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Figural Symbolism in Chinese Ideographs

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Hebrew-speaking subjects were presented with 42 pairs of Chinese characters designating antonymic concepts and were required to match them with their corresponding Hebrew words. Correct translation was significant and was related to foreign language study and academic experience. Highest success was found for the activity domain of the semantic differential and for attributes judged to afford a diagrammatic representation. Examination of the character-referent relationships suggested that translation success was due to principles of figural symbolism rather than to pictographic representation of the attributes in question. The results are seen as suggestive of the effects of figural symbolization on the invention and/or evolution of natural scripts and are discussed in terms of the manner in which the graphic medium has been fashioned to convey abstract concepts.

INTRODUCTION

Phonetic symbolism has been proposed as one of the principles underlying the process through which words have come to be associated with things in natural languages. Much of the work in this area has been summarized by Taylor and Taylor (1965), who also distinguished several

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meanings of phonetic symbolism and organized the underlying issues in terms of seven hierarchically arranged experimental questions.

In contrast to the wealth of studies on phonetic symbolism, little experimental work has been devoted to the phenomenon of figural symbolism. Several studies have indicated significant intra-and inter-subject agreement in the matching of nonsense names with nonsense figures (Irwin and Newland, 1940; Fox, 1935; Scheerer and Lyons, 1957). Perhaps the most dramatic demonstration is that described by Kohler (1947), where subjects displayed significant agreement in matching the nonsense word "maluma" with a rounded meaningless figure and the nonsense word "takete" with an angular meaningless figure. This result was also obtained by Davis (1961) in Tanganyika. Holland and Wertheimer (1964), who had subjects rate the two figures and the two words on semantic differential scales, found the expected matching, as reflected in scale distances, to hold strikingly for literal scales such as angular-rounded, and also, though to a lesser degree, for clearly nonliteral scales such as fresh-stale.

In a number of studies, in which subjects matched meaningful words with nonsense figures, a significant agreement both within a given linguistic community and over different linguistic communities has been obtained (Hall and Oldfield, 1950; Krauss, 1930; Scheereer and Lyons, 1957). Scheerer and Lyons, who also required subjects to draw lines of their own choosing to correspond to English concepts, found certain figural attributes to occur more often in connection with certain concepts than with others.

The studies mentioned above were concerned with the relationship between figural attributes and either phonetic or semantic attributes. It might be preferable to reserve the term "figural symbolism" for the latter type of relationship, applying it to the former type only where it appears that the figural-phonetic association is mediated by affective or semantic connotations. As for figural-semantic associations, studies available thus far appear to have addressed themselves to only three of the seven possible issues analogous to those outlined by Taylor and Taylor (1965) for phonetic symbolism. These issues concern what Taylor and Taylor denote as "subjective symbolism" (symbolism detected by observers) and involve intrasubject consistency, intersubject agreement, and cross-cultural generality in associating figures with concepts. Since with one exception no attempt has been made to explore possible embodiment of figural symbolism in natural languages, the issues concerned with objec-

tive symbolism or the relationship between objective and subjective symbolism have yet to be investigated.

The one exception is a recent study (Koriat and Levy, 1977) which examined the proposition that orthographic characters in natural writing systems tend to capture the symbolic implications of their phonetic referents. Hebrew speakers judged the magnitude, brightness, and hardness symbolism of orthographic characters designating five vowel phonemes in Hindi and in Japanese. For both languages and all three symbolic dimensions the figural symbolism of the orthographic characters was found to replicate very closely the sound symbolism of their phonemic referents.

The present study extended investigation of the proposition that orthographic characters embody the symbolic implications of their referents to a logographic writing system—Chinese. In Chinese, orthographic signs are used to designate concepts rather than sounds, and therefore a sign-referent correspondence may be more directly revealing of figural-semantic associations than the graphic-phonemic correspondence investigated in the previous study. In the first experiment to be reported, Hebrew-speaking subjects were presented with pairs of Chinese characters designating antonymic concepts and were required to match them with their corresponding Hebrew words. A better-than-chance success in matching in such a study would support the idea of a cross-cultural figural symbolism, which, in the process of historical development, came to be embodied in the pattern of Chinese orthography.

