An Innovative Approach to Represent Ideogrammic Compounds Chinese Characters

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Abstract
This paper adopts an innovative approach to represent the Ideogrammic Chinese Characters for e-learning. The Pictogram Chinese Characters representation uses a series of images and combines these images using a morphology and interrelation approach. We combined multiple evolution graphics of Pictogram Chinese Characters representation to represent Ideogrammic Chinese Characters. Our innovative representation shows an effective representation of the combined evolution graphic of Pictogram Chinese Characters as an approach to represent the Ideogrammic Chinese Characters for e-learning.

Keywords: Ideogrammic Chinese Characters, Pictograms Chinese Characters, E-learning, Evolution Graphic

1. Introduction

China is one of the oldest nations in the world. This nation is the most populous in the global with approximately, 1.351 billion people. One fifth of the planet speaks Chinese or Mandarin and this making China as one of the most widely spoken language in the world. In addition, due to the fast growing in economic, social and politics, Chinese language had become one of the most important languages in the world. This also causes a lot of the people to learn Chinese language.

Chinese language stands out as one of the most spoken language in the globe with over an estimated of billion people in China, Hong Kong China, Taiwan, Macau, South East Asia countries and various other parts of the world speaking it. This can easily assumes that Chinese language is one of the most important languages in this blue planet. In addition, the increasingly growing of china as one of the world most powerful country also cause as one of the factor that more and more people in the world learning Chinese language. Current studies have shown that Chinese language has become a very popular choice for second language among the colleges’ students. It had surpassed pervious favorite which include French, Dutch, Spanish, German and Japanese languages. This increasing popularity isn’t surprising since the growing appeal of Chinese culture in the west and worldwide.

Chinese language had become one of the most important languages in international business operation too. The Chinese market is the biggest growing market even in this economic downturn. Expertise in Chinese has grown increasingly important to the overall global economy and many business owners are looking to break into this international market. Any business in the twenty-first century will be trying to do business in China and in doing so will required Chinese speakers to negotiate agreements and develop these trade deals. Economists predict by 2020, China will without doubt surpass the United States as the biggest international superpower.

Alike other languages around the global, Chinese as a great dialects too, the most common Chinese dialect is Mandarin Chinese. As we know that English language happens to be one of the most popular language in China, but most of the Chinese tend to not understand English well. Therefore, in China, learning Chinese is very important as it serve as the important source of the knowledge. In reality, Chinese Mandarin is a common language throughout Chinese overall, although a number of dialects could be more common in other location.
Unlike other language, Chinese Characters use a system of logographic to represent the written characters. Compared with alphabetical languages, such as English, Malay, Dutch and etc., that use phonetic symbols to represent the pronunciations of words, each Chinese character has a unique meaning. Figure 1 shows the comparison between the English language, as an example of alphabetical language, and the Chinese language. If a Chinese beginner has never learned the phonetics for the characters “鱼”, surely he or she cannot possibly pronounce the word. Meanwhile, for an alphabetical language beginner like English learner, he or she will still be able to read the word even if he or she has never learned the word before. From this example, you may imaging how difficult is the Chinese language.

2. Formation of Chinese Characters

After the creation of Chinese Pinyin tonal system has been introduced to the learners, this make learning Chinese language, especially reading, easier than before. In fact, the important of Chinese Pinyin is a crucial method when it uses to writing Chinese in a series of alphabets representation. The pinyin spells the sound, and includes tone marks to help give you the proper pronunciation. In fact written Chinese language is very important too because the knowledge of the written language opens up the culture of one of the world’s oldest civilizations.

![Fish Mountain](image)

**Figure 1.** Comparison between Chinese Characters and English words

The original idea of Chinese Characters formation started with pictograms, which means that the formation of Chinese Characters started with pictures. In technical term, we address this formation category as Pictogram Chinese Characters. Although it may be hard to see at first glance how the character “日” resembles the real life sun, we can see how it has evolved over time into its present form by looking at the more ancient form, for instance, as illustrated in figure 2.

![Evolution](image)

**Figure 2.** The evolution of Chinese Characters

Beside the Pictogram Chinese Characters formation, there are 5 categories of Chinese Characters formation, namely, Simple indicatives characters, Compound indicative characters, Phono-semantic compound characters, borrowed characters and Derived characters. Each category use of the formation are using different idea and form to create the Chinese Characters characters. These formations had enriched the Chinese characters vocabulary and enhance the meaning of the characters to meaning representation.

