Chinese Characters, Chinese Culture and Chinese Mind

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Abstract

Writing forms - whether in terms of Chinese characters and Chinese ideographs, phonetic alphabet or numeric systems – are created by and thus reflect culture, mind, and social reality. In turn, these writing forms exert great impact on the culture and mind of their users. This article contends that in addition to the cultural content that the Chinese writing system conveys, the media of Chinese characters and alphabet themselves may very likely act like mathematical notations and consequently function as a processing system. Such a system has a strong impact on the mind, culture, and even the brain structures of their users. Chinese characters, for example, due to their unique physical properties rather than the cultural content loaded in them due to their pictographic and ideographic nature, have helped for thousands of years to organize and shape the Chinese mind just as language does. The argument of this paper is that our mind shapes our writing forms (the media) and in turn they shape our mind. As the writing forms are different, they may have helped to shape, at least to some degree, a different mind.

Introduction

The culture of a given society shapes its writing or orthographic system § according to the features of its language. The writing system, in turn, influences the culture which creates it. On the one hand, orthography as a reflection of language reflects its own cultural environment, especially the prevalent mode of thought. On the other hand, as an active force, it promotes and reinforces its socio-cultural reality, the established mode of thought in particular.

According to this assumption, the pictographic and ideographic writing system of the Chinese, which has evolved over three thousand years and still retains its genetic relationship with its original form, may have acted as a powerful agent, affecting its culture and thought patterns, and even the organization of the function of the brain through inducing unique specialization in the reading brain. This essay further assumes that the formation of typical structure of pictographic and phonetic compounds with the pictographic radicals placed on the left, roughly indicating meaning and phonetic radicals placed on the right, roughly indicating pronunciation, is the outcome of the interaction between the Chinese characters and the brain. This compound structure represents the main body of Chinese characters. However, how this structure was formed and developed until it became the main body still remains a question. This paper sets forth a very tentative resolution of this mystery.

1. The Starting Point: Graphic Features Of Chinese Characters

Several thousands of years ago, the Chinese people established a tradition of thinking in terms of images. Then they formed the habit of writing and recognizing script forms in terms of images. In fact, these cognitive processes – thinking, writing, and decoding in terms of images have long been interacting and reinforcing one another for thousands of years, and, as a result, have played a significant role in shaping Chinese culture and Chinese mind, and even in affecting the organization of the brain by inducing a unique specialization of the brain.

Although today the Chinese characters are highly abstract and symbolic, the writing still preserves its pictographic and ideographic prototypes, the parent script which evolved almost six thousand years ago. The meanings are still directly loaded on the graphemes, contours, and shapes of the characters or what is today called pictographic/grapho-semantic radicals. The fact that there are direct semantic relations between the graphic radicals and their referents including ideas shows that it may be appropriate to describe the development of the formation of Chinese orthography as an overlapping process as well as a gradual one.

The unique structure of Chinese characters makes it interesting to speculate on the extent to which the readers of Chinese rely on images or icons, or graphemic mediation, especially when compared to readers of alphabetic orthography, who we assume mainly depend on phonemes (phonemic mediation).

2. Psychological and Neurological Processes Involved in the Recognition of Chinese Pictographs and Grapho-semantic Radicals

The differences between the psychological processes in the cognition of Chinese characters and the alphabetic orthography may be due to the fact that the recognition in the first case seems to follow a direct route or to have a direct lexical access because the graphemes are semantically loaded. As some scholars stated, the recognition of most Chinese characters involves visual-spatial or perceptual-spatial tasks that some Chinese scholars refer to as "visually ruled" tasks. Whereas, the recognition of the alphabetic orthographic script relies on phonologically based or rule-based tasks – or what some scholars call phonologically ruled tasks.

Metaphorically, the Chinese are raised in a cultural environment where visualization takes precedence over deduction. The processes that best characterize the Chinese mode of conceptualization involve "*Visualizing things and acquiring analogy*" and *then "visualizing this analogy and grasping meaning*." Hence, Chinese mode of conceptualization is thought – intuitive, concrete, analogical, and imaginative. This philosophical ideology highlights the way in which Chinese characters were invented, written, recognized, acquired, and learned. The graphemes, contours, and shapes of Chinese characters which themselves have content and messages were born out of the perceptive or visualized experiences. Analogy thus became the source out of which grows meaning and concept. Visualizing analogy therefore became the prerequisite in writing and recognizing Chinese characters.

