Classifier Neutralization in Mandarin Chinese

KATHLEEN AHRENS
GRADUATE INSTITUTE OF LINGUISTICS
NATIONAL CHUNG CHENG UNIVERSITY

1. Introduction

Classifier usage in Mandarin Chinese is usually considered to be a stable process.[1] When nouns are taught in school, they are taught with their accompanying classifier. Upon introspection, speakers can recall the correct classifier to be used with a noun, but in speech they do not always use that classifier. If one were to ask an educated speaker the classifier for the word 'hat', the speaker is most likely to use the classifier 'ding', which refers to a peak. However, in speech the neutral or general classifier, ge, is just as likely to be used. Speakers do not realize that they are not using the 'correct' classifier, as Erbaugh (1986:406) notes:

> Both Chinese self-report and teaching grammars describe classifer use as obligatory and invariant.....[but] the general classifier is often used where a special classifier is reported as obligatory, even by highly educated, conservative teachers of classical Chinese.'

Two observations can be made at this point: the first is that although Erbaugh provides evidence from discourse settings where speakers do tend to use the general classifier in place of the specific classifier, she did not look to see if there were any specific classifiers more likely to be replaced by the general classifier than others. The first goal of this paper, then, is to determine when normal speakers use the general classifier in place of a specific classifier. I report on an expermiment designed to test normals' classifier use and conclude that there is a pattern as to when the general classifier is substituted for a specific classifier. This pattern is compatible with a model of categorization that allows for degrees of representativity within a category.

The second observation is that native speakers have a preconceived notion of 'correct' classifer use. This fact will have implications for Tzeng, Chen and Hung's (1991) study of classifier production in Chinese aphasics, since they measured aphasics' production against normals' intuitions and not against normals' production. Therefore, the second goal

---

[1]Mandarin Chinese in this paper refers to the Mandarin Chinese that is spoken in Taiwan at present. All data that is discussed was collected from Mandarin speakers who live in, or originate from Taiwan.

Linguistic Notes from La Jolla (1995), Number 18. 140-174

of this paper is to show that contra Tzeng et al.'s conclusions, Broca's and Wernicke's aphasics have the same qualitative patterns of classifier neutralization as normals.

The framework of this paper is as follows: First, I will give background information on classifiers in Chinese in section 2. In section 3, I will review arguments against a classical view of categorization and discuss two theoretical cognitive models. In section 4, I will describe a classifier elicitation experiment I designed to test classifier production in normals. I show that classifier production in normals does in fact differ from native speaker intuitions.[2] Moreover, I demonstrate that speakers' use of the general classifier follows a clear pattern based on the semantics of the specific classifier, and show how a cognitive view of categorization can handle these data. In Section 5, I review the aphasic data and show that both Broca's and Wernicke's aphasics pattern the same with respect to classifier usage as normals. I also make a prediction for future occurrence of the general classifier in both normal and aphasic populations, based on a cognitive account of the phenomena.

2.0 Classifiers in Chinese

2.1 Classifiers vs. Measure Words

Classifiers are often not distinguished from measure words in discussions of Chinese grammar. For example, Chao (1968:584-620) refers to classifiers as individual measures, and subsumes them under the rubric of "measure words".[3] Li and Thompson (1981:106) further confuse the issue when they state that "any measure word can be a classifier." Combining these two groups, however, as Chao and Li & Thompson do, misses an important distinction that classifiers can only classify over a limited and specific group of nouns, while measure words can be used as a measure for a wide variety of nouns.[4] In his discussion of the

---

[2]Erbaugh (1986) notes that in conversational speech, the use of the classifier ge is common. My study covers a larger database and focuses on what normals do in an experimental setting, which is arguably more formal than a normal conversational setting. These results can be used as a baseline for further studies against which to measure the relative 'correctness' of aphasic production of classifiers.

[3]The other subgroups include container measures (ex. cup, bottle), classifiers associated with verb-object constructions (ex. say one phrase word ==> say a sentence), group measures (a dozen), partitive measures (some, portion), temporary measures (floor: a floor of dirt; courtyard: a courtyard of flowers), standard measures (half, whole), quasi-measures (county: a county (of a state)) and measures for verbs (trip: go there (on a trip) once; battle: to do battle once).