The investigation of figural symbolism in natural languages involves several problems, some of which Experiments II and III were intended to clarify. Briefly, the present Chinese orthography has evolved from an early writing system which was at least partially pictographic in nature (Karlgren, 1929; Wang, 1973). A pictogram is a literal, though schematic, copy of its referent, and the ability to guess the symbol designated by a pictographic sign would hardly be regarded as an instance of figural symbolism. In the study of sound-meaning linkage, onomatopoeia—the imitation of nonspeech sounds in speech—has been distinguished from phonetic symbolism (Taylor and Taylor, 1965). Pictographic representation, which can be regarded as the figural analogue of onomatopoeia, should also be distinguished from figural symbolism. The purpose of Experiments II and III was to determine the degree to which the Chinese characters used in Experiment I can be said to employ a pictographic mode of representation. Studies of the historical development of Chinese orthography (Wang, 1973) indicate that signs which were originally

pictographic have undergone major changes so that in their present forms they bear little resemblance to their referents. If Hebrew-speaking subjects could be shown to guess beyond chance level the meaning of Chinese characters which appear to be clearly nonpictographic, this would suggest a cross-cultural figural symbolism which has affected either the invention or the historical evolution of figural signs used to designate concepts in the Chinese language.

EXPERIMENT I

Method

Subjects

One hundred and twenty Hebrew-speaking subjects (54 males and 66 females) who had no previous knowledge of Chinese participated in this study. Subjects ranged in age from 15 years to 35 years, with a mean of 23.5. The experiment was conducted in small groups.

Materials and Procedure

Fourteen antonym pairs were drawn from each of the three dimensions of the semantic differential (Osgood *et al.*, 1957), providing a total of 42 such pairs. The test stimuli representing the evaluative dimension were good-bad, wise-foolish, beautiful-ugly, kind-cruel, sweet-sour, clean-dirty, pure-impure, white-black, happy-sad, ordered-chaotic, horizontal-vertical, stale-fresh, fragrant-foul, and wet-dry. The potency dimension was represented by weak-strong, soft-hard, rugged-delicate, heavy-light, deep-shallow, thin-thick, masculine-feminine, loud-soft, small-large, convergent-divergent, central-peripheral, loose-tight, low-high, and dull-bright; and the activity dimension was represented by slow-fast, tense-relaxed, calm-excitable, hot-cold, sharp-dull, angular-rounded, brief-continuing, simple-complex, alive-dead, easy-difficult, odd-even, one-many, full-empty, and bright-dark. The near-equivalents of these pairs in Hebrew were presented to a Chinese expert conversant in both Hebrew and Chinese, who was asked to locate the corresponding Chinese characters in a dictionary (Gills, 1964). This translation was checked by a

second Chinese expert who was presented with the Chinese characters and provided the Hebrew translation for them. Neither translator was informed of the nature of the experiment. The Chinese characters were photocopied from the dictionary and appeared on the test sheet in exactly the size of their appearance in the dictionary.

All of the materials for the experiment were compiled into a booklet. Each item consisted of two Hebrew antonyms and the two corresponding Chinese characters. The Hebrew words were printed on the right, one above the other, with the Chinese ideographs facing them on the left. The orders of the pairs and of the members of each pair were random except that in half of the items the Hebrew words were arranged in the order of correct translation, while in the other half they were presented in reverse order. The written instructions directed subjects to indicate the appropriate match for each item. Following the matching procedure, subjects were instructed to list the foreign languages they knew.

Results

The mean percentage of correct translations for the 120 subjects was 54.56%, with a standard deviaton of 5.75. This is significantly better than chance (50%) at the 0.001 level ($t = 8.63$, df = 119).

In order for a pair translation to be different from chance at the 0.01 level of significance, it must have been made by at least 75 subjects. Using this criterion, 15 items yielded a significantly correct matching and five items yielded a significantly incorrect matching. Thus a consensual translation was three times as likely to be right as wrong. This ratio is similar to that obtained for phonetic symbolism in word matching studies (e.g., Slobin, 1968).