In the formation of simple indicative characters, some simple abstract form is used to represent the Chinese characters. This formation has overcome one of the weaknesses of the pictogram whereby you only can express the things that have an actual form of representation. Chinese characters such as up, “上” and down, “下”, are using this representation as in figure 3. For both Chinese characters, the horizontal line which available at both characters represent the earth. Whatever above the earth represents the “up” side and whatever below the earth represents the “down” side.
Meanwhile in the formation of Compound indicative characters, it is formed to help to make the pictogram and simple indicative to be easily to understand. The idea of compound indicative characters is formed by combining any of the pictogram or simple indicative Chinese characters. Which mean this method is help to make new vocabulary by combining the pictogram or simple indicative Chinese characters. Currently, this formation method is still using to create new Chinese language vocabulary.

In another category of formation Chinese characters, a Phono-semantic compound character is used to create the characters. This character is formed from other characters which is quite similar, with additional signs to make a new character. This characters having the same sound as the one of the original words. Figure 4 shows the example of Phono-semantic compounds characters of 彩 which is formed from the original word of 采. This category of characters, contribute 70% of the Chinese Characters.

In Borrowed characters, these characters are “borrowed” another group of Chinese Characters to express the meaning which is different from the original one. The number of these Chinese characters is limit. Sometimes, this category of Chinese characters is created to substitute the original idea of the characters.

In the last category, the derived characters, these characters share the same ethnological root, commonly with identical meaning in the very original character, yet is used to indicate different meanings. In fact, the sound of the characters changed too. In this study, we are focusing on the Compound indicative characters formation.

In this research, we adopted the original concept of the formation of ideogrammic Chinese and presented it by using a multimedia approach. The explanation on how we used the multimedia approach to represent the evolution is explained in section IV. This approach that we adopted has been found to have greatly encouraged the learning interest of the beginners.

Our research extended the idea of using an evolution approach to represent the pictograms Chinese Characters by Low et al [1]. Here, we introduced a combination of 2 or more pictograms of Chinese Characters evolution, as proposed by Low et al., to represent the Compound indicative characters. By extending the representation of pictograms Chinese Character to Compound indicative characters, we represented the Compound indicative characters in a novel and interactive way. Our method helped the beginner to learn Compound indicative characters in an interesting and funky approach.

The main contribution in this paper is to extend Low’s at al pictogram Chinese Characters representation to represent the Compound indicative characters by combining 2 or more than 2 Pictogram Chinese Character representations. This means that the Compound indicative characters are formed by 2 or more pictographic characters which are combined to suggest a third meaning. This multimedia approach to explain how the Compound indicative characters are formed has added-on the interest element to e-learning.
3. Compound Indicative Characters

The formation of Compound indicative characters is literally seen as logical aggregates or associative compounds. Ideogrammic compounds symbolically combine 2 or more pictograms or ideograms to yield a composite meaning, which then suggests a third meaning. For instance, as shown in figure 5, the word of “木” is a pictogram for tree. Doubling the character of “木” produces “林” which has the meaning of “grove”. Taking a step further, tripling the character of “木” produces “森” which means “forest”.

![Figure 5. Creation of different Chinese Characters by combination of multiple “木”](image)

Another example, as in figure 6, of ideogrammic compounds Chinese Characters is, “日”, when it is put along with “月”, a new Chinese Characters is formed as “明” which means bright. On the other hand, when we put “田” and “力” together, a new Chinese Characters is formed, “男” which means rest.

The ideogrammic compounds Chinese characters formation is an important formation approach. Approximately 13% of the total Chinese Characters belong to the Ideogrammic compounds, making this formation the second largest formation category. Ideogrammic compounds Chinese Characters can help to overcome the limitations of the Pictographic Characters. In other words, by adding on some necessary stroke/s, the pictograms Chinese Characters can add on more vocabulary to the Chinese Characters. For example, as in figure 7, the original meaning of the character “木” means tree, and by adding on the horizontal stroke at the top of the character “木”, it becomes “末” or beginning, where the horizontal stroke drawn at the beginning of the wood represents the root. In fact, Chinese scholars are still using this method to create new Chinese Characters.