[4]Note that in some languages, such as English, measure words classify for a more restricted group of objects. For example, 'a slice' usually refers to some food that can be sliced, and 'a grain' must refer to a very small cylindrical object.

conceptual structure of the Chinese classifier system, Tai distinguishes classifiers and measures as follows:

> A classifier categorizes a class of nouns by picking out some salient perceptual properties, whether physically or functionally based, which are permanently associated with the entities named by the class of nouns; a measure word does not categorize but denotes the quantity of the entity named by a noun. (Tai, 1990)[5]

For example the measure word jin 'catty (a Chinese unit of weight)' can be used to weigh grapes, pencils, or books, all of which occur with different classifiers, namely ke, zhi, and ben respectively.

2.2 Classifiers Diachronically

Historically, classifiers in Chinese derived from nominals. In records from the Yin Shang Dynasty (1401 - 1122BC), Wang (1958) notes the occasional use of container measure words such as you 'cup'. The first use of nominal classifiers, and more prevalent use of measures, appeared during the Han Dynasty (206BC - 220AD). Sometime during this dynasty and the next, the quantifier and classifier/measure unit moved from a position following the noun to a position preceding the noun. In other words, it went from a Noun-Quantifier-Classifier type language such as Thai, Burmese and Japanese to a Quantifier-Classifier-Noun type language such as Vietnamese.

Several classifiers came into use during the Late Han period (100 - 200AD) that are still in use today, although the group of nouns they classify has changed over time.[6] For example, the classifier ben originally meant 'root' or 'stem', as in wushi-ben cong 'fifty-CL onion' or 'fifty onion plants.' By the time of the Northern and Southern dynasties (420 - 589AD), however, it regularly occurred as a classifier for books, although the reason for this semantic change remains unclear to scholars to this day.

The classifier ge, the most common classifier in use in standard Mandarin today, originally was a nominal meaning 'bamboo-stalk.' By the period of the Northern and

---

[5]The difference between classifiers and measure words can also be viewed as a scalar relationship, with classifiers at one end of the scale and measure words at the other. Some measure words may in fact be more "classifier-like" than others (Ron Langacker, p.c.). However, I think that Tai has captured the correct generalizations for the endpoints of this scale.

[6]I discuss these four classifiers because they will be pertinent to later discussion. Note that zhi and ge will be especially relevant, as discussed below in Section 2.3.

Southern Dynasties (420 - 589AD), it was used as a classifier with nouns of many different semantic categories, including ren 'person.' By the Tang Dynasty (618 - 907AD) it occurred with abstract nouns as well.

Another classifier which came into use during the late Han period (100 - 200AD) and is still in use today is the nominal tiao, which originally meant 'branch.' As a classifier it also referred to slender, long and branch-like objects, including ropes and roads. Tiao also refers to abstract items such as 'affairs' or 'matters' because during the Han Dynasty documents were written on bamboo strips. After it was written down, an item of business then became 'a strip' (tiao) of business.

Lastly, the classifier zhi seems to have been a classifier from its earliest use on. In the Shuowen Dictionary of the Han Dynasty (206BC - 220AD), zhi is defined as a classifier for single birds. Its use is then extended to refer to a single animal, as opposed to the classifier shuang, which refers to pairs of animals, and later on, pairs of objects. Zhi is also used as a classifier for boats and sometimes for chairs in Mandarin. A homophonous character zhi with a different written character is the classifier for long, hard, cylindrical objects such as arrows, guns, pens and pencils.

2.3 Classifiers Synchronically

In historical as well as in modern Mandarin, a nominal classifier is a bound morpheme. It must occur with a determiner. The determiner can be a demonstrative (zhe 'this', na 'that', na 'which'), or a quantifier (yi 'one' or xie 'some'). The possible permutations are: demonstrative plus classifier (zhe ge 'this-CL'), quantifier plus classifier (yi ge 'one-CL'), or a demonstrative plus a quantifier plus a classifier (zhe yi ge 'this-one-CL'). A noun may optionally occur after the determiner-classifier unit.

In standard Mandarin, the morphemes zhi and ge are the two most common classifiers in use today; however, ge is arguably the most common since it can be used with all classes of nouns. Nevertheless, zhi is becoming a second neutral classifier in the Mandarin Chinese spoken in Taiwan today for the following two reasons: first, as I mentioned above, zhi occurs with a varied subclass in Mandarin, and second, zhi is the neutral classifier for Taiwanese.

