

## A STUDY OF CHINESE CHARACTER ACQUISITION IN THE DIGITAL AGE

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**Abstract** The present article explores the ongoing changes in Chinese character acquisition, resulting from the frequent use of multimedia for learning purposes. The current state of character study among Romanian students is presented by taking into account the great difference between the Chinese script and the languages with orthographic writing systems. When learning characters, one should assimilate their form, sound and meaning as a whole. The mechanisms of character study are explained through the character-centred theory, the word-centred theory and by neuroscience. This article analyses the positive and negative influences on Chinese character acquisition brought on by the increasingly prevalent use of multimedia devices, including professional websites and character handwriting applications on smartphones.

**Keywords** Chinese characters, character-centred theory, multimedia, cognitive neuroscience, handwriting.

### Chinese language acquisition for Romanian students

Chinese characters carry with themselves millennia of culture and civilization, which makes them crucial when teaching Chinese as a foreign language. Nevertheless, the difficulties of learning this ancient visual language abound among students worldwide. The main challenge is to memorise a character's properties (form, sounds and meaning) as parts of a whole, and understand Chinese as more than a spelling-centred language. For instance, the Chinese ideograph for *good* is 好, pronounced hǎo, with a pitch mark. It is also a polyphonic character, with another pronunciation, hào, meaning *to like*. Several homophonic characters share the same pronunciations, but different tones, such as 烟 yān and 盐 yán, meaning *cigarette* and *salt*. Moreover, each character has its own stroke order, writing sequence and structure, which

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are ignored by users of the Latin alphabet. The handwritten version of a character should be correct and aesthetic. This system requires Romanian learners to enhance their perception of details, represented in Chinese by the eight basic strokes, namely dot (*Dian* “丶”), horizontal (*Heng* “一”), vertical (*Shu* “丨”), hook (*Gou* “丨”), rising (*Ti* “㇇”), downward left slant (*Pie* “丿”), downward right slant (*Na* “㇏”), and folding (*Zhe* “㇔”), as well as other derived strokes.<sup>1</sup> Basic strokes make up components and radicals, which create characters, the basis of the sophisticated and holistic Chinese script. The semantic function of characters changed gradually due to immigration, cultural appropriation and industry innovations.<sup>2</sup> Romanian speakers are used to the linear thinking shaped by the Latin writing system. The number of syllables in a word does not completely influence its memorisation. On the contrary, Chinese characters are not always words on their own and words themselves can change meaning completely if one character is modified. The strokes and radicals are organised spatially, logically and aesthetically in a square shape to embody meanings. For example, the Romanian word *apă* has two syllables, but the Chinese character 水 (*shuǐ*), *water*, has only one syllable. All the characters correspond to a single syllable, but depending on their combinations, they can have different meanings.

Without a certain awareness towards Chinese characters, Romanian students take them for words, which reduces character understanding and learning efficiency. The conflict between the character-centric and the word-centric approaches is to blame for this error. For instance, the word 水 refers to *water*, while the word 水果 means *fruit*, although both have the character 水. As far as characters are concerned, they cannot be properly memorised if their stroke order is not respected, which is a serious issue throughout the educational process. The first step when teaching Chinese in Romania is to introduce and practice the Pinyin system,<sup>3</sup> which marks phonetic reading with Latin letters. The cognitive system acquires knowledge more easily if there is something familiar to it. Romanians prefer Pinyin instead of Chinese characters instinctively, as they are habituated to its Latin alphabet appearance.

Teaching Pinyin before the actual characters is problematic, because it misses tone marks as well. This way, students cannot learn how to write and pronounce properly.

One of the biggest challenges of learning Chinese, especially its pronunciation, lies in the tones and the four pitches used to convey characters' meaning. Pinyin is designed to mark the Chinese phonetical system based on Latin letters, while the characters' forms are learned through visual exercises. This method makes tone distinction extremely difficult for non-tonal language students, who name it the “Chinese wall”. The four tones are high-flat, rising, fall-

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<sup>1</sup> Tsu Jing, *Kingdom of Characters: A Tale of Language, Obsession, and Genius in Modern China* (New York: Penguin, 2022), 133-36.