The number of items translated correctly by each subject varied from 18 (43%) to 31 (74%). Of the 120 subjects, 82 had more than 50% correct translations, compared with 25 who had less than 50% correct translations.

Table I presents data on the correctness of the translations for each of the three domains of the semantic differential. The activity domain stands first in success of translations, followed by the evaluative and potency domains, but only for the first two domains is the percentage of correct translation significantly different from chance. This ordering is quite similar to that obtaind by Slobin (1968) for phonetic symbolism; however, it appears somewhat inconsistent with Oyama and Haga's

Table I. Correctness of Translations by Semantic Domain

Semantic domain	Mean percentage correct	Number of pairs significantly correct	Number of pairs significantly incorrect	Ratio correct: incorrect
Activity	57.68[a]	8	1	8.0:1
Evaluation	53.98[a]	4	2	2.0:1
Potency	52.02	3	2	1.5:1

[a] $p < 0.001$.

(1963) finding that potency scales made the strongest contribution in the judgment of similarity between nonsense figures and nonsense words.

In the area of phonetic symbolism, Slobin (1968) found a positive relationship between the number of foreign languages studied and success of translation. With figural symbolism, Irwin and Newland (1940) found age, grade, and (among older children) intelligence to be positively related to success in making the standard, consensual response. In the present study, the relationship of translation success to foreign language contact and to academic experience was examined. The mean percentage of correct translations for 69 subjects who had some college education was 55.83, compared with 52.75 for the 51 subjects with below college education ($t = 3.01$, df = 118, $p < 0.01$). Seventy-one subjects reporting knowledge of three or more foreign languages had, on the average 55.53% correct translations, compared to 53.06% for subjects who knew less than three languages ($t = 2.38$, df = 118, $p < 0.05$). Thus success of translation appears to be positively related to academic experience and foreign language contact.

EXPERIMENTS II AND III

Experiments II and III were designed primarily to examine the degree to which the significant translation success obtained in Experiment I was due to pictographic representation as opposed to figural symbolism.

The distinction between pictographic representation and figural symbolism (and between onomatopoeia and phonetic symbolism) is generally made in terms of the degree to which a sign can be said to bear a physical resemblance to its denotation. The terms "phonetic symbolism" and "figural symbolism" have generally been invoked when a sign appeared in some way to "fit" a referent without bearing any physical resemblance to it. They have also been distinguished from a strictly symbolic representation, in which a sign can be said to bear an arbitrary connection to its referent.

The distinction between figural symbolism and a pictographic representation in terms of the resemblance of the sign to its referent is not easy to apply. In the area of phonetic symbolism it has been implied that sound symbolism—as opposed to onomatopoeia— should be invoked if a sound is found to suggest attributes such as brightness and size, which are clearly nonauditory (Brown, 1958; Tanz, 1971). This suggestion offers one criterion for distinguishing figural symbolism from pictographic representation: the possibility of pictographic representation can be ruled out in those cases in which the attribute suggested by a figural pattern cannot in principle be depicted graphically, e.g., when this attribute is nonsensory, or when it is sensory but nonvisual. Accordingly, Experiment II was designed to obtain ratings of the degree to which the concepts employed in Experiment I could *in principle* be graphically conveyed in a literal or diagrammatic manner.

Yet, even for those concepts which in principle can be represented pictographically, it is possible to examine the extent to which the Chinese ideographs designating such concepts can be said to employ this mode of representation. Thus the contrast big-small could be represented through a variation of the size attribute (e.g., a small vs. a large circle, as in Kendler *et al.*, 1962), or it could be conveyed metaphorically through some other figural dimension suggesting size (e.g., brightness or complexity). The following criterion is offered to define a strictly pictographic representation: a pair of figures can be said to convey a certain contrast pictographically rather than symbolically to the extent that most perceivers will be able to guess correctly the contrast conveyed by these figures. Accordingly, in Experiment III subjects were presented with the pairs of Chinese characters employed in Experiment I and required to guess the attribute most probably represented by the contrast between the pairs.