It is important to study ideogrammic Chinese Characters because of the following reasons:

i. is able to remedy the limitations of Pictographic Characters.
ii. is superior to other forms of character formation and Chinese scholars are still using this formation to create new Chinese characters.
iii. is able to represent more abstract meaning.

![Figure 7. Abstract meaning of add on a horizontal stroke to the word of “末”](image)
4. Related Work

Our research is closely related to the multimedia representation approach of Chinese Characters. In fact, many studies have been carried out to observe and explain the formation and representation of these Characters. Some of the related research in multimedia representation of Chinese Characters is described in this section.

In the process of learning Chinese Characters for beginners, multimedia application plays an important role in learning and recognizing the Chinese Characters. A lot of representation methodologies have been used, and they can be classified into the conventional approach and technology approach.

In the conventional approach, writing in blocks and flash cards are the most used approach to help beginners recognize and memorize the Chinese Characters. For block writing, as shown in figure 9, the beginners are required to repeatedly write the words and memorize the characteristics of the Chinese Characters while writing. For flash card learning, a set of flashcards are sorted accordingly and displayed one by one to let the beginner read and memorize them. Some flashcards are made from paper while some of them are electronic flashcards as in [2], [3] and [4]. This is a kind of “parrot learning” whereby the user blindly memorizes the Chinese Characters. Another conventional tool that is used to memorize Chinese Characters is matching. In this method, users are helped to remember and recognize the characters by matching the relevant characters [5]. This approach is interactive and is similar to the flashcard approach.

For the technology approach, some apps or application have been developed for the Chinese characters learning purpose. Most of the applications are developed according to the conventional approach, which means, rather than using cardboard, flash card or other tangible materials to represent the characters, it uses multimedia to represent the learning methodology of conventional approach. In the application of Chinese Input Method Editor Application [6], the user is required to write the word that the user wants to learn into the box provided. Some possible Chinese Characters will be suggested or provided, and the user only has to select the word that the user wants to learn. The meaning of the word will be presented in their mother tongue. This application provides an interactive approach that allows the student to learn by writing, but this application does not have any interesting element that catches the attention of the user. Another example of application on learning Chinese Characters using the multimedia approach is recognizing and memorizing the Chinese characters by using the creative mnemonics representation. This approach takes the most significant part of the Chinese characters and relates that significant part by using a creative approach. The idea may help the user to memories the Chinese characters easily, but, the problem is that this application does not follow the original formation to explain the meaning of the Chinese characters.

![Figure 8. The Evolution of Chinese Character “船”](image-url)
Beside using the interactive approach to help the learner to memorize the Chinese characters, other alternative approaches also had been introduced. Chen, Hsueh-Chih et al. introduced to help on memorizing the Chinese characters by using the radical-derived Chinese characters \cite{11}, \cite{12}, \cite{14} and \cite{15}. This idea had developed a teaching platform to learn the Chinese characters. According to \cite{11}, radical-derived Chinese characters have shown a positive result on helping the students to memorize the Chinese characters.

On the other hand, some of the researchers introduced to change or enhance the pedagogy of second language learning using technology \cite{12}. Chen et al. stated that the innovative in teaching and learning is not about the technology involved but the pedagogy in supporting the meaning of learning, therefore in Chen et al. research had improve it by enhancing the pedagogy and the technology implementation.

As stated in the section, a lot of methodology had been used to enhance the learning experience of the learner specifically for the students who learn Chinese as second or foreign language. We believe that engagement of multimedia to memorize the Chinese characters is important since our research is follow the idea of the visual help in memorization \cite{13}. In addition, our research is focus on the primary school children. Therefore, engagement of multimedia is appropriate to implement.

5. Adopting Multimedia in Chinese Characters Representation

The teaching and learning field is changing rapidly and the field of education is experiencing momentous changes too, particularly in applying multimedia in education. The adoption of multimedia in education has accelerated in recent years and is expected to continue expanding in the future. One of the reasons why multimedia is utilized is due to the fact that it is able to grab the attention of learners. Usually, the animation is presented in a novel and special way, hence catching the attention of the learners. In our research, we used a dynamic (a series) multimedia representation. The reason why we chose dynamic multimedia approach to represent the ideogrammic Chinese Character is because it helps learners to visualize difficult concepts more easily. This is very important especially for the learners who learn the Chinese language as a foreign language.

