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Towards a Reformation of Chinese Ideographs

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Abstract. General characteristics of Chinese ideographs are explained and their shortcomings are pointed out. A new way of counting numbers of strokes is proposed. Some topological parameters of radicals (elements for construction and indexing of Chinese ideographs) are measured. The 214 radicals are classified to nine categories according to their meanings and average values of topological parameters for these categories are obtained. A proposal is made to reform the present Chinese ideographs.

1. Introduction

We have three kinds of ideographs in the world history which were developed by big powers, the Egyptian hieroglyphs, Mesopotamian cuneiforms (the wedge-type characters) and Chinese characters (Fig. 1). The former two changed later to phonograms and are no longer used now. The Chinese characters are the only ideograms working even now in civilized countries. Good introductions of them are given in some encyclopedias (KODANSHA, 1983; ENCYCLOPEDIA BRITANICA INC., 1987; CRYSTAL, 1987).

Hereafter, we use the term "Chinese Ideographs" (abbreviated as "CI") instead of Chinese characters, in order to include all of classical Chinese characters, new-type characters in China and Kanji* characters, the Japanese characters in Chinese origin (terms with asterisks are listed in Appendix A to indicate Kanji characters for them). CI have been working as logograms (with both meanings and pronunciations) within the same country or culture, while as ideograms (with meanings only) between different countries or cultures.

There have been other ideographic systems in eastern Asia, which were produced by simulating CI. Examples of them are characters in Eurasian kingdoms in 10–14th centuries, Qi-dan,* Xi-xia* and Nu-zhen.* But, they disappeared when these kingdoms lost their powers (NISHIDA, 1984). Vietnam developed Chy-nom* in 13–19th centuries, which are not used any more when alphabets came in (NISHIDA, 1984).

It is widely accepted that the general trend in developments of characters is a process from pictogram, through ideogram to phonogram. However, the system of CI is a big exception to this trend. Why are CI still used in eastern Asia, i.e. in China, Taiwan, Hong Kong, Japan and Korea? (We are using these terms as regions of respective cultures and not