The saying "*visualizing things and acquiring analogy*" and *then "visualizing analogy and grasping meaning*" are dialectically related. In ancient times the creation and formation of Chinese characters served as evidence to illustrate the ancestors' process of understanding and conceptualization and thinking in which visualization experiences were the prerequisite and out of which, grew meaning or concept. This may serve as instrumental in the understanding of the organization of cognitive activities and brain strategies.

The assumption might be justified that the recognition of Chinese pictographs and ideographs is primarily an intuitive, holistic, concrete, and analogical process in contrast with what is involved in the recognition of the alphabet, which may be characterized as an abstract, analytical, deductive, and linear process.

Cognition processes are always underpinned by neurological processes and it is a widely accepted fact that there are neurological correlates of language: the two sides of the cortex perform different tasks and the two hemispheres of the brain are specialized in different cognitive processes. Recently, speculation on the lateralization and localization of cognitive and linguistic processes in the brain has been extended to incorporate the study of the cognition of orthography. A growing wealth of theory, experiment, and hypothesis has shown that a different orthography may quite likely favor a different mode of neurological processing. The Chinese pictographs and ideographs may favor an operation in the reading brain which may be distinct from the one elicited by a phonological orthography. Professor Yuxin Jia's clinical observation supports this assumption: a tumor confined to Broca's area does not inhibit recognition of single pictographs upon loss of speech. Stated differently, impairment of language functions in the left hemisphere spared the mental functions of the right - the patient retained skills in the area of visual-spatial orientation, where the right half of the brain is dominant; and by extension, the ability of recognizing such features as character, faces, objects, and even graphemes.

From the speculations concerning the division of labor in the brain, we might tentatively assume that the right hemisphere is largely responsible for processing the features of pictographs and grapho-semantic radicals, as they may be primarily specialized in perceptual-spatial, visual-spatial, and relational tasks, as well as synthetic or holistic mental activities.

Investigation into the Japanese writing system has provided the most convincing data in favor of this assumption, as Japanese orthographic system has both *Kanji*, the Chinese pictographs and *Kana*, phonological forms. Speakers suffering from localized aphasia show evidence that, despite loss of the ability to recognize *Kana*, their ability to recognize Kanji is spared. Damage on one has no effect on the other. From a historical perspective, ancient pictographs would be especially compatible with such a dominant right hemisphere processing, as the earliest were the closest to drawings and the least related to phonetic graphs. Furthermore, the early characters almost all belong to the high frequency characters used today, reaching 77.5 percent, sometimes to 99.48 percent of the total characters.

3. The Effect of the Phonetic Loan Character: The Interplay of the Two Hemispheres

Speculation about right hemisphere domination in the brain processing of Chinese characters should not allow us to overlook the effect of the phonetic loan characters, which were formed and developed by phoneticization of the pictographs.

Unlike alphabetic orthography, each Chinese character is a self-contained unit of form, sound, and meaning. Therefore, almost every Chinese character is a multi-coded word. The phonological element, including the phonetic radicals in the compounds, must have played an important role in structuring the characters and in affecting reading and recognition process, and consequently in helping organizing the brain.

Originally, the loan characters were borrowed on the basis of their phonetic values and served mainly to indicate pronunciation. They may have represented a different,

homophonous word and they may or may not have been related to meaning. Those which only possessed phonetic value eventually | became amorphous loan characters.

What complicated the matter in history is the development of the grapho-semantic and phonetic compounds, which were formed primarily by adding grapho-semantic radicals to the loan character. Such compounds eventually came to represent over 90 percent of the total number of Chinese characters. In this compound structure, the grapho-semantic radicals and phonetic radicals stand symmetrically, with the former approximately making the semantic value and the latter indicating roughly the value of sound. In connection with neurological processes, the grapho-semantic radicals will probably elicit responses in terms of images, icons, or graphemes, etc. The phonetic radicals are most likely to elicit responses in terms of phonological forms, or at any rate, through an intermediate phonological stage. However, some of the phonetic radicals partially indicate meaning, while some indicate only pronunciation. The purely phonetic radicals might be compatible to the syllabic *Kana* of Japanese, which is quasi-phonetic graphs in nature and thus may have similar effect. The grapho-semantic and phonetic compounds are also called morphemic and phonetic compounds by Chinese scholars.

As the structure of grapho-semantic and phonetic compounds constitutes the main body of Chinese characters, it naturally follows that there must be numerous phonetic radicals. In fact, there are over one thousand phonetic radicals according to recent investigation. A large role is played by the phonetic radicals in recognition and cognition, as well as in brain processes. Hence, its significance cannot be ignored. Based on the above analysis of the assumptions, we may assume that where the Chinese characters are concerned, a recognition or reading may not only involve the right hemisphere but also the left, with its aptitude for apprehension of phonological forms. However, the fact that the pictographic and ideographic nature of the Chinese characters and their heavy dependence on the right hemisphere for recognition is something unique in the world.

