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Abstract

Objectives: The process of combining the ancient 'Gabgolmoon' (oracle bone script) hieroglyphic characters of China with digital systems is considered to be a very significant milestone towards achieving the popular and mainstream use of the character system. **Methods/Statistical Analysis**: Unlike the Korean which is based on ('pyoeum moonja'), the Chinese characters are ideographs ('pyoeui moonja' or ideographs/ideograms are the graphic symbols that represent an idea or concept, independent of any particular language, and specific words or phrases). The ancient characters have a significant visual presence and effect through additional leveraging of digital technologies in the process of appealing the meanings of these characters that have been digitalized into image form. And the issue of converging the character system not only in Chinese language academia but extending it to the entire academic fields of Liberal Arts is merely a matter of time. **Findings**: The process of combining ancient hieroglyphic characters using computer science and digital systems can be considered to be related to the combination with the technological introduction of e-learning. The need to integrate the fields of Liberal Arts and Natural Science will become even more urgent in order to adapt to the additional advancements soon to be brought by the digital education infrastructures is an urgent matter, and the process of digitalizing and establishing a comprehensive database for hieroglyphic characters (ideographs/ideograms) is considered to be a process which can be significantly useful to the education industry as well.

Keywords: DigiLog, Bones and Tortoise Carapaces, Digitalization

1. Introduction

Recently, the term 'Digital Humanities' is becoming famous among American scholars. This term has started to receive attention from few years ago. National Endowment for the Humanities supported by the Federal Government of America created 'Digital Humanities Initiative' program in 2006. The study became known little by little. The program was renamed as the 'Office of Digital Humanities' in 2008. This new branch of the humanities attempts to combine the traditional humanities study with results of research accomplished by computer technology.

Digital Humanities originally started from drawing up human records by using computers in digital methods. Text Encoding Initiative which was established for creating standard sign system for invention of electronic text of the humanities field is a good example of the early stage of the Digital Humanities.

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In this digital Age, the humanities should be accepted as the method of 'digilog'. The traditional method of the humanities have been analog, but the new innovation method will be digital. It may be hard to find completely digital method for the humanities due to the characteristic of study. However there are many ways to help the study through the digital technology. Humanities scholars should open up new vistas by adopting digital technology effectively accomplished by the science and technology.

2. Socrates' Fear

Socrates told Phaedrus that a person who believes anything written on something is clear and exact is foolish, because he thinks a written language is dead like cooked fish on a dinner table in comparison with oral statement language is like a living fish in the water.

To Socrates, a written language is a dead discussion which is a popular word among modern intellectuals. Likewise, Socrates believed that a written word is a serious danger to societies. A written language is a one-sided communication which is why it cannot communicate directly unlike oral statement language which is bilateral. A written language has a huge chance of making people misapprehend and regard the written language as a truth or fact. Another reason why Socrates warned against a written language is that written language destroys human power of memory. He believed that the power of memory is the only way to establish individual knowledge basis .

Rousseau spoke that a vocal language is superior over a written language in his major work 'Essay on the Origin of Languages'. He said that he wants say that all languages which cannot communicate with public are the languages of slave.

Like what Socrates mentioned, human beings created documents such as clay tablet, papyrus or parchment to store information and knowledge from their brain. Odyssey and Ilia's by Homer, who lived three centuries prior to Socrates, are the major works of oral statement culture.

Whoever the inventor of the type may be, the printing media and the development of printing techniques resulted in revolutionary changes to the human culture. Printing media played an important role in spreading the information and knowledge beyond the limitations of time and space widely and easily. Thus, these revolutionary changes were clearer in the Western society than the East. The Korean and Chinese printing techniques, as well as the shapes and characteristics of the types were different from the West which is why the mass reproduction in the East was limited.

The appearance of radios, televisions, and movies in the 20th century led to the fear that books may be shifted to the new digital media. The critic who gave the highest position to the power of digital media is Mcluhan. According to his book 'Understanding Media (1964)', he said that digital media in 20th century made contributions to liberate human mind and sense which were suppressed by linear text.

The power of televisions and movies with appealing visionary and auditory components to the human minds and senses were more powerful than anyone ever imagined. In the past 100 years, television had undesirable nickname 'stupid box', but it has established the media empire replacing the one of printing media. Children no longer read a book, but instead they were captivated by the fancy screen of television.