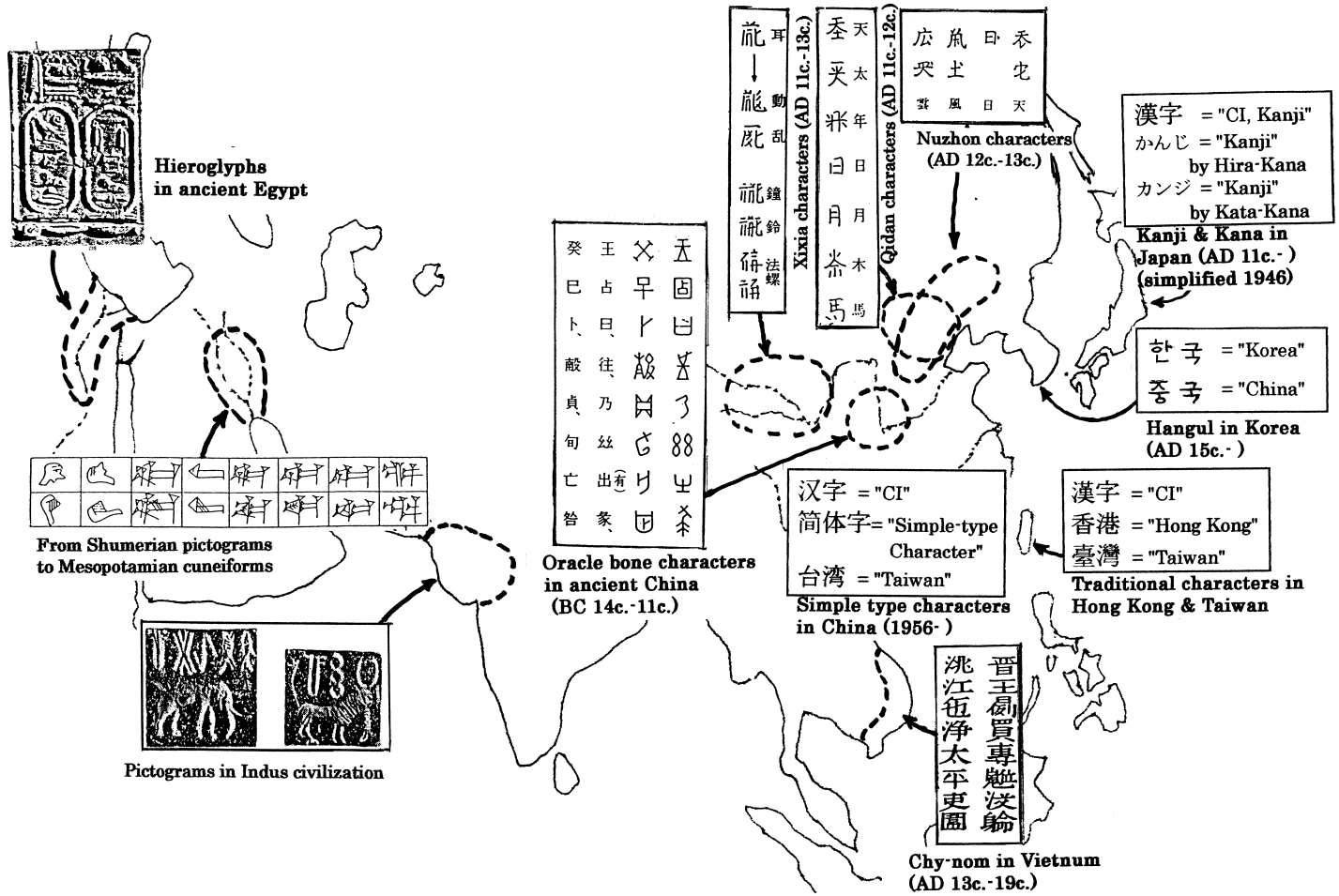

Fig. 1. Ideographs in Eurasia. Small characters besides classical characters show correspondences with present Japanese Kanji characters.

as political units.) According to the opinion of this author the reasons are explained as given below.

First, the system of CI functioned as a communication tool among different cultures for more than 2000 years, so that Chinese dynasties could govern that large area in a bureaucratic way. Secondly, CI have an advantage that one can catch their meanings quickly at a glance and read sentences rapidly. This property is common among systems of ideographs; the true advantage of CI is that their shapes are simplified properly so as to enable rapid writing. Thirdly, many CI have attractive shapes. Each character has balance, strength, movement and elegance in itself, and their combinations give a great variety of impressions to observers. This is why a branch of art, calligraphy, is developed in eastern Asia.

The first reasoning above suggests a possibility that if a proper system of ideographs is constructed, it may provide an efficient tool of communication among different countries out of the eastern Asia. This is one of the motivations of the present work. However, this author is not the first one who mentioned on this possibility. A linguist, T. Suzuki, suggested to develop CI to a world-wide symbolic communication system (HASHIMOTO *et al.*, 1987a).

On the other hand, the system of CI has several shortcomings. Advantages and disadvantages of Chinese characters are also discussed by western scholars (for example, see Web-URL(a) in the reference list). The most serious one is that children are forced to work hard to master these complicated CI. This shortcoming led to movements of simplifications of CI in China and Japan in the middle of 20th century. However, both countries took different ways of simplification, while Taiwan and Hong Kong are still using traditional CI. Korea decided in 1948 to use Hangul characters (phonograms) in official documents, which were invented by Korean scholars in 15th century. At present CI are mixed with small fraction in Korean newspapers. In Japan we have phonograms called Kana* and mix Kana with CI. Thus, we have four different writing systems in the eastern Asia. Moreover, since we have different shapes and usages of CI, as shown in Fig. 2, mutual communication through CI has become difficult, in spite of the fact that CI are ideographs.

meanings	China	Taiwan	Korea	Japan
economy	经济	經濟	經濟	経済
ideologie	主义	主義	主義	主義
registered mail	挂号	掛號	登記	書留
study	用功	用功	工夫	勉強

Fig. 2. Examples of CI with different usage and abbreviations in eastern Asia. CI for "economy" and "ideologie" were invented in Japan in the modern age, and other countries followed them. "Registered mail" and "study" existed in these countries since long years (from HASHIMOTO *et al.* (1987b)).

It is natural to consider that we should unify these different systems of CI. But, they are used already by a lot of people, and their changes will be met with strong objections. Another difficulty would be a problem which country should take a leadership of unification process. Therefore, what we can do at present would be to create an ideal system of CI as a long time span project. We may say that, even if 50 years were necessary for its creation, it would without doubt contribute for more than 500 years. This is also one of the motivations of this work.

The purpose of this paper is to explain several features of CI and to propose an outline for reforming CI, so that new CI can be learned easily by anyone in the world. Note that CI have been tested for 3000 years and are still surviving, which might suggest strongly that the system of CI matches to the basic nature of human beings.

However, this kind of work should be made by cooperation with those from many cultures including western ones, because the system of CI is a treasure of the whole world and because wisdoms from different cultures are necessary for a better result. This is why this paper is written in English.

2. Recent History of Reformation of CI

The dictionary Kangsi-Zidian*, published in 1716, contains 47,035 CI and has been looked upon as a standard both for shapes of characters and meanings. However, major fraction of CI included in it are slight variations of original ones, and the number of essentially different characters is about 10,000. But, this is still a great amount, and many of them have complicated shapes.