Method

Experiment II

Twenty-four new subjects participated in this study. They were presented with the list of 42 pairs of Hebrew antonyms and were asked to rate on a 7-point scale the degree to which the contrast described by each antonym pair "could be conveyed by a pair of figures so that a person who is to guess the underlying attribute is likely to think of the right one." A rating of 1 was used to indicate high figural describability.

Experiment III

An additional group of 24 Hebrew-speaking subjects who disclaimed any knowledge of Chinese participated in this study. The 42 Hebrew antonym pairs employed in Experiment I were divided into two sets. Each set included 21 pairs, seven from each of the three domains of the semantic differential. The division of the pairs was such that pairs which signified somewhat similar attributes (e.g., deep-shallow and low-high) were assigned to different sets. The subjects received the two sets in counterbalanced orders. For each set, the subject was presented with a sheet of paper on which were printed the 21 Hebrew antonym pairs, and with 21 stickers, on each of which was printed a pair of Chinese characters, each pair corresponding to one of the Hebrew pairs. The order of the stickers was randomized for each of the speakers. Thus, in contrast to Experiment I, which required matching members of a Chinese ideograph pair with the members of a corresponding Hebrew pair, Experiment III employed matching Hebrew pairs with the Chinese pairs in terms of the dimensions of meaning conveyed by each pair as an entity. The instructions read as follows (translated from Hebrew):

> Suppose a person who does not speak your language wished to convey to you the contrast "long-short." He could express this contrast by means of two drawings, say, a long and a short line, a long and a short rectangle, etc. In a similar way he could convey graphically the contrast "big-small," "angular-rounded," and the like.
>
> You will be presented with pairs of figures. These figures constitute actual Chinese characters designed to express certain concepts in a pictographic manner. Each pair expresses a pair of antonyms. You are to examine each pair and to try and guess what contrast the inventor of the Chinese language meant to convey by this pair.

It was then explained to the subject that he was to indicate his guesses by matching the 21 stickers with the 21 Hebrew antonyms and that he could take as long as needed to achieve the best matching. It was also pointed out that the order of the two antonyms in each pair was immaterial. When the first matching task was finished, the subject was handed the second set of 21 items and asked to follow the same procedure. The experiment was conducted individually and lasted about 1 hr.

Results

In Experiment II, the mean figural describability ratings for the 42 antonyms was 3.50, with a range from 1.13 ("angular-rounded") to 6.13 ("pure-impure"). The 42 items were divided into low and high figural describability items, with 21 items in each set. The mean percentages of correct translations for the two sets of items were 51.79 and 57.34, respectively ($t = 4.38$, df = 119, $p < 0.001$). Thus correct guessing was higher for antonyms which in principle lend themselves more readily to a diagrammatic or pictographic representation than for those which are harder to convey pictographically.

The implications of this finding can be clarified by the results of Experiment III. The data of this experiment were analyzed by calculating over all subjects the number of times each of the Hebrew antonym pairs was matched with each of the Chinese pairs. On the average, a Hebrew antonym pair was correctly matched with the corresponding pair of Chinese ideographs 1.07 times. Of the 42 items, 13 were matched correctly by none of the subjects, 18 by one subject each, nine by two subjects each, one ("difficult-easy") by four subjects and one ("central-periphal") by five subjects. The inability of subjects to guess the dimension conveyed by each pair of Chinese characters suggests that the Chinese ideographs employed in the present study have retained few traces of a literal representation. In fact, for 40 out of the 42 items some other Chinese pair was judged appropriate to the Hebrew pair more often than the correct one, and some other Hebrew pair was matched with the Chinese pair more often than the correct one.

The incorrect matchings were examined in an attempt to uncover systematic trends in the confusion. The hypothesis was examined that ideographs representing one domain of the semantic differential would be confused more often with Hebrew antonyms belonging to the same

domain than with those belonging to a different domain. The data, however, did not support this hypothesis, and no other systematic trend was detectable from a cursory inspection of the most common confusions.