At this moment, having experienced more than 10 years of 21st century, the human beings are faced with different kinds of fear, the fear that Socrates once had as well. The fear comes from the development of the computer and internet. Some intellectuals call Internet as the 'second world' or 'another world', and Marshall Mcluhan thought that media can extend all functions and abilities of human beings.

Today's digital information are widely spread throughout the world at the speed of light. In comparison with printing media, information through the internet and computer can be considered as quantum leap. Thus the fear for internet and computer may be greater than that of Socrates who worried about the invention of text and book. In comparison with the power of Internet and Social Network Service (SNS), Socrates' concern rather seems small.

The modern people in this digital era seem like they can't live without Internet and SNS. They communicate with other people through text messaging service and SNS like KakaoTalk. They buy a coupon for their lunch by using social commerce service like Ticket Monster and Coupang. They can handle their account without visiting banks and do the shopping without visiting department stores and shopping centers by using mobile shopping service.

Recently, Korea Broadcasting and Communication Commission announced that hours of watching television were greatly decreased because of new media such as smart phones. It means the new media such as smart phone can replace the television soon.

3. Digital Culture and 'Digital Dementia'

When a person uses computer for gaining information, concentration is greatly dropped. The important thing is about concentration is that it is deeply related with the development and status of human brain, and brain nerve cells.

A few years ago, neuroscience research team in the George Mason University Krasnow Institute for Advanced Study, Virginia, U.S, announced that adult's brain is changed easily beyond simple shift. Michael Merzenich also said that a brain is changed easily, and the scale of change is huge.

Recently, many scientists speak the fact that human brain is more flexible compared to what people have thought. Dr. Gary Small in UCLA Brain Research institute has studied the influence of digital media to human brain. According to his research, human brain is changed extensively. The more people use the internet, the bigger the chance experienced by the brain. It supports Merzenich's theory. Small makes conclusion that today's explosive digital technology changes not only human life style and the method of communication, but also the human brain rapidly and seriously. If a human frequently uses smart phones or goggle searching engine, the neural circuit of human brain which had been used in the past becomes weak. However, new neural circuit for new digital environment is strengthened.

Based on this new theory, scientists recently discovered the fact that the brain of human who usually uses computer has different function or organization in comparison with the human brain that usually reads a book.

Maryanne Wolf, an American cognitive neuroscientist and child developmental psychologist, published 'Proust and the Squid (2007)' and received attention. In this book, Proust means French novelist Marcel Proust, and it refers to the intellectual level or literature. Squid is a marine mollusk, and it refers to the biological level or science. Wolf points out that a human being reads a text and understands the symbol by connecting brain circuits. For example, when a person sees a fake word, human visual association area does not react. However, the human visual association area is activated busily when a person sees a real word. People show different reactions when they read different types of text even though the text has a same meaning. People who use ideogram like Chinese and ancient Sumerian language, for example, activate visual areas of left and right brain, and main parts of the occipital lobe and the temporal lobe when they see a text and these areas are used for object recognition.

When people see a word, their occipital lobe is activated. When they hear a word, their left hemisphere is used. When they speak and create a meaningful word, the activities of parietal lobe, frontal lobe and temporal lobe become active. Thus, the key of sight is the occipital lobe, and the key of hearing is the temporal lobe, and the keys of language are the parietal lobe, frontal lobe and temporal lobe.

The sensory area of cerebral cortex deals with senses by acquiring information from sensory organs, and motor area makes skeletal muscles contract by handling voluntary movement. Association center performs a high degree of mental activity to convey a necessary command to the motor area by deciding, analyzing, and synthesizing information in sensory area.

Cerebral cortex is divided into different parts performing different functions. Information from a certain part carries out complicated mental function by delivering the information to the other part.

Wernicke's area: This part is activated, while people are hearing. This part is in charge of interpretation of language information. If this part gets damaged, people can speak well, but their speeches are meaningless, and they cannot understand language.

Broca area: This part performs a function of speaking. If this part gets damaged, people can hear and understand language, but they cannot react and speak well immediately.