2.4 Semantic vs. Grammatical Motivation

Even though the historical development of the classifer-noun relationship permits one to see a semantic motivation for it, some linguists would argue that the classifier-noun relationship is nothing more than an arbitrary grammatical pairing. However, a dividing line between having semantic motivation or being an arbitrary pairing can not be easily drawn.[7] It

[7]As Farrell Ackerman (p.c.) notes, it is not difficult to distinguish between these opposing poles of a truly transparent vs. truly opaque relationship. What is difficult is to decide where a dividing line should be drawn along the scale that extends from one of these poles to the other, as will become apparent from the discussion that follows.

is possible that constructions have semantic motivation and are fully predictable. It is also possible for constructions to have semantic motivation, but to not be 100% predictable. As the form-meaning pairings become less and less predictable, the constructions move closer and closer to being arbitrary. I would like to argue below that the use of Chinese classifiers in modern Mandarin is semantically motivated, although not fully predictable. Below, I will give three reasons for considering Chinese classifiers as having semantic motivation.

First, native speakers characterize new objects on the basis of their observed characteristics. For example, the noun 'compact disc' occurs with the classifier pian, which refers to 'something thin' or 'a slice of something'. The word for 'computer' occurs with the classifier for machines, tai.

Second, nouns can be characterized based on their most salient feature from the point of view of the speaker. For example, if the speaker was viewing a snake from the side so that its length and cylindricality were emphasized, the classifier tiao meaning, long, thin and cylindrical would be likely to be used. If, on the other hand, the speaker was looking at the snake head on, so that only the features of the head were visible, s/he could choose the general classifier for animals, zhi.

Third, classifiers may or may not occur with a noun depending on whether the noun is representative of the category the classifier instantiates. For example, the classifier zhang categorizes for both 'paper' and 'sofa'. However, as I will show empirically for the first time in Section 4, normals are much less likely to use the classifier zhang with the noun 'sofa' than with 'paper', preferring to use the general (or neutral) classifier instead. This follows from the fact that zhang classifies for thin, rectangular, two-dimensional objects (taking these as the more central properties), and sofa deviates from these features on at least two counts. If classifier usage were purely an arbitrary association, then we would not expect to find any semantically motivated patterns of the sort mentioned above.

In addition, as I mentioned at the beginning of this section, there are cases where the relationship between the classifier and the noun is arbitrary, as in the case of the noun for 'boat' and the classifier zhi, which is the classifier for animals. Thus, it is not the case that all nouns will take a classifier that is semantically related, although it can be said that all classifiers have some semantic category with which they are associated (except for the neutral classifier). In all cases, the noun was semantically associated with the classifier at some point in the past, although the relationship might seem arbitrary now.

In this section I have attempted to give an overview of the classifier system in Mandarin Chinese, and to give arguments that show that classifier usage is semanticaly motivated, but at the same time permits some arbitrary pairings. Next, I will contrast the classical conception of categorization with the prototype view, look at previously argued and new data pertaining to these views, and then go on to discuss two theoretical accounts of the prototype view.

3.0 Classical and Cognitive Accounts of Categorization

The 'classical' approach to categorization can be attributed to its originator, Aristotle, as well as to the movement that has dominated linguistics, psychology and philosophy for much of this century. The 'cognitive' approach refers to work originally addressed by Wittgenstein (1978), and later developed independently by first Rosch (1973, 1975, 1978), and then later Langacker(1987), and Lakoff (1987). I will give a brief overview of the classical approach based on Taylor (1989). Then in the next two subsections, I will go on to review two categorization approaches, namely the Cognitive Grammar account (Langacker) and the Radial Category Model (Lakoff).

3.1 Classical Account

The goal of this section is to review briefly the Aristotelian assumptions concerning categories as summarized by Taylor:

> (1) Categories are defined in terms of a conjunction of necessary and sufficient features.
> (2) Features are binary.
> (3) Categories have clear boundaries.
> (4) All members of a category have equal status.
> (Taylor 1990:23-24)

As I mentioned above, there has been extensive work in the psychological and philosophical traditions that show that this view of categorization has its problems. The first problem is that there is often no set of criterial attributes that can be picked out so that all members can share them. Wittgenstein (1945) first pointed out the members of the category 'game' do not share a group of common properties that can distinguish games from non-games. Lakoff (1987) pointed out a similar phenomenon when he discussed the definition of 'mother'.

In addition, some members of a class lack a property which seems to be criterial. For example, 'giving birth' is usually a central property of being a 'mammal'. However, platypuses lay eggs, and are still considered to be mammals. Should we then do away with the attribute 'giving birth'? If we do so, we seem to be missing something fundamental to the understanding of the category. On the other hand, the 'classical' approach does not allow a member to deviate from the list of 'necessary and sufficient features' either.

