writing. It would not be abiding knowledge but simply a passing thought.[11]

While India has had a long history of careful preservation in oral tradition of such materials as the Rg Veda, Ong's words should be carefully considered. The orality of the early Buddhist teachings was formulaic, patterned, and mnemonic. With the advent of writing, the age of commentaries came into existence and what is of more importance, these commentarial thoughts have persisted through time in the written texts. If there had been no writing, the persistence of the analysis and appraisal of the oral teachings would have long since been "simply a passing thought." In particular, the commentaries to Mahayana texts do not lend themselves to oral transmission. Before, we dispatch orality for the primacy of the written word, some reflection on the ancient Greek philosophers may be in order. Pierre Hadot from his prestigious position at the College de France, points out that Socrates did not believe that knowledge was a set of data that could be memorized and passed along in texts and commentaries. Instead, Hadot maintains that Socrates believed that philosophy could only be lived and could be best communicated through dialogue. Plato followed in this tradition and gave less importance to the written word than to the encounters between people. This approach would deny Ong's support of the necessity of the written word. The dialogues of Plato are pragmatic in the sense that they relate to the immediacy of a given situation and not to some larger system of thought.[12] Colin McGinn has taken up the same theme when he puts forward his life's goal of finding practical value for everyday life in the process of learning how to use thought in a clear manner. In discovering this challenge of philosophy, he abandoned his earlier

quest to create a standardize technical vocabulary which could help convert philosophy into a science.[13]

The technology of writing itself was subject to technological advances. Up to the late 20th century, the most significant development was the replacement of hand written script with printing. In this paper, I am addressing the issue of the influence of information technology on Buddhism, but we still have not had a full study of the impact of printing more than a thousand years ago in China. There are a number of excellent studies of typological and chirographical cultural patterns that have been produced by writers who focus primarily on Europe. Unfortunately, the study of printing in Europe often gives little credit to the Chinese inventors of paper and the technique of reverse image transfer. These European studies cannot be used to understand what happened to Buddhism as a result of printing. It was the invention of paper by the Chinese that permitted most of the advances in typological developments in Europe. Since reverse image printing on paper occurred in Asia before it was used in Europe, knowledge of the history of that printing is essential for a full comprehension of the role of printing in history. The study of the role of printing in Europe has been done by scholars such as Roger Chartier, especially in his volume translated into English as *The Culture of Print: Power and Uses of Print in Modern Europe.*[14] Elizabeth Eisenstein in *The Printing Press as an Agent of Change: Communications and Cultural Transformations in Early-Modern Europe*[15] also deals with some of the same issues of print technology in determining the patterns of European life. Even before the printing press came on the scene, the cultural patterns associated with writing itself have been studied by many and a summary of that material can be found in Walter Ong's *Orality and Literacy: The Technologizing of the Word.*

When we add the technology of printing to that of writing, it is obvious that the world's cultures have combined the two as central aspects of power and influence. The study of the history of the written Buddhist canons is one of the ways in which this influence of writing and printing can be explored.

Today, Buddhism along with all of the religious traditions is faced with the advent of information technology that goes beyond writing and printing. Our scripts have been put into computer coding and can be used to create display of letters. We are able to store in electronic format these codings and reproduce identical versions of our writing when we wish. For most scholars, the computer is a "smart" typewriter and little more. The internet is considered to be of little use because the content is not reviewed or judged. For the publisher, the computer is a "smart" printing press and allows for cheaper and faster printing. We are hesitant to take the step that goes beyond well established practices. Therefore, for most scholars, publishers, librarians, and students, the information technology is simply a convenient system for performing the tasks that are recognized and valued. Buddhist groups are learning that the internet can provide an avenue for advertising and communication that goes beyond the news bulletin and distributed paper information sheets. In most ways, we have only achieved a primitive use of the technology and have little insight about what is happening to our personal world of experience. Jonathan Rosen has started to explore this issue in his volume *The Talmud and the Internet: A Journey Between Two Worlds.* He has few answers for us and finally reaches the conclusion that: "...unlike the Talmud, the internet has no moral center. It is a vast crass, chaotic organism..." At the end of the work, he has to admit that the internet "...looks less broken and more like a