4. The Evolution of Chinese Characters: The Formation of the Grapho-Semantic (On the Left) and Phonetic (On the Right) Compounds

Why did grapho-semantic and phonetic compounds ultimately come to constitute the majority of Chinese characters? Then, more importantly, why did grapho-semantic left and phonetic right compounds eventually make up the majority of the compounds? The answer addressed to the first question has been provided by quite some scholars. And the scholars seem to agree that this structure was formed and developed over long period of time so as to accommodate the needs of the development of Chinese language: it is developed simply to control the number of the characters as well as the basic (iconic) forms. The second question, however, has long remained unanswered.

It can be asserted that the historical development of Chinese characters was marked by the tendency towards a configuration in which the grapho-semantic component became fixed on the left and phonetic component on the right. We assume that the gradual development and formation of this compound occurred in correlation with the division of labor in the brain over the course of the long time. Or stated differently, the formation of this compound structure was the outcome of the interaction between the characters and the brain.

Historically speaking, Chinese characters proceeded through three stages of development: pictographs and ideographs, loan characters, and grapho-semantic and phonetic compounds. Gradually, however, the grapho-semantic and phonetic compounds took

precedence over all the rest and soon became the backbone of the total system. Since its origin, the categories of grapho-semantic and phonetic compounds steadily and gradually began to replace the other categories. In the Shang Dynasty (1600-1100 BC), for example, they accounted for about 20 percent of the 9,000 characters inscribed on the tortoise shells which have been handed down to us. In the Eastern Han Dynasty (25-220), they accounted to about 82 percent of the total 9,353 characters. Later in the Ching Dynasty (1644-1911), the number increased to 8,057, constituting approximately 90 percent of the total Chinese characters. At present, 90 percent or more may belong to this category, although exact data are not available. It seems logical and natural to conclude that the evolution of Chinese characters inclined towards the formation and extension of grapho-semantic and phonetic compounds.

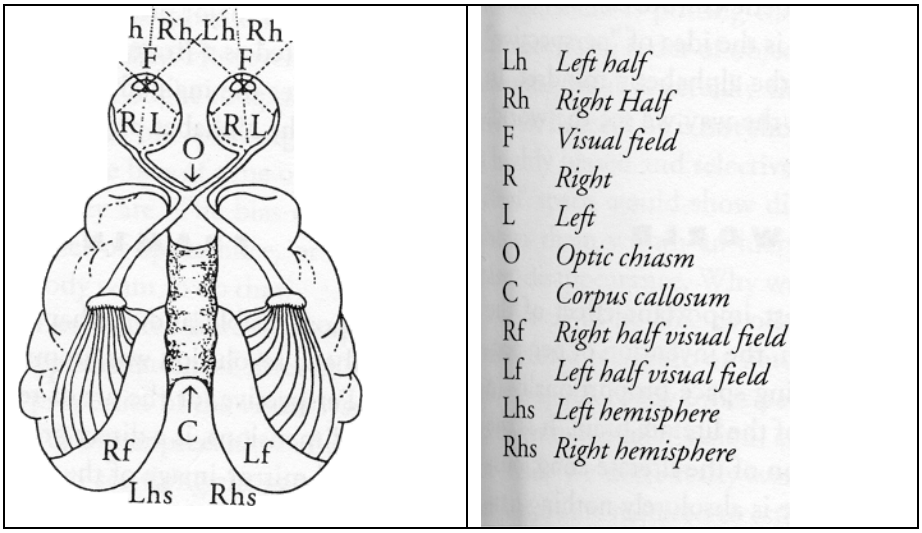
It was a considerable time before the configuration with grapho-semantic radicals placed on the left and phonetic radicals placed on the right became the predominant structure. In ancient times, this structure was invented both by adding grapho-semantic radicals to the phonetic loan characters or also by adding loan characters to the pictographs. At first, however, the positions of the grapho-semantic and phonetic radicals were not fixed. They were free elements, that is to say, either element could be placed anywhere in the formation of the character: at the top, at the bottom, on the right, on the left, in the middle. By the Chou Dynasty (1500-1100 B.C.), however, the positions of these elements had begun to be fixed: the grapho-semantic radicals were mostly placed on the left and the phonetic radicals were placed on the right. Eventually this structure became the most common structure. According to some statistics, the top and bottom structure - where either radical can be placed at the top or the bottom - represents only 23% percent of the total. The middle or circumjacent represents an even smaller number: 7 percent. Obviously, the historical development of Chinese characters has shown a very marked tendency towards the formation the grapho-semantic left and phonetic right compound, which now occupies the majority of all the compounds and accounts for the majority of the total Chinese characters.