<sup>2</sup> Ying-shih Yü, Josephine Chiu-Duke, and Michael Duke, *Chinese History and Culture: Seventeenth Century Through Twentieth Century* (New York: Columbia University Press, 2023), 17.

<sup>3</sup> Chris Shei, *Understanding the Chinese Language. A Comprehensive Linguistic Introduction* (Oxford: Routledge, 2014), 29-33.

rising, and high-falling. Romanian students who lack sensitivity to these pitches mistake tones and even words each other. Thus, the two main issues for Romanian learners of Chinese are the Chinese characters and their tones.

### **Cognitive neuroscience and Chinese character acquisition**

Cognitive neuroscience seeks to discover the biological workings of the human mind, aiming to explain how the information-processing structure of the human brain makes mental operations.<sup>4</sup> As a form of information processing, language learning implies effective cumulation, transformation, refining, storage, application, and improvement operations. These concepts have been studied by neuroscience. They help us understand the different areas of the brain.<sup>5</sup> Chinese characters stimulate the area responsible for the processing of images more than other languages do. When this psychological theory is applied to learning Chinese characters, it becomes understandable why breaking a thought pattern is so hard. Non-Chinese speakers name this task “the Chinese wall,” because their cognitive pattern affects their interest and motivation.<sup>6</sup> According to cognitive neuroscience, the Chinese ideographic language system and the orthographic one shape the brain differently. Chinese native speakers have a more evolved “Broca’s area,” while orthographic language speakers have a more developed “Wernicke’s area.” Broca’s area is in charge of language analysis and comprehension. Its anterior part ensures the understanding of words’ meaning, while the posterior one is responsible for phonology.<sup>7</sup> Chinese language awareness begins with visual elements (the characters), before sounds. In order to develop a sensitivity to Chinese characters and ease language acquisition, the beginner should be exposed to as many of them as possible.

### **The character-centric and word-centric theories**

The Chinese character-centric theory is also named the Zi-centred theory. It refers to the study of Chinese based on its characters. The Zi (Chinese character) as a whole is defined by its phonetic, semantic, and orthographic dimensions.<sup>8</sup> At first, the theory was put forward by Xu Tingqiang, in 2008. His aim was to connect the research of ancient and modern Chinese, while

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<sup>4</sup> Steven A Sloman, et al. “Cognitive Neuroscience Meets the Community of Knowledge,” in *Frontiers in systems neuroscience* 15 (21 Oct. 2021), doi:10.3389/fnsys.2021.675127.

<sup>5</sup> Eric R. Kande, John D. Koester, Sarah H. Mack, and Steven A. Siegelbaum, *Principles of Neural Science* (McGraw-Hill’s AccessBioMedical Science. New York, N.Y.: McGraw-Hill Education LLC, 2021), 46.

<sup>6</sup> Pellatt Valerie, Liu Eric T., *Thinking Chinese Translation, A Course in Translation Method: Chinese to English* (London and New York: Routledge, 2010), 45.

<sup>7</sup> *Ibid.*, 56.

<sup>8</sup> Xu Tongjiang, *The Guideline of the Character-centered Theory “汉语字本位语法导论”* (Jinan: Shandong Education Press, 2008), 25-9

exploring the characteristics of the Chinese script. The theory is proved by grammatical units, structure and semantic expression.

The Chinese word-centric theory appeared in 《马氏文通》 (Ma Shi Wen Tong), in 1898. It was the first book to systematically analyse the traditional Chinese grammar. The explanations, however, are strongly influenced by the Indo-European language structure, which revolves around words. Chinese characters are different from letters. They can stand for morphemes, words or make up sentences. Their functions explain why Chinese students learn English words letter by letter, not as units. They see letters as equivalent to ideographs. Given the essence of the Chinese writing system, the word-centric theory is not as feasible as the character-centric one.