beginning..." There are those who have gone to extremes, Mark Taylor and Esa Saarinen, bodly state "If you read books justify it"[16]). Richard Lanham[17] and Jay David Bolter[18] are less confronting but they feel that the "hypertext" is a transition that is inevitable in the history of literacy. It is not convincing to see the digital revolution as a complete break with printing because as already indicated, the computer is used as a very convenient method for reproducing words. The computer follows the format of print. There are word breaks, page breaks, paragraph breaks, line breaks in every word processing software. The International Standards Organization has accepted a form of digital markup that is called SGML (Standard General Markup Language) which is little more than an agreement on how to produce printing commands for the computer. The subsets of SGML such as HTML and XML are thus still tied to the concepts of printing for basic format of texts. We might better say that while the printing culture has reached a plateau of development, the transition toward the digital is the way in which printing is expanding and becoming even more dominant in our lives. At the same time, it must also be admitted that the computer takes printing to a level of function that goes far beyond the printed page. It is this capacity of new word use in the digital age that must be understood and applied in thoughtful ways if the new technology is to be realized in its most influential mode.

All of this raises a host of questions for society and education. The use of new technology in our schools has not been very successful. When television came into common use in the 1950s, there was the thought that it would be a major pedagogical tool for education. The reality has been quite the opposite. The television generations failed to find ways of using the medium in the classroom in an efficient manner. Instead, the technology of television was left to entertainment and commercial use. We decry the lack of significant programming, the "wasteland" of the T.V. schedules and yet there was no concerted effort on the part of our governments or educational institutions to spend the money needed to create the desired content. We have now become the first generation of the digital age and the same challenges are before us. There have been large projects to provide computers to the classrooms and laboratories of our schools. The machines and the connections are important but they are the easiest of the challenges. It is already obvious that the money spent on production and development of computer games is far greater than that of educational content. Little surprise then that many children use the computer as a game machine for entertainment that is no advance over the existing television offerings. The internet offers more scope for education since it can make available more information than most libraries. Yet the content is presented in a fragmented and chaotic fashion without clear guidelines for accuracy and scholarly analysis and evaluation.

These are the challenges that Buddhism along with the rest of the world, face in the use of the digital inventions. If we take some very specific examples of the digital development within the Buddhist sphere, we may begin to answer some of the parts of the question about education and the future. The first major introduction of the digital world to Buddhism came in the late 1980s and early 1990s when the first attempts were made to produce versions of the canonic texts for computer use. Prof. Supachai at Mahidol University in Bangkok was given the task of inputting the Siam Edition of the Pali canon as a gift for the 60th birthday of the king. Prior to this, Prof. C.C. Hsieh at Academia Sinica in Taiwan had pioneered in the effort to create a large database containing the entire corpus of the twenty five dynastic histories of China. While Prof. Hsieh's work contained only sections of Buddhist materials, he was able

to provide the help needed by others who wanted to put Chinese characters into digital format. Two young European scholars living in Japan, Christian Wittern and Urs App, collaborated on efforts to input the Chinese Zen texts. In 1988, I began to work toward a database for the Chinese Buddhist canon and in 1990 set up an input group in Shanghai. In order to give some cohesion to the various projects, we established the Electronic Buddhist Text Initiative (EBTI) at a meeting in Berkeley. Since those early days of the attempts to create digital versions of the Buddhist canons, great progress has occurred. It is an indication of how fast changes have come upon us that all of this has happened with the last 15 years. Today, the Chinese Buddhist canon is available on the internet, there are four versions of the Pali canon on CDs and the internet, the Korean edition of the Chinese canon is on CD and soon to be on the internet, the Tibetan canonic input is progressing on CDs. Our great need is to proceed with the creation of a Sanskrit database for Buddhist materials. There are new digital tools available such as the Fo Kuang Shan Dictionary and the online dictionary of Charles Muller in Japan. The International Dunhuang Project at the British Library has digitized thousands of manuscript images from their collection and makes them available for use on the internet. These are but a few of the exciting developments for the study of Buddhism using the computer. The problems that still face us are many. What use can be made of the digitized canons? Are they only a convenient method for reading and retrieving information? Here at Hsilai University, our students are already exploring ways of using the Chinese and Pali versions. A brief description will help us understand how this early usage takes place. By searching for every example of a given term, the student researchers often find hundreds of places where it occurs. At first, the amount of information is overwhelming. How can one use two or three thousand examples of a term? It is here that the computer must be used to sort and categorize the information. Spreadsheets first developed for accountants now find a new audience for those who have multiple terms with multiple meanings found in multiple places. From the spreadsheet, it possible to create images that display the information in a way that helps to minimize the size of the datasets. The computer can quantify the data and these counts allow students to use color and image as an effective way of showing the nature of the retrieved hundreds or thousands of examples. The experience of our students indicates that Buddhist textual material, whether it is philosophical or cultural, can be codified and quantified in ways that were not previously possible.[19]