The development of Chinese characters toward the grapho-semantic left and phonetic right compound cannot be regarded as an accidental event. It was brought about by the interaction between the stimuli provided by those structures and the brain processes underlying reading and recognition modes. This interaction may well have been going on ever since the introduction the grapho-semantic left and phonetic right compounds. In other words, the Chinese characters, as external stimuli, must have corresponded to or correlated with neurological or brain processes in such a way as to allow the script to be read and decoded as effectively and as quickly as possible. Thus the grapho-semantic left and phonetic right compound may have been an effect on cerebral organization where reading was concerned.

From studies of investigating brain specialization, we know that, in both eyes, the optic chiasma splits the visual fields vertically into a right visual field (RVF) and a left visual field (LVF). The light in the LVF of both eyes falls on |B the right of the retina in both eyes, while the light in the RVF falls on the left of | the retina in both eyes. The optic nerve from the right side of the retina of both eyes extends to the cortex of the occipital lobes of the right hemisphere of the brain, while the optic nerve from the left side of the retina of both eyes connects with the cortex of the occipital lobes of the left hemisphere of the brain. This suggests that the RVF of both eyes is processed by the left hemisphere. Clearly, the right hemisphere is faster and better at processing information presented to the LVF.

It seems likely that the right hemisphere may more readily process configurations, images, icons, or features and the left hemisphere may more readily process speech forms and

phonological forms. Consequently, it seems likely that grapho-semantic radicals may be processed more efficiently by the right hemisphere and phonetic radicals more efficiently by the left. In other words, when the grapho-semantic radicals fall on the left visual field of both eyes, they will probably be processed more effectively than when they fall on the right visual field. Likewise when the phonetic radicals fall on the right visual field of both eyes, they will probably be processed more effectively than when they fall on the left. Therefore, it seems plausible that the formation and development of the grapho-semantic left and phonetic right compound should correlate with neurological processes, or the division of labor in the two hemispheres of the brain.



Examined in this light, the development of this compound – from the stage when either of the radicals could be placed freely to the stage when the placement of both radicals was essentially fixed – was, virtually a long historical process of trial-and-error, or hypothesis-test-adjustment with regard to physiological selectivity on the part of the brain. The final fixing of the grapho-semantic radicals on the left, and phonetic right could not have been accidental or arbitrary – there must have been a causal or correlative connection between this structure and the function of responsibility in the brain. Or the structure of this compound should be the outcome of stimuli it created and the selectivity of the brain.

We should not, however, overlook the impact this structure of the Chinese characters may have on the reading brain or the Chinese mind throughout the long period of interaction. The grapho-semantic left and phonetic right compound may have served as an effective environmental conditioning agent that predisposes its lateralization in the reading brain. Viewed in this light, this unique compound structure may have played an organizational role in brain strategy, as well as the Chinese mind.

Recommended Reading

Bentin, S. (1989) Compte rendu sur I'ouvrage: Right hemisphere contribution to lexical semantics. In C. Chiarello, (Ed.), *Language and Speech, 32* (1), pp.67-72.

Biederman, I. and Tsao, Y.-C.. (1979) On processing Chinese ideographs and English words: Some implications from stroop-test results. *Cognitive Psychology, 11*, pp. 125-132.

Bogen, J. (1968) The other side of the brain I: Dysgraphia and dyscopia following cerebral commissurotomy. *Bulletin of the Los Angeles Neurological Society, 34*, pp. 73-105. 1968-1969.

De Kerckhove, D. (1988) Critical brain processes involved in deciphering the Greek alphabet, in Derrick De Kerckhove and Charles J. Lumsden (Eds.*), The Alphabet and the Brain: The Lateralization of Writing*. Heidelberg: Springer-Verlag , pp. 153-320.

Hatta, T.. Recognition of Japanese Kanji in the left and right visual fields, *Neuropsychologia, 15*, 16, pp. 685-688.

McLuhan, M. (1962) *Understanding Media*, New York: The New American Library. 1962.

Sasanuma, S. (1975) Kana and Kanji processing in Japanese aphasics, *Brain and Language, 2*, pp. 369-383.