On the other hand, people who use the Hangeul, explained as "the perfect character system wisely created by Sejong the Great" by the Wolf, and alphabet use the vicinity of the parietal lobe actively which is located inside of the brain.

People who frequently use Internet and SNS experience a decrease in the quantity of gray matter in the dorsolateral frontal lobe which is located the back and side of front part of brain. This is why the part of brain which is related with analytic thinking and concentration for reading books is decreased when people frequently use the internet or SNS. On the other hand, people who read books often have particularly developed parts of temporal lobe temporal which handles sight and memory of language. Especially, one study received attention as it concluded that novels among all books cause considerable changes in the brain function.

'Digital dementia' is phenomenon where ability of memory or calculation is weakened because of reliance on the tablet PC, computer or cell phone excessively.

In other words, a brain cell is strengthened and increased if it exercises more and more just like a muscle cell. Synapse, which connects neurons, records a memory in the brain cell depending on activity. Thus, directly experiencing, feeling, and thinking are the most essential exercises for the growth and development of children. Especially, the more children get a chance to exercise their body in person, the more stimulation arises to record something in their brains. Exercise may seem to be good for just physical health, but it is important for brain health and mental health as well.

If children seat in front of digital instrument such as computer and watch a visual media, the children are just indirectly experiencing the virtual reality. In fact, the brain activity is paused at that moment. Thus digital media causes a damaging effect and weakens the memory capacity in children's brain before it develops in full.

There are scientists who raise the question whether the digital instrument weakens people's concentration and distract them. Some scientists claim that not only using the internet or SNS, but also playing video games is helpful to develop user's concentration. It means that online games have positive effects on the cognitive functioning in general from visual detection to concentration. They claim that even a simple computer game such as 'Tetris' can improve the information processing speed.

For example, a report in the 'Nature', the most authoritative scientific journal, discovered that the intervention group who plays 'Medal of Honor' for ten days experienced improvement of concentration ability and memory distinctly compared to the control group who did not play the game. In 2009, neuroscientist in UCLA found out that dorsolateral prefrontal cortex is activated when people use searching engine like Google confirming what this report mentioned previously that cortex handles logical analysis and concentration.

The fact that information from the internet and SNS is sometimes untruthful and inaccurate can lead to a big problem including distracting the concentration. In the case of printing media, the printed material has to go through a censorship from editors before it is published. Furthermore, it should pass a kind of test from book reviewers or critics through book reviews.

4. Humanities, and Critical, Creative and Integrated Thinking

4.1 Humanities and Critical Thinking

Why is critical thinking more necessary in the 21st Century?

First of all, critical thinking is essential for the digital era where countless information overflows. For instance, there are various and a large number of opinions and claims about same problem in the internet. Furthermore, there are a lot of old information which passed legal prescription, incomplete and untruthful information. Critical thinking is essential as it can prevent people from being a passive consumer of the information and change them to be a producer by actively accepting the information.

Secondly, critical thinking is necessary to overcome global crises and challenges in today's world. The future will be the age of limitless competition due to exhaustion of resource and exploding world population.

Thirdly, critical thinking is an indispensable tool and weapon for living in the era of internationalization where society gets more complicated and borders between nations are collapsed. Now many countries extend interdependences, and form single system under the name of globalization. The boundaries of the world are weakening, and the world society is integrated or reorganized based on economy. This integration or reorganization is related with political, scientific and sociocultural power beyond economy. In this situation, critical thinking is the most important thing. If somebody wants to take an active role in the world successfully as a global citizen, it is necessary to arm him or herself with critical thinking.

4.2 Humanities and Creative Thinking

4.2.1 Observation Ability

Creative thinking such as critical thinking is necessary for the digital era. In the broad meaning, creative thinking seems to belong to critical thinking, but it has independent position in narrow meaning. Creative thinking and critical thinking do not have mutually exclusive relationship, but have complementary relationship. Absolutely, investigation and critic are deeply related with critical thinking.

A creativity is not only an innate ability, but it is an ability acquired and improved through education and training based on curiosity and passion. Creative thinking is a similar concept with ability to shift a viewpoint. A new thought that others have not thought about can be the creative thought.