The character-centric theory explains the meanings of characters and words based on individual ideographs. The grammatical units in Chinese are the morpheme, word and the phrase. A word comprises morphemes and can be combined into phrases. Some characters have meaning on their own, but can also be parts of words. For example, 果 can mean “fruit”, but it means “to apply” in the word 苹果. The understanding of characters’ semantic function is relevant to vocabulary development. For instance, 车 means *vehicle* by itself, but is combined with other characters to designate more specific means of transport: 自行车 (*bicycle*), 救护车 (*ambulance*), 出租车 (*taxi*), 火车 (*train*), 公交车 (*bus*). Characters are considered words when they make sense on their own. They are grammatical units when they form words as morphemes.<sup>9</sup> The character-centred theory sees words as a combination of characters. The word-centred theory sees them as units, neglecting ideographs and their function as morphemes. The words formed by characters are related to each other by definition, introduction, and coordination. The words above are linked by definition, because they all contain 车.

When studying Chinese, it is more practical to focus on the appearance of characters, than their grammatical function. There are many structures in Chinese: subject-predicate, verb-object, verb-complement, and others. The differences between them are so ambiguous, that Romanian learners make frequent mistakes and believe grammar rules in Chinese are few to none. In fact, after millennia of Chinese civilization, they evolved. The mixture of grammatical structures from various ancient and contemporary dialects makes Chinese an extraordinary linguistic phenomenon.

The characters’ expressive function plays an even more important role when sentences have ambiguous structures. There are many exceptions in Chinese grammar, so the context often exclusively shapes the meaning. Because Chinese words do not change depending on case, number, or gender, they have flexible positions in sentences. The person is usually the subject and the passive voice is less frequent compared to English.

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<sup>9</sup> Lv Shuxiang, *Chinese Grammar Analysis*, “汉语语法分析问题” (Beijing: The Commercial Press, 1979), 45

However, there are debates concerning the character-centric theory, which supposedly blurs the connection between characters and words. Consequently, it does not bring Chinese studies up to the international language research standard, which the Romance languages achieved. In any case, modern colloquial Chinese diminished the importance characters had in the classic period. Thus, the word-centric theory is getting more attention from contemporary Chinese researchers and teachers of Chinese as a foreign language, who should meet international standards.

The conflict between the two theories resides in the lack of interest for ideographs assumed by word-centrism. The characters are thus limited to no more than a writing system. The study of foreign languages is now supposed to rely on phonetics and meanings, independent of symbols like Chinese characters. This is regarded by many scholars as ignorance towards the real meaning of characters in language, culture and civilisation. The reason behind the word-centric theory can be that making sentences with words is more pragmatic than creating words with characters. After all, the grammatical function of characters is applied in classical Chinese studies, rather than colloquial Chinese.

The flaws of the character-centric theory:

1. A character has multiple semantic and grammatical functions. In linguistics, it can be either a morpheme or a word. Without tones and contexts, a character has several pronunciations and meanings, which is against the clarity required for scientific research;
2. The meaning and pronunciation of a character may vary depending on dialects and historical context, which is challenging for researchers;
3. Character-centric theory may confuse morphemes and characters in Chinese, which is not favourable for teaching Chinese as a foreign language.

The debate between the character-centric and word-centric theories is analysed by many renowned sinologists worldwide. The process of learning characters is crucial for further studies of ideographs. This fact encourages us to look for the best methods. The first step in teaching Chinese is to form character awareness. Written communication wise, the characters are the foundation of vocabulary and sentences. Once the high-tech multimedia technologies emerged, learning Chinese characters has been improved by new study methods, backed up by neuroscience.

### **The traditional Chinese character learning methods**

The Chinese writing system is ideo-phonographic-symbolic. It has square-shaped characters, which are connected to syllables and tones. Therefore, traditional teaching methods focus on

memorising the form, sound and meaning as one,<sup>10</sup> by repeatedly writing and pronouncing ideographs. While teaching techniques vary, they are all based on the origins, evolution and cultural value of Zi. There are strategies based on components, pronunciation, writing rules, etc. The emergent approaches include:

- simultaneously learning characters and readings
- recognising ideographs, rather than writing them
- learning the characters, then using them in sentences
- learning the six types of characters
- giving classifications

There are more pragmatic methods as well, including flashcards, pictures, pronunciation practice, mnemonics, character semantics, games, and calligraphy.<sup>11</sup> Broadly speaking, they are all included either in decentralized literacy or centralized literacy.<sup>12</sup> Every approach has pros and cons. Nevertheless, the learning/teaching technique(s) should be chosen according to educational needs.