A third problem has to do with the fact that the 'classical approach' allows the formation of definitions, which, although adequate, can in fact be totally unrevealing. For example, a person can be thought of as a 'featherless biped', and a point can be thought of as

'a line segment of length zero', yet these characterizations do nothing to further our understanding of the meaning of the word.[8]

The last problem to be discussed here concerns the issue of the degree of representativity in a class. As I discussed above in section 2.4, and will go into in greater detail in Section 4, all members of a category can not have equal status, since some nouns are more likely to appear with the neutral classifier than with the specific classifier they should agree with. However, we will see below that accounts based on cognitive aspects of categorization allow for the variation that occurs.

3.2 A Cognitive Grammar Account

One well-developed account of prototype theory is found in the theory of Cognitive Grammar (Langacker 1987). Langacker postulates that categorization succeeds when there exists in the target (T) a configuration "that satisfies some or all of the specifications of the standard (S)." (1987:371) If all the specifications of the standard (S) are satisfied by the target (T), then S is referred to as a schema. The categorizing relationship of S $\longrightarrow$ T is one of elaboration or specialization, as in Diagram 1 below.

Elaboration
Diagram 1

The standard/schema and the target are fully compatible, but the target is delineated in greater detail. For example, the target [CAT] is an elaboration of the schema [ANIMAL].

On the other hand, if only some of the specifications of the standard are satisfied by the target, then the standard is referred to as a prototype. The categorizing relationship prototype - - > extension then involves "horizontal" extension from the standard/prototype, where the target contains only some of the specifications of the standard/prototype, as seen in Diagram 2 (adapted from Langacker 1986, p. 383).[9] It is also important to note the

---

[8]The examples of 'platypus', 'person' and 'point' were used in Langacker's 1993 Cognitive Semantics class.

[9]In an elaborative (vertical) relationship, the standard is referred to as a schema. In an extension (horizontal) relationship, the standard is referred to as a prototype. Thus, I will refer to them as a standard/schema and standard/prototype respectively.

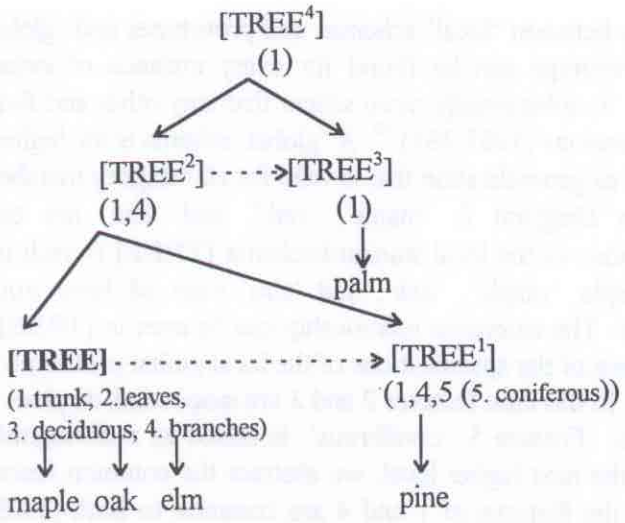
difference between 'local' schemas and prototypes and 'global' schemas and prototypes. A 'local' prototype can be found for every instance of extension. A 'global' prototype, however, 'is substantially more salient than any other and functions as the apparent basis of more extensions'(1987:381).[10] A 'global' schema is the highest order schema and holds only the maximal generalization that is valid for all category members.

In Diagram 2, 'maple', 'oak', and 'elm' are targets that satisfy all of the specifications of the local standard/schema **[TREE]** (which is also the global prototype.)[11] For example, 'maple', 'oak', and 'elm' trees all have trunks, leaves, branches and are deciduous. The extension relationship can be seen in [TREE] - - - > [TREE^1] (1,4,5) 'pine', where some of the specifications of the local/global prototype [TREE] must be suspended or modified. In this case features 2 and 3 are suspended, as pines do not have leaves and are not deciduous. Feature 5, 'coniferous', is added as a distinguishing characteristic. When we move to the next higher level, we abstract the common features of the lower level. So for example, the features of 1 and 4 are common to both [TREE] and 'pine'. These are the features that are held in [TREE^2]. Then there is an extension from this local standard/prototype [TREE^2] to 'palm', where 'palm' entails only the feature 1 ('trunk') from [TREE^2], and the feature of 'branches' is suspended from the specifications of the standard/prototype [TREE^2], as palms do not have branches. When we abstract to the highest level, [TREE^4], we abstract the common features from the level we were just on, which means that we are left with feature 1, 'trunk', as the commonality feature for TREE^4. In this example, [TREE^4] is the global schema.