In Japan after the Second World War, the GHQ (General Headquarters, which were organized by American military and existed during 1945–1952) forced a policy to reduce the number of CI and to simplify their shapes. This policy was based on the western idea that ideograms are at a primitive stage and should develop to phonograms. In 1946, the 1,850 characters were chosen as Tentative Characters* and additional 92 CI only for person's names (MINISTRY OF CULTURE, 1982; TODO, 1982). Among them 881 CI were nominated as Educational Characters* to be taught in the compulsory education. This system was modified in 1981 and the Standard Characters* were fixed, which includes 1945 CI with 166 CI for person's names. The Educational Characters increased to 996 in 1977, and further to 1,006 in 1988.

These regulations are not applied to newspapers and other publications, where about 5,000 CI appear in total. This number might indicate the number of concepts necessary for expression of all kinds of affairs in the world. However, according to a research (MINISTRY OF CULTURE, 1982), about 80% of total appearances of CI are occupied by 500 CI, and 99.6% by 2,000 CI (see Table 1).

In China, just after the People's Republic of China was established (1949), they planned to replace CI with alphabets, and they produced 2238 simplified CI in 1956 for tentative use, called Simple-type Characters* (MINISTRY OF CULTURE, 1982; TODO, 1982). In addition a system of alphabetical spellings of CI, pinyin-zimu*, were fixed. But, after the cultural revolution they began to estimate the advantage of CI and decided not to abolish them. Owing to the Simple-type Characters, the literacy of Chinese people increased drastically. In Chinese schools they learn about 3000 CI. According to a statistics in China

Table 1. Frequencies of usage of CI in Japanese literatures.

Number of CI	100	200	500	1000	2000
Frequencies of appearances	40.2%	56.1%	79.4%	93.9%	99.6%

(HASHIMOTO *et al.*, 1987b), 1000 CI appear with frequency of 90% and 2400 CI with 99%. These frequencies are similar to those in Japan.

Here, it is interesting to note that in the *Longman Dictionary of Contemporary English* (LONGMAN GROUP LTD., 1978) about 2000 defining words are nominated, which are used for explanation of each word. The number 2000 seems to be a critical one as a number of important words.

Around the year of 1978 before fixing the Standard Characters, the Japanese government discussed with China towards unification of CI (ASAHI-SHINBUN NEWSPAPER, 1978). But, it was too late because of the reason mentioned in Sec. 1.

3. Past Trials of Creating New Ideographs

The Esperanto, created in 1887 by Ludwik L. Zamenhof in Poland, is the most famous one as an artificial language. It follows the grammar and the vocabulary of Latin languages and uses a system of alphabet (phonogram). Hence, Esperanto depends much on the European culture. Although it does not play a role of world-common language, the trial to construct a new language, which is different from any conventional one for the sake of equality, should be highly evaluated.

Symbols, which are commonly accepted pictographs, have been developed since long years and used in many occasions, such as mathematics, traffic signs on the streets and the airports. At present ISO (International Organization of Standardization) is managing creation, normalization of international symbols (TAKAHASHI, 1973; MURAKOSHI, 1987). Most of them are reasonably designed and easy to learn. But, it is mainly for one-way communication and not for mutual one. Moreover, its function is limited to simple messages, and building up sentences by arranging them is impossible. Some trials were made to create systems of symbols with higher functions, such as ISOTYPE (TAKAHASHI, 1973; MURAKOSHI, 1987). But, they do not seem to be used widely.

As an artificial system of ideographs Bliss symbols are remarkable (HELFMAN, 1981). They are produced by a German Jewish refugee, Karl Blitz, who was born at the end of 19th century in Austria-Hungary area. Later, he changed his name to Bliss, escaped to Australia, and produced in 1949 this system of symbols in Sydney. His motivation came from the memory in his youth, i.e. in his home country more than ten languages were spoken and people with different languages hated each other. He got a hint of his work from CI, which he knew when he was in China. Having constructed his system of symbols, he showed it to some linguists, but without response.

In 1971 this system was known to a stuff of a institution in Canada for orally handicapped children, and was employed as a tool of communication. This trial proved to be a great success, and it became popular among handicapped persons. In 1981 they had

many centers in 11 countries promoting this system. But, there was no center in the eastern Asia (two centers in Asia, India and Israel). This author would guess that the people in eastern Asia know CI and are not impressed much by the Bliss symbols.

A remarkable point in Bliss symbols is an introduction of special elements for specifying parts of speech*. They are effective in reducing number of necessary symbols. At the same time it suggests an importance of distinguishing parts of speech for correct understanding.

A similar system of ideographs LOCOS were proposed by a Japanese designer, Y. Ohta, at an International Graphic Design Conference (1971) (MURAKOSHI, 1987). It enables us to make sentences by arranging symbols. It gave an impact among designers, but it does not seem to be used practically.

