
Chinese Character Learning System

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ABSTRACT

As the distinctions of formation structure between Chinese and Western languages, learners take more effort in grasping correct formation structure and pronunciation when they are studying Chinese character. Various Chinese character learning systems have already been proposed in order to help the learners recognize the character, but ignore its handwriting and cultural background. We here present a learning system for learners to study Chinese character better. To increase the effectiveness in learning Chinese character, we combine pronunciation and character writing with the integrated use of computer, projector and camera in this design. This system eases the learners to understand the meaning, cultural background and formation structure of character

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KEYWORDS

Chinese character; Projector; Pronunciation;
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by using the morphological and phonetic animation projection and handwriting instruction. In comparison with screen-writing systems, this system provides a more authentic learning experience for learners through simulating the learning process of writing a more authentic learning experience for learners through simulating the learning process of writing on real paper. We anticipate our system to be a starting point to explore the instruction in Chinese character in the field of its formation structure, pronunciation and handwriting, and to be used in the classroom or at home in the future.

1 INTRODUCTION

The number of foreigners who study Chinese as the second language is increasing. One of the most crucial distinctions between Chinese and Western languages is that the former is based on ideograms, whereas the latter is based on phonograms [2]. Due to this distinction, Western learners of Chinese experience more difficulties in grasping correct formation structure and pronunciation. Chinese stroke combines in different ways to form components that are the fundamental elements to construct character [7]. Learning the Chinese character takes lots of effort because learners have to memorize not only the formation structure of the character but also its pronunciation.

Various Chinese character learning systems have already been proposed in which researchers use songs, database system, animation or game to help learners recognize Chinese character. Catherine McBride-Chang proposes Visual Chinese Character Identification Model [6] that shows the activation of the meaning system by both orthographic lexicon and phonological lexicon in Chinese. Yuma Ito generates a song for learning Chinese character comprehensively by using sounds that represent the formation structure of the character and lyrics that represent the meaning and usage [1]. They combine pronunciation and formation structure, but the sound is decided by the researchers, which results in the lack of relevance between these two elements. The graphical arithmetic strategy is used to help foreigners understand the meaning of a character by using the morphological animation presentation visually [3]. This method shows the structure of Chinese character vividly, but it ignores the cultural background and historical changes behind the character. Yun Wen has tried to find an effective approach to improve L2 learners' Chinese orthographic knowledge by making use of technology [7]. The researchers designed a digital Chinese character composition game with the paper-interface named as ARC (Augmented Reality-based Chinese Characters), seeking to enable learners to complete the game collaboratively in classrooms. However, the learners focus more on whether the character is correctly composed but seldom discussed the pronunciation and meaning of the character. In conclusion, the existing systems remain mainly in teaching the recognition of character, not giving the learner the opportunity to write by themselves.

This project aims to create a system to help second language learners learn Chinese, namely pronunciation and formation structure of Chinese character. By using this device, the learners can practice recognizing, writing and pronouncing Chinese character. The system incorporates the

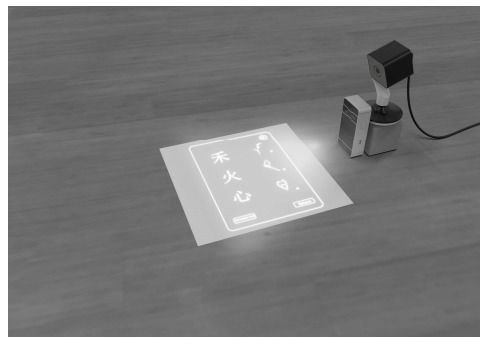


Figure 1: Chinese Character Learning System.



Figure 2: Inscriptions on bones or tortoise shells of the Shang Dynasty, Chinese character of "秋".

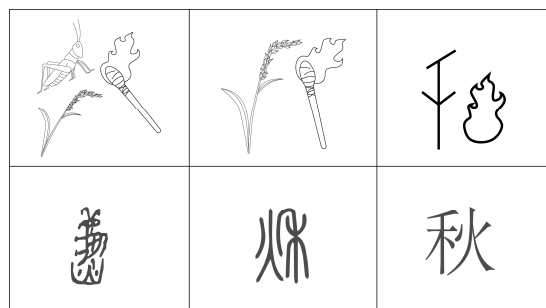


Figure 3: Animation demonstration of Chinese character "秋".

following functions: a) project the stroke of Chinese character and the animation of the origins of this character; b) identify the character written on paper and pronounce it.

2 SYSTEAM FEATURES

Our design is to allow Chinese learners to access the origins of Chinese character by recognizing, pronouncing and writing practice through projection (Fig. 1). Understanding character formation structure and cultural background is the key goals of our research. Moreover, our device gives corresponding feedback for the handwriting character written by the learners.