There is an old saying in the Western culture 'Curiosity killed the cat'. It means if somebody has a curiosity to know the body structure of the cat, the person should kill and dissect the cat as it is impossible to see the body structure of the cat without dissecting it. In the creative thinking, observation ability is important as much as a curiosity. People who have a creative thinking carefully look at something that others have no regard. Intuition and insight are also important for creative thinking as much as curiosity and observation ability.

4.2.2 Intuition and Insight

Intuition, which is the ability to directly understand the whole object such like sensory perception, is essentially different from rational cognition which is based on reasoning. Especially, the irrational philosophy claims that it is possible to approach the nature of things without media and understand the nature directly. This intuition is closely related with insight which is an ability to understand relationship between things. Thus, it is impossible to create something without insight through intuition.

The moment when a certain good idea suddenly comes across is usually called 'the moment of insight'. Creative thought given by intuition and insight should be checked through the process of judgment and inference in order to persuade others.

4.2.3 Creativity and Imagination

For the creativity, finding interrelationship is as important as intuition and insight. New and brilliant thought can be created, when someone finds interrelationship between things or phenomena which does not seem to have correlation between them. Joseph Schumpeter, who is an Austrian-Hungarian economist of the first half of 20th Century, pointed out that innovation is not creating new things which were not existed before or discovering new amazing things. He said that innovation is just an artifact to reunite with existing knowledge. In other words, if existing knowledge, technologies or products are imitated well, new and innovative idea will be created. In this viewpoint, imitation is not always opposite concept of creation. Imitation is a womb that creation is born. Confucius said that people who know new thing by mastering old things can be other's teacher.

The most important thing in the creative thinking is the imagination. For the creative thinking, imagination plays a role of catalyst like an enzyme. For example, a temperature of living things is not high enough to produce energy or synthesize substances for metabolism. Living things use an enzyme which is a catalyst for body chemical reaction which remedies the temperature problem. An enzyme enables reaction which is feasible in high temperature to be occurred in body temperature circumstance by reducing reaction of activation energy. Imagination plays a role of an enzyme for the creative thinking as shown in the example.

An example of a stereotype is a person who thinks only inside of a circle when drawing the circle. Ability to shift a viewpoint and have creative thinking is to think outside of a circle, when he sees a circle. People who have a creative thinking do not worry how big circle they should draw in order to take things in the circle, but think about things outside of the circle. If Russia thought creatively, they could still have Alaska. How does reading books influence creative thinking? Reading has a deep relationship with left brain. American cognitive neuroscientist Maryanne Wolf says that normal people use their left brain for reading, but people who have dyslexia use their right brain for reading. It means they use different neural circuit. In the point of Wolf, dyslexia is not a disability or disease, but a just symptom as the reading is not a natural innate ability.

Deuk-Sin Kim, who was a literary person in the middle of the Joseon Dynasty, had dyslexia. He was a disgrace to his family rather than a glory. At the age of 10, he stammered to read a book and tended to forget the content of book easily. Dyslexia is the proof to lack circuits for reading in people's brain tissue. But it does not mean that the person suffering from dyslexia is poor at other fields such as art, science or architecture. It can promote the activity of right brain and it can cause creative thought to break the exiting frame. People who have dyslexia can show a brilliant ability in other fields excluding reading, because the lack of left brain type circuits is filled with right brain type circuits. Recently, brain scientists discover that creativity is deeply related with cortex of right brain. In other words, the front part of superior temporal gyrus handles creativity. Wolf says that each child who has dyslexia may have a unique potential, and it should be avoided to limit their unique potentials in order to treat their dyslexia.

4.3 Humanities and Integrated Thinking

Integrated thinking functions as critical thinking and creative thinking. In other words, integrated thinking plays a role of bridge to connect between critical thinking and creative thinking.

The recent invention of Alpha Goled to continuous attention of public on AI. Integrated thinking is an important factor in this situation. For improving integrated thinking, left brain and right brain should be developed at the same time. As public knows, human brain, which is consisted of around ten billion neurons, is mainly divided by left brain and right brain. Left brain is called 'language brain', and brain language center is located in it. The more a left brain is developed, the more outstanding logical, analytical and rational abilities such as a command of language, understanding of text, symbol and number, and reasonable thought are. In comparison, right brain which is called 'image brain' handles sensible areas to grasp situation in a moment including music or sports by using abilities such as intuition. In other words, the left brain is in charge of vertical or logical thinking based on reason, and the right brain is in charge of horizontal thinking based on sensitivity.