---

[10]I have highlighted [TREE] below to indicate that in this representation it is central to the category, that is, it is the global prototype.

[11]These features were picked in order to facilitate the discussion of extension from a prototype, and are assumed to vary among different speakers or within the same speaker at different times. I am not suggesting that these are the only distinguishing features.



Prototype Model
Diagram 2

I will discuss in detail in Section 4.2 how the Cognitive Grammar account of categorization handles the classifier data in Mandarin Chinese. In the next subsection I will look at another cognition-based account of categorization, namely the Radial Category account.

3.3. Radial Category Account

The Radial Category Account (Lakoff 1987) differs slightly from the Cognitive Grammar account in that it does not overtly present a more abstract level of schematicity. Lakoff (1987) gives two examples that support his account, the Dyirbal four-way nominal classification system and the Japanese classifier hon. I will review his analysis of the classifier hon here as a way of summarizing his account.

First, central cases of the use of hon appear with concrete basic-level objects such as sticks, bamboo staffs, pencils and baseball bats. These basic-level objects can be represented as a square in the center of the hon cateogory within a base model, as shown in Diagram 3.

Second, a theory of motivations, including image-schema transformations and conceptual metonymies, is required for the extension of a category. The direction of extension goes from basic-level objects to other, more abstract objects, such as hits and pitches. Hits and pitches have a long, thin trajectory: an image-schema relationship justifies extending the central case to a non-central case. The central sense (represented by the square) and extended senses (represented by the circles) of the classifier hon are given in Diagram 3.

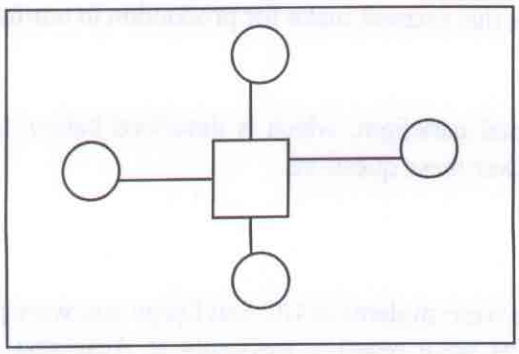


Diagram 3
Central and Extended Senses

Third, the application of hon to refer to hits in baseball makes sense, but it is not predicted. Instead, it is a matter of motivated (not arbitrary) convention. Motivations include image-schema transformations, conceptual metonymies and conventional mental images. Motivations can overlap and provide extra reason for the classifier to be used with a certain noun.

Both these accounts could handle the data I will present below. I have chosen to use Langacker's model because it allows me to discuss the data in a succinct and direct manner. Lakoff's model, while hypothetically able to hand the data, does not explicitly deal with variation within the central cases, which as we will see below, is what is happening in the Mandarin classifier data. However, with adaptation, Lakoff's model should be able to account for variation in the central cases as well.[12]

4. The Present Study

In the above sections, I argued based on the intuitions of native speakers that classifiers in Mandarin are not only semantically motivated, but also semantically motivated within the prototype model view of categorization. However, four major questions remain:

1. To what extent is neutralization of classifiers prevalent among normals? (Section 4)

2. Is there a pattern of neutralization and, if so, what type of account can explain the pattern found in the data? (Section 4)

3. Do Wernicke's aphasics show evidence of substitution errors that cross semantic classes as Tzeng, Chen and Hung suggest? (Section 5)

[12]I leave the details of such formulation open for further work and evaluation.

4. What prediction does this account make for production in normals and aphasics? (Section 5)

I created an experimental paradigm, which is described below, to elicit classifier usage in normals in order to answer these questions.

4.1. Methods

4.1.1 Subjects

Fifteen subjects were students at UC San Diego and were paid for their participation. Another twenty subjects were research assistants at Academia Sinica in Taipei, Taiwan. These twenty subjects were volunteers and were not paid for participating.

Of the UCSD group, five were female and eleven were male. Ten subjects spoke only Mandarin Chinese for the first six years of life, while two spoke Taiwanese for their first six years, two spoke both Mandarin and Taiwanese for the first six years, and one spoke Mandarin and Hakka for the first six years. At the time of testing, all subjects were fluent in Mandarin Chinese, with seven subjects fluent in both Mandarin and Taiwanese, seven subjects fluent only in Mandarin but able to understand a little Taiwanese, and one subject fluent in Mandarin, Taiwanese and Hakka. Most of these subjects had left Taiwan after the age of 21.