2.1 Generation of animation

The system can disassemble Chinese character according to the program and explain them in detail in the form of animated images and present it by projection. Chinese character can be disassembled in the form of letters, stroke symbols, images, and pictograms.

The Origin of Chinese Characters(《说文解字》), which is firstly written in the Han Dynasty as a dictionary and constantly being supplemented later, includes 9353 Chinese characters and 1163 ancient Chinese characters, altogether 10516 characters. In this book, Chinese character is dissembled into radicals and the original form and meaning of the character is traced. According to this principle, abstract character is decomposed into the form of concrete images. Through such a strategy, learners can better understand and learn more Chinese characters in the process of learning the splitting and merging of a Chinese character. For instance, the Chinese character of "愁" which can be divided into upper and lower structure components, the upper part of "秋" for the meaning of autumn. The Chinese character "禾" means "rice", and the Chinese character "火" means "flame". Inscriptions on bones or tortoise shells of the Shang Dynasty (c. 16th-11th century B.C.), "秋" looks like the picture shown in Figure 2. The structure above "秋" is the locusts, sub-Chinese Character structure is a fire which used to drive the worms, It represents that when ripen in fall, locusts that destroy the crops are drive away by fire, But gradually people simplified ancient "秋" to the latter-day "秋" which is combination of "禾" and "火" (Fig. 3). At the same time in the ancient Chinese, when autumn is coming, all things began to wither so there is a sense of sadness. Chinese character "心" which is the lower part of "愁" means mood. "If your heart is like autumn, then how can your mood not be sad?" The explanation comes from an ancient Chinese poem, "what worry, heart autumn." By disassembling the Chinese character in this way and then combining them, learners can not only learn multiple Chinese characters but also learn the formation structure of the overall radicals of Chinese character. These are all essential knowledge for those who need to learn Chinese character. Moreover, through the logical narration of stories, learners can better remember Chinese character by images memory and logical understanding, which can deepen their understanding.

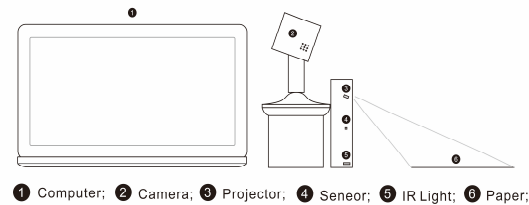


Figure 4: System configuration.



Figure 5: Projection interface.

2.2 Writing character

The system aims to help learners recognize and write the character correctly. With the animation projected on the paper, the learners acquire the meaning, the formation structure and the cultural background of the character. Then the learners can practice writing it. The camera captures the image information written by the learners and converts it to digitized data. After comparing it with the standard template, the device sends corresponding audible instructional feedback.

2.3 Pronouncing character

In the learning process of disassembling Chinese character, the formation structure and pronunciation are played together so the learners can click on any Chinese character showing on the interface to let the device pronounce it. In daily life, if the learners encounter an unfamiliar character, the device can recognize the character, pronounce it and project the animation of the formation structure, so that he can better comprehend the pronunciation, formation structure and meaning of the character.

3 LEARNING SYSTEM

3.1 Hardware

The system configuration is shown in Fig. 4. The system consists of a computer, a small-sized projector, and a camera. The camera automatically captures the character written or the character seen by the learners. Then computer process the image captured by the camera and converts the information into computer language, and calls related programs and tools to recognize, pronounce the character and give instruction feedback. The projector projects a square of approximately 200*140mm on the plane. In this space, learners can watch the animation of disassembling and merging Chinese character and tracing the projected Chinese character on the paper. What is more, this system is small and simple, which is conducive to the teaching of Chinese character. Additionally, in comparison with screen-writing systems, this system provides a more authentic learning experience for learners through simulating the learning process of writing on real paper.

3.2 Projection interface

The system could project the Chinese character on the plane which is projected at a size of approximately 200*140mm. The learners can choose the character they want to learn according to their level and character radicals. After the choice of course, the learners press the "play" button to let the system show the stroke of Chinese character and disassembled form structure in animation. Moreover, if the learners click any Chinese character which appear in animation, the system will pronounce the Chinese character. When clicking on the "write" button, the learners can write the Chinese character on the paper. After finishing writing it, the learners can click the "report" button to get a score and feedback on the handwriting. Furthermore, the learners can use the "identify" button to identify the Chinese character on the screen. (Fig. 5)

4 CONCLUSIONS

This project focuses on Chinese character learning for foreigners. Pronouncing, recognizing and writing of Chinese character are combined in this system, to help foreigners understand Chinese character better and enhance the learning experience. The core equipment projector and sensor are used to present the character-stroke, cultural background and pronunciation. The following features demonstrate the contributions of our system: 1) Projection of animation. 2) Character recognition. 3) Pronouncing Interaction. We anticipate our system to be used in the classroom, at home or in the exhibition hall, to bring the treasure of Chinese culture — Chinese Character to more people.

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