When the results of Experiments I and II were compared, antonyms which were judged to be more figurally describable (in Experiment II) yielded a higher rate of correct translation in Experiment I. This result suggests the possibility that antonyms judged in principle to lend themselves more readily to figural description are actually represented in the Chinese orthography in a literal or pictorial manner. This possibility was examined by comparing the results of Experiments II and III. The 21 items scoring high on figural describability in Experiment II yielded a total of 22 correct matchings, compared with 23 for items of low figural describability. On the basis of this result it can be concluded that the higher percentage of correct translation which was obtained for antonyms of high figural describability is not due to a stronger pictographic representation of these antonyms in the Chinese writing system.

DISCUSSION

The major aim of the present study was to investigate the manner in which the graphic medium in one natural writing system has been fashioned to serve as a symbolic code. The finding that subjects noncognate of Chinese were able to correctly guess the meanings of Chinese ideographs with better than chance success (in Experiment I) suggests that the choice of orthographic codes to designate concepts is not arbitrary but is rather governed by lawful, cross-culturally consistent, figural-semantic association. Experiment III further revealed that the sign-referent relationship involved is metaphorical or analogical rather than mimetic: the Chinese characters included in this study, rather than reproducing in a literal manner the criterial attributes of their symbolic referents, convey their meanings through indirect qualities shared by the figural and semantic realms.

That translation success was particularly high for sensible attributes (which in principle afford a relatively literal or mimetic representation through the graphic medium) is puzzling, since these attributes were not found to be coded in a literal manner in the Chinese orthography. The effect of figural symbolism on the invention and/or evolution of ortho-

graphic signs has apparently been stronger for sensible than for nonsensible concepts, perhaps because sensible concepts might generally allow for a better metaphorical representation, or because their graphic representation might have been invented earlier, so that the effects of figural symbolization have been brought to bear during a longer period of evolution.

From the results on the whole, it appears that the metaphorical mode of representation has been favored over the pictographic mode in the formation of the Chinese orthographic codes included in the present study. This is true even when the concept concerned could in principle be conveyed pictographically. One possible explanation of this observation requires an understanding of the manner in which the Chinese script (which is essentially pictographic) has been fashioned to convey abstract concepts. One common method, according to Gelb (1963) and Karlgren (1929), involved allowing a picture of a concrete object to stand for an abstract idea associated with or suggested by that object (e.g., tower = high, sun = bright). Another method involved forming compound characters from simple picture characters, the combination of which suggests an abstract idea (e.g., woman + child = happy, fish + sheep = fresh, three women = falsehood). Still another method involved phonetic transfer, i.e., borrowing the sign of a homophonous concrete word to express a word which is difficult to depict pictographically. Common to all these devices is the fact that the representation of an abstract idea is egocentrically bound to a concrete object or situation. Werner (1957) cited numerous examples indicating that this mode of representation, termed by him "syncretic," is characteristic of a primitive mode of mental functioning like that of the child or primitive man. Syncretically formed logograms often depend on culture-specific cognitive associations (e.g., "north" expressed by a picture of two men standing back to back, north having been regarded as the "back" in China). Meanings of such symbols would therefore be harder to guess by individuals of another culture (Experiment III) than the meanings of concepts conveyed literally or diagrammatically. In contrast, a diagrammatic representation (e.g., the representation of the contrast "small-large" in terms of a small and a large circle) apparently requires a degree of abstraction characteristics of a more advanced mode of cognition (Werner, 1957). The few Chinese logograms formed according to the diagrammatic principle (e.g., "two," two horizontal lines; "three," three horizontal lines) would probably be more readily decipherable by subjects noncognate of Chinese than most of the logograms included in the present study.

The significant success of translation found for nondiagrammatic characters apparently reflects the effects of principles of figural symbolism. The Chinese script has undergone such major changes in the course of its evolution that it is impossible, in the great majority of the present-day linear and schematic characters, to recognize the underlying pictures. It is likely that principles of figural symbolism have contributed to the development of the simplified signs. It might even be that the formation of sign pictures designating concrete objects (e.g., "sun") was affected by those qualities associated with them (e.g., brightness), which were later borrowed to express them metaphorically.

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