It is interesting to note that a tribe of Inuit is using an artificial system of phonograms, which was created by a Christian missionary (TAJIMA and TANAKA, 1999). This fact suggests a possibility that a system of characters created by a single person can survive within a small group. This author would like to suggest also that a new language or a new system of characters should be constructed on a basis of a long-lasted culture so that it be accepted widely. The case of Esperanto is a good example for it.

4. Important Features of CI

4.1. Sizes of CI

Each CI is written with an equal size, mostly within a square space. Therefore, it is easy to identify each character. One may tend to write more complicated CI with larger sizes in order to show their details clearly, but it will lead to a confusion through a failure of identification of each character.

4.2. Number of strokes

Degree of complexity of each CI is measured by the number of strokes. However, its counting depends on the order of strokes in brush-writing of CI. Sometimes two line segments are written in one stroke as a natural motion of hand. As a result the present way of counting is rather difficult to master. Here, another method of counting strokes is proposed. In this method any segment or point is counted independently, if it is isolated or connected to other segments with a kink. In Fig. 3 some examples of CI are shown with

meaning	one	eye	poem	compete	group of fish
	一	目	詩	競	魚 魚魚
number of strokes	1	5	13	20	33
new number of strokes	1	6	14	24	39

Fig. 3. Numbers of strokes by the conventional and a new ways of counting.

stroke numbers both by the traditional and the new methods.

Recently, TOGAWA *et al.* (2000) obtained average stroke numbers of Educational Characters at successive grades and those used in general. According to their results this average increases monotonically with the school grade. This fact shows that the complexity of CI increases with the number of strokes. However, at the same time it should be kept in mind that CI with large number of strokes is not always difficult to learn (HASHIMOTO *et al.*, 1987a).

4.3. Four categories of construction of CI

Many of CI are constructed by combining elements. A Chinese scholar Xuzhen* in Han* dynasty edited the first dictionary Shuowen-jiezi*, in which CI were classified according to elements included in them. Moreover, he proposed four categories of CI constructions (TODO, 1982; HARUNA, 1992), as listed below (see also Fig. 4).

(i) figurative characters*: simplification of shape of real object; abbreviated as FGC,

Fig. 4. Four categories of construction of CI. FGC: figurative character, IDC: indicative character, ICC: ideo-combined character, IPC: ideo-phono character.

Table 2. Different English terms for the four categories.

Categories	The Pinyin Chinese-English Dictionary (1978)	Kodansha Encyclopedia of Japan (1983)	Proposed here
FGC	pictographic character	pictographs	figurative ch.
IDC	self-explanatory character	diagrammatic character	indicative ch.
ICC	associative compound	combined meanings	ideo-combining ch.
IPC	pictophonetic character	phonetic character	ideo-phono ch.

(ii) indicative characters*: graphic expressions of concepts; IDC,

(iii) ideo-combined character*: combination of elements with combined meaning; ICC,

(iv) ideo-phono characters*: combination of elements, one with meaning and another with pronunciation; IPC.

He gave two more categories, derived characters* (abbreviated as DRC) and borrowed characters* (abbreviated as BRC). However, these two are concerned to usage of characters after constructed, and are not mentioned here any more.

Strange to say, English terms for these categories are not established yet. A few examples of English terms are listed in Table 2. Since they are not convincing enough, the present author has proposed the above terms, which are direct translations of the original expressions by CI. In many literatures, including ENCYCLOPEDIA BRITANICA INC. (1987), English terms are not given.

4.4. Radicals and their redundancy and multiple meanings

Elements for construction of CI are themselve FGC or IDC. In conventional dictionaries a limited number of elements (214 in number) play roles of classifying CI, and called "radicals"*. In Shuowen-jiezi* 9,353 CI were classified by 540 radicals, while Kangsi-zidian* had 214 radicals (HARUNA, 1992; SATO, 1996). This latter number is followed by the later dictionaries. On the other hand, there are many other elements which are used frequently for construction. In this paper they are also called radicals, and radicals for classification are called "indexing radicals".

According to a statistics based on 996 Educational CI (WATANABE, 1976), about 86% of CI are IJC or IPC and 14% are FGC or IDC. Hence, most CI are constructed by combination, and one needs in principle only to master a limited number of elements in

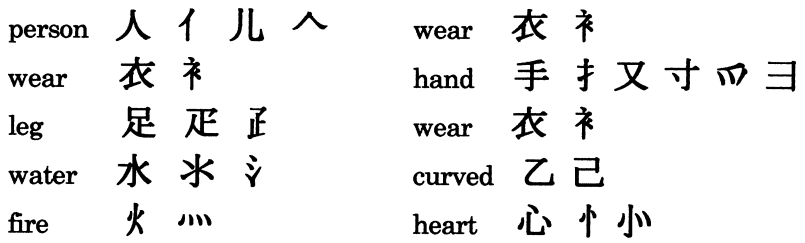

Fig. 5. Examples of the cases where several radicals have the same meaning.