In addition, multimedia representations also enhance the visualization of concepts of the formation of the Chinese Characters, which is represented by combining the evolution of Pictogram Chinese Characters representation. The research on L2 vocabulary acquisition shows that foreign words associated with imagery techniques are learned more easily than those without these associations \cite{7}\cite{16}. Oxford et al. explained that visual imagery helps learners to package information more efficiently than using only words alone because most learners are able to associate new information to concepts in their memory more easily by means of meaningful visual images \cite{8}.

Audio and visual aids also influence and facilitate language acquisition. A study by Khalid et al. revealed that the group provided with additional audio-visual aids performed significantly better in vocabulary retention \cite{9}. In addition, the studies carried out by Khalid showed that video clips were more effective than still pictures. Khalid also suggested that videos build a mental image, creates more curiosity leading to increased concentration, and embodies an advantageous combination of modalities, such as dynamic images, sound, and printed texts. Therefore, in the system, we also included the audio element. The audio that we used included the Malay and English language.

6. Overview of the System

Figure 8 shows part of our approach that we proposed. In this study, our target learners were standard 1 primary school students. The Chinese characters that we used were based on the Chinese language textbook for national primary schools.

The learner is required to move over the cursor to the Chinese Characters that they want to learn. When the cursor is placed over the Chinese characters, the animated Chinese Characters will be activated, as shown in figure 8(1) to figure 8(6). This combined evolution will be displayed using multimedia animations. In addition, the pronunciation of the Chinese characters will be pronounced in the Chinese language. In addition, to ensure the correct understanding, the meaning of the characters will also be translated in the English and Malay language.
Basically, the storyboard that we used in this system utilized many illustrations or cartoons because we wanted to attract the attention of our target audience, who were primary students (standard one) from national schools. The animation of the approach is designed by grouping up the Chinese characters according to scenarios. In total, we created 13 scenarios according to the syllabus of Chinese language subjects in national primary schools. On the design of the scenarios, we opted for local images as our design choice rather than Chinese figures or imageries, for instance, the picture of the Malay pavilion as shown in figure 10 and the paddy field view in a typical Malaysian village as illustrated in figure 11. It is because we wanted the students to learn with objects or situations that they are familiar with or could relate to. The choice of pictures eases the learning process of the students and encourages and promotes the Chinese learning environment in Malaysia.

![Example of Chinese characters writing practice sheet](image)

**Figure 9.** An Example of Chinese characters writing practice sheet

### 7. Learning Pedagogy

In order to master the Chinese language, a learner must master the listening, reading, writing, memorizing and speaking skills [10]. For an L2 learner, memorizing and recognizing Chinese characters are very important because without these 2 skills, a learner is unable to communicate in the Chinese language. Our approach mainly focuses on memorizing and recognizing Chinese characters. The reason why we focused on these two skills is because existing approaches are just not helpful or effective enough as previously discussed in the related work section.

Our framework extended the original idea of pictogram Chinese characters representation by combining 2 or more than 2 pictogram Chinese characters to create a learning approach. In addition, this framework is more student-centered learning. In addition, this approach is interesting, novel and fun as multimedia elements are included in the process of Chinese characters learning.

The combination of pictogram Chinese characters is used in this learning system because we are fully aware of the advantages of images in helping children memorize. Therefore, we used a combined evolution of pictogram Chinese characters to represent the Ideogramic Chinese characters as this method of learning can really reduce the burden of these learners in memorizing complex languages especially in learning Chinese characters.
8. **Learning Pedagogy Conclusion and Future Work**

We propose a new learning approach in edutainment for Malaysian national primary students (standard one) who are taking the Chinese language subjects or classes. Since Chinese characters are very different from alphabetical languages, the learners require good memorization skills and need a lot of practice. In this learning process, the learners could be frustrated, especially primary school students.

Our approach extends the original pictogram Chinese characters by combining 2 or more than 2 pictogram Chinese characters, and this forms the Ideogramic Chinese Characters. Our strategy is to use the original ideogrammic Chinese characters formation idea and present it via a multimedia approach. The multimedia approach that we applied involves visual and mind-mapping concepts that can aid students in their learning process of the language.

For future work, we hope to further extend the representation to another Chinese character formation. Hopefully, this approach will enhance the learner’s learning experience and encourage interactive learning of the Chinese characters.

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10. References