My own experience with research on the Buddhist canon may help explain the changes that have happened. In the 1960s, I began to study the nature of seven Chinese translations of a *prajnaparamita* text. Since these translations had been made from Sanskrit manuscripts over a period of eight centuries, my attempt was to determine how the text had changed over time. For two years, I carefully read and reread the text gathering all the examples of certain technical terms. Using the information on how these terms were used, that is whether they were present in all translations or in what number they were present, I determined that three families of Sanskrit texts were represented in the seven Chinese translations.[20] After the CD Rom of the Korean version of the Chinese canon was made available, I ran an experiment and looked for the technical terms using search and retrieval software. In less than 20 minutes, I completed the searches and found a few places that I had missed. In other words, two years of manually combing through hundreds of pages of texts could now be equaled in a few minutes. While this is revolutionary in terms of speed, it opens up

a host of other issues. What can be accomplished by making such searches? How can I use this new software to expand my research far beyond what was previously possible?

In September of this year, at the VSMM Conference (Virtual Systems and Multimedia) in Geongju Korea, I was exposed to the cutting edge of research that uses immersive software. It is immersive in the sense that through the use of special glasses or headgear, one is given the experience of being surrounded by the imagery. Sitting in the world's largest virtual reality theatre, we were given a vision of a lilly pond and we "entered" it and looked up through the water at the lotus blossoms floating above. What use is such software for Buddhist studies? It is only for computer games? This is now the object of my personal search for the role of the digital world in Buddhist education. Can I conceive of a way in which I might be "immersed" in the Buddhist canonic texts? And if immersed, what would be the value or usefulness to me in working on the analysis of the teaching and message of the texts. Let me describe how I approach the problem. Some time ago, I was treated to a display of an image of the San Francisco Bay taken from space. It was in the work of a researcher at the Jet Propulsion Laboratory in Pasadena. He showed us the image with the blue green water of the bay and then explained that each pixel on a computer screen displays the dominant color of the image. However, there is the data on the other colors of the spectrum because it is impossible for the computer to choose to display the dominant color without have the comparison to the others. He then turned off the dominant color and displayed the secondary color of each pixel. The Bay suddenly had large areas of red. These are brine shrimp that never appear when we see only the dominant color but nonetheless the information is there for display as the secondary color. Using this model, I have begun to construct with help from technicians at the University of West Virginia and Berkeley, software to analyze the words in a Buddhist texts. First, looking for clusters of characters, that is places where a Chinese character appears many times in a section of the texts as compared to other sections where it seldom or never appears, we begin to see a structure in the text. This structure is not the usual chapter, scroll, or page division but is purely based on the clustering of words. It is assumed that the cluster of a word indicates that the word is under discussion in that section of the text. Next, we establish the secondary character in each of these clusters. What character is second most used word in the identified segment of the text and what are third and fourth categories? Just as with the pixels of color, we now have a ranking of valence of character clusters. Moving into immersive environments, we can imagine display of the word clustering in colors.