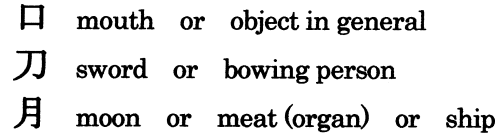

Fig. 6. Examples of the cases where one radical has different meanings.

order to catch meanings of a lot of CI. However, many of CI now have changed their meanings, and new meanings can not be guessed from their elements. In fact, French poet, Henri Michaux who traveled in China, pointed out that meanings of only 500 out of 20000 CI could be guessed from their constructions (GEORGES, 1987). These deviations arose through a long history of usage of CI.

There are many cases where several radicals have the same meanings (redundancy of radicals), and where a radical has different meanings (multiple meanings). As are seen from Fig. 5, the radicals for "person" and "hand" have many variations. Examples of radicals with multiple meanings are shown in Fig. 6.

There are some cases, where a radical has the second meaning derived from the primary one. For example, all radicals for "hand" shown in Fig. 5 primarily mean "hand as a part of body", and also "action with hand" as a derived meaning. Some other examples are shown in Fig. 7.

4.5. Shapes of CI

Many of the present CI have attractive shapes, which are characterized in terms of balance, strength and symmetry. In constructing a new system of CI these characteristics should be considered. However, since the concept "strength" is difficult to define or explain, it is not discussed in this paper.

4.5.1. Distinguishability

Most CI can be distinguished easily from other characters, while there exist several exceptions, as shown in Fig. 8. This kind of similarity should be avoided as much as possible. However, no reliable method to measure the similarity is available at present. Such method should be developed in future.

	(primary)	(derived)
羊	sheep	good thing (from its importance)
厶	arm	get a thing into privacy
方	flag	square
車	wagon	transport

Fig. 7. Examples of radicals with primary and derived meanings.

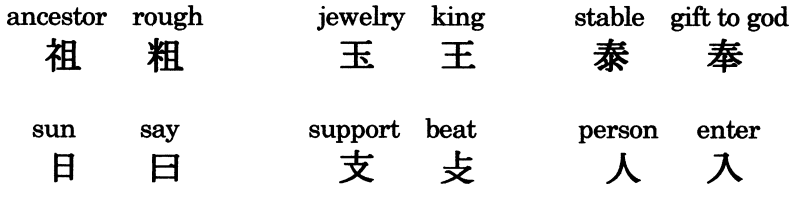

Fig. 8. Examples of similar CI.

Table 3. Statistics of symmetries from 996 educational CI. exact: exact symmetries, rough: rough symmetries.

symmetry	exact	exact & rough	%	Examples of symmetric CI
right-left	108	168	18.9	木 月 雨 軍 間
up-down	2	8	0.8	弓 州 旧 巨 区
up-down & right-left	12	20	2.0	日 田 王 車 非
rotation without reflection	0	1	0.1	己
reflection at oblique line	2	6	0.6	寸 女 可 多 才
translation	5	5	0.5	比 竹 羽 弱 競

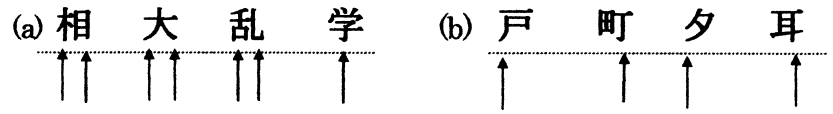

Fig. 9. CI with good balance (a), and bad balance (b). The arrows indicate contact points at the ground.

4.5.2. Symmetry and balance

Many CI have symmetries of several types as shown in Table 3. Even if basic structure of a character has a symmetry, its conventional typography often looses symmetry because of slight curvatures and additional kinks at the ends of strokes, as can be seen from Figs. 2–9. This typography used in this paper is called Ming dynasty font*. This asymmetry might reflect a tendency in calligraphy to avoid symmetry.

According to a statistics (WATANABE, 1976) 207 CI out of 996 Educational Characters have symmetries of a rough sense. In the first and second columns of Table 3, the numbers of CI with exact symmetries and those including rough symmetries are shown, respectively. The third column is for fractions of the latter. Coexistence of CI with and without symmetries is giving attractive looks to written sentences.

Most CI have shapes with good balance owing to the long history of usage. Some of CI lacks balance as are shown in Fig. 9, where CI are supposed to be supported at the contact points to the horizontal line. Mixture of these unbalanced CI in sentences is giving a dynamic impression to them. Therefore, we should not be too much critical to the balance of shapes.

4.5.3. Topological properties

It would be meaningful to characterize shapes of CI by topological point of view. The following topological properties are considered here:

Nele: number of elements, i.e. separate parts of CI.

Nloop: number of loops, i.e. number of closed spaces surrounded by strokes.

Nk: number of kinks, i.e. number of junctions between two strokes.