Decentralized literacy is the most frequent approach to teaching Chinese as a foreign language, and is widely spread in Romanian universities. It combines the characters' memorisation with their use in context. The acquisition of ideographs becomes less monotonous, as they are scattered throughout texts of different difficulty levels, depending on the students' knowledge. When new characters appear, the brain is prompted to develop a deeper capacity of interpretation. The characters are used gradually, from simple to complex, to encourage curiosity and perseverance. This practical approach enables students to use ideographs properly from the beginning. At the same time, decentralized literacy shows the value of the word-centric theory. Compared to this method, the traditional ones are overly complicated. They require more grammatical explanations and time to learn stroke order and readings, without preparing students to use this knowledge in real-life situations.

The Chinese writing system comprises six types of characters: pictograms, simple indicatives, compound indicatives, phono-semantic compounds, transfer characters, and loan characters.<sup>13</sup> Teaching them gives students a holistic understanding of the Chinese script's origins and its first stages of evolution. When learning the six types of characters, one analyses them from the easiest to the most complicated, and goes from visualization to abstraction.

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<sup>10</sup> Wu Junru, "Neurocognition in the Reading of Chinese Characters," *Journal of Chinese Writing Systems* 6, (3): 167-183. 2022, doi:10.1177/25138502211061605.

<sup>11</sup> Pan Yujiao, "Character teaching method research about foreign students of no-Chinese characters cultural circle" ( MA thesis, Jilin University, 2012), 24.

<sup>12</sup> Zhang Yi, "A Study on the Teaching Method of Chinese Characters in Foreign Language Teaching," *哲学文史研究*, No. 8: 73-75.

<sup>13</sup> Cîndea Giță, Iulia Elena, *Decoding Chinese Characters: Development and Construction Principles* (Sibiu: Editura Universității "Lucian Blaga" din Sibiu, 2016), 15.

Hence, character knowledge ranges from explicit images to implicit signs. Each ideograph has its own historical background waiting to be discovered. For teachers, however, this method requires a combination of entertainment and academia. Making something look fun at first does not guarantee it will always be this way.

### The use of multimedia for Chinese character learning

Mobile phones are indispensable tools in modern society and more applications are designed to improve character study, enabling users to write them on the screen. Despite the difference between writing with a digital pen and a traditional one, this method meets the demand of our digitalized community. It even ensures a more effective study of characters.

The most popular apps rid the learning process of time and space constraints. Their software customises lists and provides exercises. The best known include Skritter, Pleco, ChineseSkill, Chinese Writer, and Chinese Calligraphy and Color. The Pleco app is the most popular among Romanian students thanks to its extraordinary features. It includes a dictionary, flashcards, optical character recognition, document reader and more. The most used function is handwriting. The app provides a special space, where the user writes. Afterwards, the software makes a list with all the characters resembling to the user's. Thus, even if a character is incorrect (with missing strokes or improper structure), one can still find the right one on the list. For most Romanian students, the primary function of Pleco is the fast-search dictionary. A character's pronunciation and meaning are connected, so it is impossible to find the definition without the pronunciation. With Pleco, students write a character on the screen and find its meaning, words containing it and even sentences. However, the app is not designed to emphasise the correct and aesthetic way of writing. Thus, students make mistakes during their exams.

The internet supplies many resources for character study regardless of one's learning objectives and level of Chinese. The Chinese Etymology 汉字源<sup>14</sup> website is the most suitable for academics. It was created by Richard Sears, an American who has computerized the origins of Chinese characters for years. The website provides more than 96000 ancient Chinese characters from archaeological sources, all of them ready to be searched for and studied free of charge. Due to his massive contribution, Richard is nicknamed Uncle Chinese-Character. Each character is introduced with its detailed evolution, from ancient inscriptions on bones and shells to the modern version, through all the written forms from different dynasties and locations. The character's development is presented as a documentary about human society and other fields. Richard's story is an inspiration to go beyond learning Chinese characters and make them into a lifetime career.