Ernest Gombrich, recently deceased art historian, struggled with many of the issues which are emerging in the use of the computer. He stated "In history, we record, but in science we try to explain single events by referring them to general regularity"[21] Clifford Geertz describes the explanation of art that has been expounded in Gombrich's words as "...a long and unplanned series of technical inventions and psychological discoveries.."[22] He goes on to point out that in art "...the innocent eye is aimed and educated: the power of appearances is gradually discovered." Geertz offers the following phrase to describe the process of art and its interpretation: a "...lurching toward a more various sense of the world and the possibilities it holds for us." All of these thought can equally be applied to Buddhist studies and the computer. At this point, we can look forward to "a long and unplanned series of technical inventions and psycological discoveries" and as we become more acquainted with the

use of imagery "the innocent eye (will be)/ is aimed and educated: the power of appearance (will be)? is gradually discovered." We are indeed "lurching toward a more various sense of the world" a shift in the way we experience and interpret the world. There are possibilities and it is time for us to explore and exploit these.

Notes

[1] Some of the problems of this dominance of molecular biology has described by John Tyler Bonner in *Lives of a Biologist: Adventures in a Century* (Cambridge: Harvard University Press) 2002.

[2] The "celebration" was hardly front page news. The remembrance and the analysis of the event was relegated to a short feature story on National Public Radio with Walter Cronkite as narrator.

[3] *Digital Biology: How Nature is transforming our Technology and our Lives*. Peter J Bentley (New York: Simon and Schuster) 2002.

[4] See Carl Zimmer's comments in "Is this Chip Educable? The Biological world has proved an apt model for the technological one" *New York Times Book Review* Sunday, March 10, 2002 P 25.

[5] *A New Kind of Science*, Stephen Wolfram (Champaign, Ill: Wolfram Media) 2002.

[6] Landow, George P., *Hypertext 2.0*, George P. Landow. Rev., amplified ed. Baltimore: Johns Hopkins University Press, 1997.

[7] Ibid.

[8] Stuart Moulthrop, "Traveling in the Breakdown Lane: A Principle of Resistance for Hypertext" *Mosaic* Vol 28 no. 4 (1995) pp 55-77

[9] This has been discussed by Richard Gombrich in *How Buddhism Began: The Conditioned Genesis of the Early Teachings* in the Jordan Lectures in Comparative Religion at the School of Oriental and African Studies (Athlone: London) 1996 p 13 ff.

[10] This has been researched in depth by Harry Falk *Schrift in alten Indien: Ein Forschungsbericht mid Ammerkungen* (Tubingen) 1993.

[11] Ong, quoted on p. 171

[12] *What is Ancient Philosophy?* Pierre Hadot. Translated by Michael Chase (Cambridge: Harvard University Press) 2002.

[13] *The Making of a Philosopher: My Journey Through Twentieth-century Philosophy* Colin McGinn (New York: Harper) 2002. See the work of Mary Lefkowitz in "Analyze This, This and This" *New York Times Book Review* Sunday, May 19, 2002 p 16.

[14] *The Culture of print: power and the uses of print in early modern Europe*, Alain Boureau ... [et al.] ; edited by Roger Chartier ; translated by Lydia G. Cochrane. Princeton, N.J.: Princeton University Press, c1989.

[15] Elizabeth Einstein, *The Printing Press as an Agent of Change: Communications and Cultural Transformations in Early Modern Europe*

[16] Taylor, Mark C. and Esa Saarinen. Imagologies: Media Philosophy. Routledge, 1993.

[17] Landow, George P. Hypertext: The Convergence of Contemporary Critical Theory and Technology. Johns Hopkins UP, 1992.

[18] Bolter, Jay David. *Writing Space: The Computer, Hypertext, and the History of Writing.* Lawrence Erlbaum Associates, 1991.

[19] See an early pioneering effort in the M.A. thesis of Chung-yang Hung "Selected Tales of Morality in the Chinese Buddhist Tripitaka" Hsilai University, April 2002.

[20] Lewis R. Lancaster "An Analysis of the *Astasahasrikaprajnaparamitasutra* from the Chinese Translations" Ph.D. dissertation, University of Wisconsin, 1968.

[21] "An Autobiographical Sketch" in the compilation of his works *The Essential Gombrich* edited by Richard Woodfield (Paidon, 1996) p. 34.

[22] See Clifford Geertz "The Last Humanist" (*New York Review of Books* Vol XLIX No 14, September 26, 2002, p. 6.