Nep: number of end points. (A point stroke is looked upon as having two ends, because it is drawn with a finite length.)

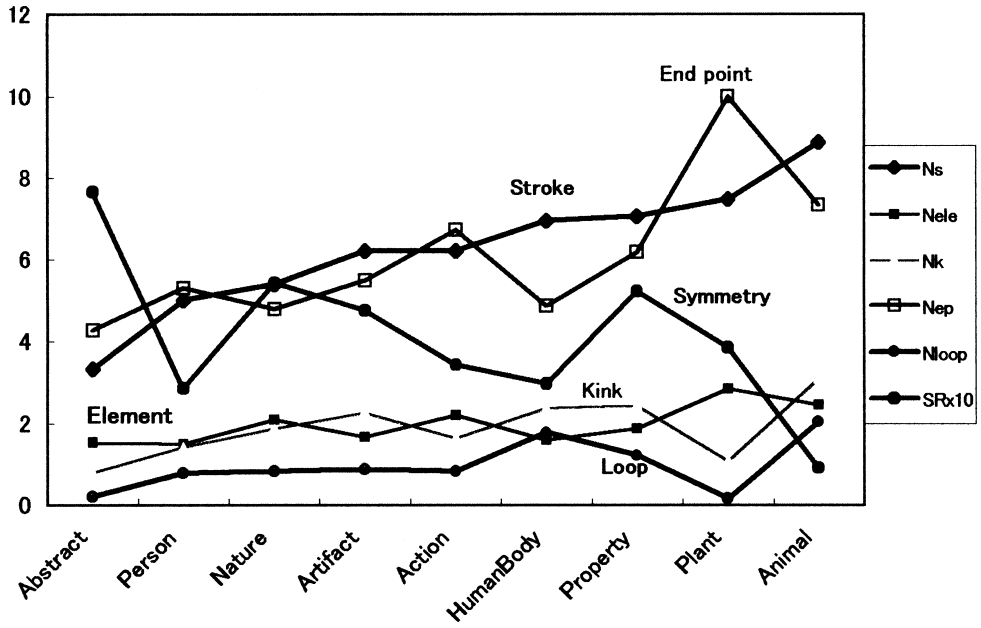

Fig. 10. Average numbers for topological properties. Samples are indexing radicals after classified into nine categories: abstract concepts, persons, nature and geology, artifacts, actions, human bodies, properties and states, plants and animals. They are arranged in the increasing order of the average stroke number *Ns*. Symmetry: fractions of symmetrical radicals.

Before counting these numbers, standard shapes of each CI should be defined. However, the conventional Ming Dynasty typography is often confusing, because it has unimportant small kinks and careless touching of separate parts. At present this author simplified the radicals so that they do not loose features of original shapes. Next, the 214 indexing radicals are classified into nine categories according to their meanings; the table of classification is shown in Appendix B. Average values of the above numbers are counted, whose results are shown in Fig. 10 along with the number of strokes and the fraction of symmetrical radicals.

It is interest to note that radicals for abstract concepts have the smallest number of strokes, few loops and high symmetry. On the other hand, natural objects such as plants and animals have large number of strokes, many end points and low symmetry. A remarkable difference between plants and animals is the number of loops. These topological properties are considered to reflect ideas of people about objects around ourselves.

Although these averaged values show characteristic tendencies as mentioned above, correlations between these parameters for individual CI are not apparent, except for the sums *Nk* + *Nep* and *Nloop* + *Nep* which have correlations with the number of strokes (see Fig. 11).

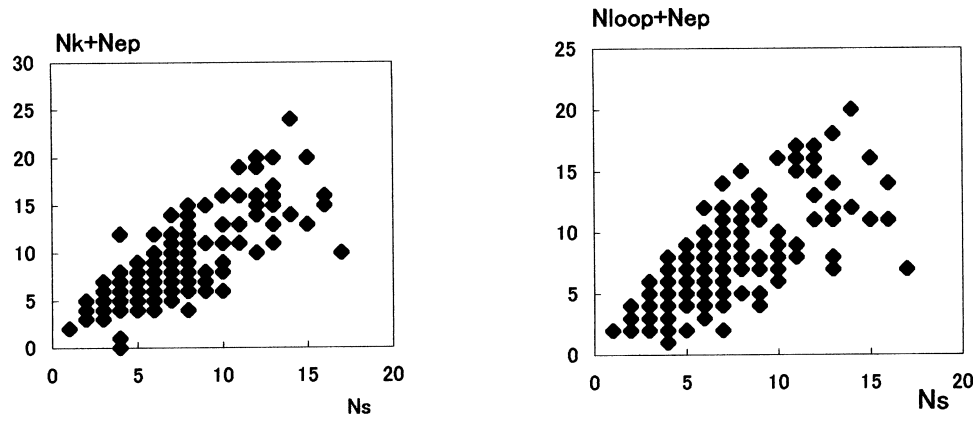

Fig. 11. Correlations between the number of strokes *Ns* with the numbers of kinks *Nk*, end points *Nep* and loops *Nloop*. Correlations are recognized only for the summations *Nk* + *Nep* and *Nloop* + *Nep*.