The learning process increases in efficiency depending on the degree of sensory brain stimulation. Its neurochemistry influences the result by reinforcing connections and integrating

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<sup>14</sup> Website of Chinese Etymology: <https://hanziyuan.net/#%E8%BD%A6>.

information. When the senses work together, people carry out cognitive processes, like concentration, memorisation, language expression, self-control, and problem solving.

Learning is coordinated simultaneously by the brain and other parts of the body. Once the receptors receive stimuli, they turn them into signals and send them to the brain, via the nerves. As the number of receptors translating stimuli into impulses increases, the brain creates and stores more information. Therefore, in order to remember Chinese characters accurately, it is recommended to visualise them, read aloud and write them often. The use of media in language study, especially character acquisition, is a valid way to improve efficiency.

### **The Advantages and Challenges of Chinese Character Acquisition through Multimedia**

Digital teaching introduces characters with their form, pronunciation and meaning, while interacting with learners in an entertaining manner. Romanian native speakers use linear thinking when they acquire new languages. However, ideographs require a well-trained visual perception, rather than acoustic. The connection between images and sounds demands learners to improve their attention and information management; on this account, Chinese might seem almost impossible to grasp for speakers of languages with orthographic systems. Thankfully, modern multimedia stimulates different sensory organs simultaneously. It also uses the other teaching methods to their utmost potential and engages the learner in activities which boost the reaction and development of brain nerves. The apps and sites provide stroke order through animations, and sounds through voice recordings. The software creates a scenario close to reality and gives more sentence examples. It also compares visually similar ideographs in order to make them clear.

As we know, pronunciation and tones are the main challenges in Chinese; the multimedia assists phonetic exercise by giving the standard pronunciation and recording the learner's for analysis and comparison. For instance, after hearing a character's pronunciation, we can repeat it to Google Translate to check if we can reproduce it or to find the flaws in our speech.

Moreover, unlike traditional teaching methods, media devices show an ideograph's form, sound and meaning in a multidimensional way. Thus, characters with the same radicals are grouped by meaning. For instance, the character 吃 *chī*, meaning *to eat*, is used in words like 吃饭 *chīfàn* (*have a meal*) and 吃早饭 *chī zǎofàn* (*have breakfast*). Other important characters such as 喝 *hē* (*to drink*) and 吞 *tūn* (*to swallow*) can be taught together because they all possess the radical 口 (*mouth*) and are related to eating or drinking. The animation writes the verb 吃 and gives all the words that are linked to it. The memorisation process is stimulated by colours, sounds and explanations. When it comes to abstract characters, the multimedia can give concrete representations for their meaning. A pained face and a sight can vividly represent the character 痛 *tòng* (*painful feeling*). What is more, the cultural dimension of characters is unveiled through visual and audio materials instead of being limited to conventional oral explanations. The connection between ideographs and customs, cuisine,



clothes, names, architecture and many other aspects is expressed clearly. As an example, the characters 你 *nǐ* and 您 *nín* are equivalent to the Romanian words *tu* and *dumneavoastră*. Simulated real life situations can illustrate the difference between them: two conversations, one with a friend and one with a teacher, for instance. Multimedia sparks the Romanian students' interest for Chinese idioms through animation. Idioms are usually made of four characters and express general truths inspired from the past. A short video stimulates the brain enough to ensure their understanding and further use.

Character acquisition through multimedia guarantees a self-study environment, free from spatial or temporal limitations. The traditional method requires a teacher who writes characters for the first time, telling their meaning and pronunciation. Afterwards, the students write them again and again on paper, respecting the stroke order. The conventional teaching procedures have two weaknesses: (1) learning characters is limited by time and space, and (2) it is a tedious process. Nowadays, these issues are solved by multimedia. Smartphone apps allow learners to use their time for studying anywhere. Digital devices design study plans according to personal goals. The learning process thus becomes enjoyable, diverse and provoking.