It is generally known that men have more developed left brain and women have more developed right brain, though it is criticized that it is based on a biological determinism. Integrated thinking harmonizes between left brain and right brain, reason and emotion to make a balance.

According to American philosopher Charles Sanders Peirce's pragmatism and abductive inference, and German falsifications philosopher Karl Raimund Popper, integrated thinking was originally a part of applied psychiatry.

In 1986, psychiatrist Graham Douglas said that integrated thinking was a process to integrate intuition, reason and imagination in human mind for development of an essential and concentrated strategy, tactic, action, examination, and evaluation, to solve a certain problem. Until now, theorists have accepted Douglas's definition as a general definition of integrated thought.

Martin clearly clarified the concept of integrated thinking in his book 'The Opposable Mind' which was improved from his research paper published in Harvard's Business Review. He picked representative CEOs who dealt with a dilemma through the integrated thought. One is Bob Young who is the founder of Red Hat. Bob integrated an advantage of profitability of Microsoft's business model and a spirit of open software. Another one is Is adore Sharp who is the CEO of Four Seasons Hotels and Resorts. He created innovative service by integrating various amenities of big hotel chain and friendliness of small hotel. According to Martin, integrated thinking is an ability to face with a tension between opposing models constructively. As 'The Opposable Mind' has mentioned, integrated thinking is an ability to think and integrate all advantages of two conflicting options. It is not to choose either one or the other, but to accept both.

In other words, integrated thinking does not select one between the two by constructively using the tension between two conflicting ideas, but it creatively defuses the tension between two conflicting ideas including elements of two ideas and creates new ideas that are better than two ideas alone.

5. Prospect of Digitalization of Ancient Script (Hieroglyphics)

Humanities should accept the digilog style of this digital era. The traditional method of humanities is analog based and new innovative method will be digital based.

In the view point of academic characteristic, humanities did not always depend on digital method, but it may receive various helps from digital technology.

Humanities scholars need to open up new prospects of humanities study by accepting digital technology effectively. Honestly, humanities scholars have been settled in the aloof ivory tower without being connected to the outside world. If they just read books condescendingly like old classical scholars, it is impossible to survive in these fast-changing times.

Recently, a word 'Digital Humanities' has been spreading among the academia centered on the American society. This area of study has been receiving attentions from public in U.S. from few years ago. National Endowment for the Humanities, supported by the U.S. federal government, created a humanities study named 'Digital Humanities Initiative' program and the program became famous from that time. Later, the title of program was changed to 'Office of Digital Humanities'. This new field of humanities attempts to integrate a study of traditional humanities and a research result of computer science. Originally, digital humanities stated from filing human record with digital method using computer. Text Encoding Initiative (TEI), which is established to create standard sign system for inventing electronic text of humanities, is a good example of early stage of digital humanities.

Digital humanities are concerned about inventing software. The software provides circumstances and tools which can be used to interact, manage, and produce knowledge in diverse digital environment including digitally created knowledge. Because it uses computer technology widely, it is specially called as 'Computer Humanities' instead of digital humanities.

Art galleries or museums seek a bidirectional communication through social media such as Facebook, Twitter, YouTube or Flicker. In the well-known research paper of German culture critic Walter Benjamin 'The Work of Art in the Age of Mechanical Reproduction' (1936), he investigated the characteristics of arts afresh by observing rapid development of industrial technology in the mid-20th century. He has found that the most important characteristic in the age of mechanical reproduction is photograph technique.

It becomes universal and public beyond simple reproductions. Now art works have the characteristics of mobility, participation and editing because of the internet environment. People who enjoy an art can easily see art works whenever and wherever they want. Also, they can be an active participating producer instead of being a passive customer by using social tagging. In other words, digital humanities find a creative collaboration with computer and digital technology beyond a simple digital converting work.

Digital humanities is receiving attention in the US, on the other hand, consilience is becoming famous among Korean intellectual society. As consilience is known as the integration of knowledge, it is a grand theory to connect between natural science and humanities which have antagonistic relationship.