4.6. Sentence structure of the Chinese language

Uniformity of CI sizes may produces an impression that each CI has an equal weight and may also suppress developing characters with minor importance such as articles, prefixes or suffixes. In this situation, meanings of Chinese sentences should be understood by the order and meanings of Characters. This kind of language is called an isolated language,* while European languages are called an inflected language.* By the way, Japanese, Korean and Turkey are agglutinative languages,* where particles* connected to words determine structure of sentences.

In Chinese the standard structure of sentences is SVO, where S, V, O are the subject, the verb and the object, respectively. This order is common in most European languages, while more than half of languages in the world including Japanese and Korean have the order SOV and very few have the order VSO (FUJITA and HIRATA, 1985).

In communication by ideograms the order SVO is guessed to be the best choice, because the Chinese follows this structure. In languages with structure SVO, it is necessary that one can identify verbs easily, because verbs located between S and O play role to distinguish S and O. Verbs in European languages make conjugations, and it is relatively easy to find verbs. In the same way we must set up suitable rules, which enable us to identify verbs.

5. A Hint to Reformation of Radicals

The first step of reformation of CI would be reformations of radicals. However, we have no definite criterion to decide the number of necessary radicals. Some of the present indexing radicals are not important, while many of other elements should be added as radicals. Moreover, when CI were created in ancient China in B.C. 14th century, they did not have some concepts which are important in the present days, such as “paper” (invented in A.D. 105), “information” or “electricity”. CI for electricity is a combination of “rain”

and “dragon”, which reflects an idea in ancient China. Radicals for important concepts should be newly created.

The reformation, therefore, would contain the following processes:

(i) Importance of each radical is examined and omitted if not. Their importance can be estimated easily from the number of CI belonging to these indexing radicals.

(ii) Some of redundant radicals are omitted. One reasonable way to admit the redundancy would be to use radicals with original figurative shapes for nouns, while those with simplified shapes for abstract concepts, verbs or adjectives.

(iii) For radicals with multiple meanings, the second meanings are transferred to other radicals. But, this treatment should me made only if a large confusion is otherwise expected.

(iv) Shapes of radicals are simplified if they are too much complicated. One must be careful, so that new shapes match to original meanings. The new-type CI in China would be also taken into account.

(v) Important elements are added to the group of radicals. In this process some classical dictionaries, Showen-jiezi, Longkan shoujian and Sishen-bianhui (SATO, 1996) would be useful.

(vi) New radicals are created, if necessary. To begin with, such concepts as “paper”, “book”, “ceramic”, “record” and “magnetism” would be considered.

List of reformed radicals is not complete yet. When it is complete, it should be criticized by a lot of people including those in western culture. After reformation of radicals, or while doing it, we proceed to the next step, i.e. reforming about 2000 CI.

6. Concluding Remarks

In this paper some characteristics of CI and an outline of their reformation are discussed. The readers may have an impression that this author is fanatic and self-righteous. But, it is not an impossible project. However, since both China and Japan have done it once about a half century ago, the next reformation would not be made at least within 50 years from now. Therefore, what we should do now is to prepare for the next reformation. In addition, proposition of a subsidiary communication tool among various cultures would be meaningful even at present.

There is an investigation to test IQ values of Japanese children (LYNN, 1982). Japanese children got an average 111, while averages in other countries were 100. This difference might be attributed to learning CI, because it forces training of pattern recognition of geometrical shapes and also of combination of concepts. There is also a report that children in Taiwan have higher IQ than Japanese children (ISHII, 1992). These facts will suggest that introduction of CI in educational systems of developing countries would produce a positive effects in their future status.

Finally, it is worth noting that a creation of character system is a highly intellectual hobby and could be enjoyed by anyone. In fact, Gottfried W. Leibnitz was fascinated by CI from his own idea of “an algebra of thought” (HELFMAN, 1981). But, CI were too complicated to produce a positive result. Henri Michaux was interested in CI as noted in Subsec. 4.3. In that sense people in western culture do not have disadvantage in this kind of work. Therefore, this author would like to propose a joint work with people from various cultures.

APPENDIX A.