Nevertheless, character study depends on calligraphy, which demands correctness and, more importantly, aesthetics. As the Chinese saying goes: the character is the man. One's manners, personality and even appearance can be told from the handwriting. Learning the character's form, pronunciation and meaning is not affected by time or space anymore. However, developing a beautiful handwriting is still the highest virtue of the Chinese culture. The interest for digital writing practice is increasing, but traditional pen-on-paper exercises and their results need further research. The knowledge found on applications is insufficient for the mastery of Chinese writing. Language learners should still study hard, pen on paper, in order to actually understand ideographs. The multimedia provides attractive alternatives, but practicing according to writing rules and using characters in context can hardly be replaced by a pad or a smart pen.

The Chinese character acquisition through multimedia benefits Romanian students, because it helps develop the appropriate linguistic thinking pattern. If they are not stimulated adequately, language (and character) learning becomes a negative experience. The Chinese thought pattern relies on fast connections between characters and their pronunciation; this requires a long-term immersion. Multimedia assists the learning process, saving time. China and Romania have very different teaching approaches, which explains why students find ideographs hard to grasp. Romania favours communication and heuristic education more than China does. In China, characters are "poured" into students' mind in a short time. Teachers' words are absolute and pupils are only supposed to listen and take notes. Oppositely, the Romanian culture and education encouraged students to think individually. They can use multimedia to find suitable study materials and access databases for question-solving. This is a positive effect of long-term, frequent brain stimulation, which results into their desire to study more on their own. The repeated association of characters

with stimuli moves them to the long-term memory. Students also show more initiative when they use multimedia.

Furthermore, digitalisation supports many study goals. Some Romanian students prefer to learn daily conversation instead of ideographs. In this situation, the use of electronic resources is enough to satisfy their need. Adjusting the amount of different stimuli maximises visual memorisation.<sup>15</sup> Classrooms with digital devices favour character learning.

The main challenge of Chinese character acquisition through multimedia is to balance study and entertainment. When students are faced with so many forms of information, they find it harder to pay attention to characters. Games or animated stories reduce their effort to memorise. Multimedia shifts focus on enjoyment and relaxation instead of study. The other main issue discussed by Chinese native teachers is handwriting. Romanian students frequently use the word *draw* rather than *write* when they refer to Chinese characters. The Chinese writing tradition requires ideographs to be correct and pleasant to the eye. There are different calligraphic styles, but they are all aesthetically valid. Character apps offer basic knowledge about stroke order, but using a finger on the screen can only develop a superficial writing ability.

From an aesthetic point of view, it is even more important to exercise pen on paper, or with a brush on rice paper. The variations of stroke thickness, curves and beginning or ending strokes are significant for the beauty of handwriting. The traditional aesthetics achieved on paper cannot be developed with a smart pen.

## Conclusion

This study aims to analyse the positive and negative influences of digitalisation on the Chinese characters 'study. Given their complex dimensions, the brain needs to be visually trained and habituated to associating images with sounds and meanings. The debate between character and word centred Chinese teaching dates back to centuries. The ideas supported by each of them proves the importance of developing awareness towards Chinese ideographs and their semantic function. On the one hand, Zi make sense independently; on the other hand, they can be combined to form a word. While the word-centred theory appeals to the international language research system, characters keep their place as fundamental phonetic, semantic and ideographic symbols of the Chinese language.

We discussed the advantages of learning characters through multimedia and the differences between digital and traditional methods. We provided two examples: the character application Pleco and the website Chinese Etymology. Furthermore, we examined some perks of digital resources:

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<sup>15</sup> Susan M. Gass, Jennifer Behney, and Luke Plonsky, *Second Language Acquisition: An Introductory Course* (New York: Routledge, 2020), 238-239.

- Entertaining presentation of character pronunciation, meaning, and form
- Individual study with little limitations
- Customized study plans for various study objectives
- Immersive learning environment, etc.

While traditional teaching approaches relied on dominant teachers and huge amounts of writing practice, the modern educational diversity and encouragement of autonomy changed everything. However, the use of multimedia for Chinese script learning is insufficient.

The negative impact of electronic devices seems to increase, demanding more consistent research on continuous learning exercises, without digital distractions. Moreover, the traditional pen-on-paper way of writing stays valuable to the Chinese culture.

Regardless of the fast development of science and technology, or the desire to make languages “typeable” on intelligent electronic devices, traditional handwriting will always be a priceless cultural heritage.