British science historian William When well used the concept of consilience in his book 'The Philosophy of the Inductive Sciences' (1840) for the first time. In the late 20th century, consilience became a keyword for 21st century due to the publication of American sociobiologist Edward Wilson's 'Consilience'. Wilson, who won the Pulitzer Prize by 'On Human Nature' (1979), has tried to remove an obstacle and make up for a space between natural science and humanities as a biologist who has humanistic knowledge and refinement.

Jae-Chun Choi, who was Wilson's student and translated Wilson's 'Consilience' with Dae-Ik Chang, think over to choose the title of Korean version of 'Consilience'. He thinks that the term means a big context as the principle which widely understands things. Thus, he used the term 'Tong-Sub'. According to his explanation, a word 'Tong' means a big context or clue, and a word 'Sub' means holding or catching. In other words, 'Tong-Sub' is a compound word which means holding a big context.

A word 'Tong-Sub' seems unfamiliar to modern Korean readers. However, this term was familiar to old Korean people as the term was widely used in the Neo-Confucianism and Buddhism. There is another interesting thing about translation. He translated subtitle 'Unity' as 'Dae-Tong-Hab' instead of 'Tong-Hab'. A word 'Dae' means 'big'. He thinks if he uses just a word 'Tong-Hab', readers may not fully understand the feeling of the meaning, so he adds the word 'Dae'.

As the subtitle of 'Consilience' shows, Edward Wilson defines consilience as the integration of knowledge. He said that it is the key to open the door of unity, and the greatest plan of human mind is a challenge which was and still is to connect with science and humanities. Wilson also said that people can understand why we exist on earth and who we are, when we fully integrate certain knowledge. 'A certain knowledge' which he mentions is the word that widely refers to natural science, humanities and social science.

Human condition is the most important unexplored field in natural science. On the contrary to this, material world that natural science discloses is the most important unexplored field in humanities and social science. A discussion of consilience can summarize that two unexplored fields are same.

Thus, I think it is valuable to make Chinese ancient characters 'Inscriptions on Bones and Tortoise Carapaces' hieroglyphics popular by combining with the digital. Because Chinese characters are ideograms, it has a huge visual effect. When it is thought to have meanings with imaged data by using digital technology, it can be easier to conflate Chinese academia and humanities academia, moreover other academia using Chinese characters such as jurisprudence or business administration. I believe not only union of humanities and natural science in the global era can be the best example of the word 'consilience', which I mentioned before, but also that people may enjoy the usefulness provided by the education, learning contents development, and open learning applied on the culture. Furthermore, the researcher expects that this paper may contribute to the changes of the image of Chinese character from existing negative idea of being difficult to positive image.

6. Conclusion

As Walter J. Ong wrote in his book 'Orality and Literacy', an empathy rather than objective distance maintenance is needed in the spoken language culture of the primitive age. Also the participation of speaking people is important. The outlook that the world will become one town through the development of electronic media is an excessive optimism.

Humanities scholars can no longer go against the streams of digital culture. Especially, the younger generation takes the digitalization as an essential rather than optional factor of their lives. Digital cultures such as the internet and SNS has already settled in their life for a long time.

In order to survive in this information-oriented society, we should evolve from Homo sapiens to 'Homo digitus'. Humankind has evolved in succession from Australopithecus that was the middle stage between anthropoid and human to Homo habilis that could use tools by hands in the Old Stone Age, and to Homo erectus that could stand upright, and then to Homo sapiens sapiens that had more knowledge. Now, it is time to evolve to 'Homo digitus' who can use the digital.

Like what Umberto Eco's said, if printing media and books disappear, then the internet will disappear as well because those things are not a mutual exclusive relationship, but a complementary relationship. Now is the information-oriented society which buys and sells information, and the digital era that the digital pushes out the analog.

At this time, humanities can no longer stay as the old humanities. In this point of view, humanities is like the prodigal son out of home, because it has experienced frustration and despair in the digital environment. Like the prodigal son in the New Testament, however, humanities will return to the analog world after experiencing every joy, hope, frustration and despair in the digital world. If humanities cooperates with the digital culture, and achieves consilience creatively in the true sense of the world, it should be reborn as the 'prince of study' in the 21st century.

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