Alphabetical terms	Kanji character
agglutinative language	膠着語
borrowed ch. (BRC)	仮借文字
Chy-nom	字喃
deviated ch. (DVC)	転注文字
Educational Ch.	教育漢字
figurative ch. (FGC)	象形文字
Han (dynasty)	漢
ideo-combined ch.(ICC)	会意文字
ideo-phono ch. (IPC)	形声文字
indicative ch. (IC)	指事文字
inflected lamguage	屈折語
isolated language	孤立語
kana character	仮名文字
Kangsi-zidian	康熙字典
Kanji character	漢字
Kukai	空海
Longkan-shoujian	龍龕手鑑
Ming dynasty font	明朝体
New-type character	簡体字
number of strokes	画数
Nuzhen	女真
oracle bone character	甲骨文字
particle	助詞
parts of speech	品詞
pinyin-zimu	拼音字母
Qidan	契丹
radical	部首
Showen-jiezi	説文解字
Sishen-bianhui	四聲篇会
Standard Ch.	常用漢字
Tentative Ch.	当用漢字
Xixia	西夏
Xushen	許愼
Yan-Zhenlang	顔眞卿

APPENDIX B.

ABSTRACT and GEOMETRY

一	one, horizontal	丨	vertical line	丶	point, object
丿	—	亅	—	乙亠	curved
乚	hanging	二	two, parallel	—	
八	eight, separate	十	ten, cross	凵	empty, container
己	curved	彡	muster, pattern	爻	—
方	(direction), square	非	is not	侖	logic

PERSON

亻	human being	人𠂉	human being	儿	person
匕子	sitting(decaying)	士	grown-up man	女	female
子	child	歹	dead body	氏	blood connection
父	father	王	king	耂老	old person
臣	servant	鬼	ghost	隶	slave

PROPERTIES and STATES

夂	delay	攵	slow	大	large
小	small	尤	proper	干	branching rod, dry
幺	faint	毋	go through	玄	dark
甘	sweet	生	alive	疒	sick
白	white	赤	red	色	color
辰	soft, vibrating	長	long	高	tall
青	blue	黃	yellow	黑黑	black
斉斎	ordered	香	flavor of boiling	而	hanging

PLANTS

屮	bad, emerge slightly	艹艸	grass, plant	木	tree
瓜	melon	禾	plant of crops	竹	bamboo
米	rice grain	豆	bean	韮	leek
麦麥	wheat	麻	flax, hemp	黍	lacquer
芑	herb				

NATURE and GEOLOGY

冂	covering, height	冫	ice	夕	evening
氵水水	water	厂	cliff	土	soil(suburbs)
山	mountain	川巛	river	阝阜	hill(geometry)
水	water	日	sun	月	moon
气	gas	灬火	fire	石	stone
穴	hollow(empty)	金	metal, gold, money	雨	rain
音	sound	谷	valley	風	wind(climate)
阝邑	town(region)	口	country, region	里	village

ANIMALS

彐互	head of pig	犭犬	dog, wild animal	牙	tusk
牜牛	cow(sacrifice)	肉	worm, leptile	羊	sheep(good)
羽	wing(flatter)	虍	tiger	虫	worm, leptile
角	horn(angle)	豕	pig	豸	wild animal
貝	shell(money)	隹	bird(excite)	馬	horse
魚	fish	竜龍	dragon	鳥	big bird
鹿	deer	黽	flog	鼠	rat
亀龜	tortoise				

APPENDIX B. (continued).

HUMAN BODY

厶	arm(private)	又	hand	口	mouth, object
寸	hand	尸	hip	廾	both hands
手扌	hand	止	foot print	毛	hair
爪⺤	nail, push down	月	meat, mustle	皮	skin
目	eye	耳	ear	自	nose(self)
舌	tongue	血	blood(contract)	疋⻊	leg
足⻊	leg	身	body(side view)	面	face, mask
頁	head	首	head	骨	bone
髟	hair	歯齒	tooth	鼻	nose

ACTION

入	enter	力	force(effort)	勹	rapping
匸	hide	卜	tell fortune	辶	extend
亻	action	心忄	heart, feel	辶	go
支	support	攵攴	beat	曰	say
欠	cry, lack	殳	(making v.)	比	compare(ratio)
示礻	show(god)	用	use	癶	depart
立	stand	聿	write	艮	see obliquely
至	reach	行	street(go, do)	覀西	cover
見	see	言	word(information)	走	run
辛	stick(bitter)	韋	go round	釆	scatter
食飠	eat	飛	fly	鬥	fight
鬲	saw				

ARTIFACTS

冖	cap	刀刂	sword(cut)	几	desk, bench
匸	box	宀	house	工	engineer(technique)
巾	cloth	干	rod with blanch end	广	roof(part of house)
糸	thread	弋	stake(planning)	弓	bow(elastic)
卩巳	half piece, embrio	戈	weapon(battle)	戸	door
文	pattern(character)	斗	dipper, measure	斤	ax
片	small piece	玉	jewery	瓦	roof tile
田	rice field	皿	dish	矛	spear
矢	arrow	衣礻	wear	缶	pottery
耒	plough	臼	millstone	舟	ship
車	wagon	酉	bottle(ferment)	門	gate
革	leather	鬲	liquer	鼎	three-leg pot
鼓	drum				

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