Of the Taipei group, six were female and fourteen were male. Six subjects spoke only Mandarin Chinese for the first six years of life, while twelve spoke Taiwanese for their first six years, and two spoke Hakka for the first six years. At the time of testing, all subjects were fluent in Mandarin Chinese, with twelve subjects fluent in both Mandarin and Taiwanese, six subjects fluent only in Mandarin but able to understand a little Taiwanese, and two subjects fluent in Mandarin and Hakka.

4.1.2. Materials

Twenty-five black and white line drawings (picture) stimuli were specifically designed to elicit classifier production with usually two or more of the target objects present in each picture (see Appendix I). The presence of two or more objects was intended to remedy a deficit in Tzeng et al.'s (1991) experiment. In their experiments, often only one of each object was included per picture, and the speaker frequently used only the noun without a classifier, as in (1).

(1) Mao zai yizi shang
cat on chair top'
"A cat is on the chair."

Since speakers must use a classifier when they use a numeral before a noun, presenting two objects induces the speaker to encode the fact that there are two objects in the drawing, thereby encouraging classifier production.

The stimuli presented at least 75 opportunities to produce a noun phrase. However, the subject could choose to describe the same picture in a number of ways, so that a context for classifier usage was not necessarily elicited. For example, although the experiment was designed to elicit classifiers by usually depicting two or more tokens of a given noun in a drawing as discussed above, the speaker still could use a bare NP as shown in (2).

(2) Ma zai he shui
horses are drinking water
"Horses are drinking water."

Thus, contrastive pictures where also included as an additional tactic to encourage speakers to produce classifiers. For example, a picture of two apples on one table and two bananas on another table induced one subject to say (3):

(3) You liang-zhang zhuozi, yi-zhang zhuozi you liang-ge ping-guo,
has two-CL table one-CL table has two-CL apple

yi-zhang zhou-zi you liang-gen xiang-jiao
one-CL table has two-CL banana

"There are two tables. There are two apples on one table,
and there are two bananas on the other table."

Moreover, in addition to line drawings, extra photos were also included for the Taiwan group in order to ensure that neutralization was not only a response to drawings of objects, but in response to lifelike representations of objects as well.

4.1.3. Procedure

Subjects were asked to describe what they saw in each picture. All responses were recorded on tape. The UCSD group transcribed their own tapes. I later went over these tapes and transcriptions and verified that the transcriptions were correct. The subjects were only told that they had to transcribe their own tape after the elicitation session, so that they did not purposefully shorten their response to the stimuli, or modify their spoken language to reflect the constraints of the written language.[13] I transcribed the relevant data for the

[13]I had the UCSD group transcribe their own tapes in order to see if the subjects wrote down the classifiers that they had just used, or if they switched to the more "correct" (non-neutral) form. In all cases, the subjects wrote down the classifiers that they spoke, which means that the classifiers they used were in fact acceptable to them in a written register as well. In addition, I found several examples of subjects who used the written form of zhi that

Taiwan group myself. The elicitation session lasted five to ten minutes, and the transcription session (for the UCSD group) lasted fifteen to twenty minutes.

4.1.4 Results

The subjects on average produced about 50 instances of classifier-noun usage per session out of at least a possible 75. Many of these instances included the neutral classifier occurring with a noun that has no other classifier, or the animal classifier zhi with an animal that has no other classifier. These instances can not be considered neutralization. Therefore, of all the data I collected, I concentrated on analyzing the classifier data for the 30 nouns that had the potential to trigger neutralization. Results for 30 classifier and noun co-occurrences showing the percentage of neutralization to ge or zhi are summarized below in Tables 1 and 2. In Table 1, the lefthand column lists the 30 nouns arranged in alphabetical order of the English glosses from top to bottom. The second column shows the percentage of classifiers that were the neutral classifier. The third column lists the total number of classifiers elicited. The fourth column shows the number of classifiers that were neutral. The final column shows the number of classifiers that were not neutral. In Table 2 the classifiers are arranged in order of percentage of neutralization from top to bottom, with the remaining columns the same as in Table 1.

---

referred to animals when they were using it with a long, thin cylindrical object. This indicates that not only is zhi homophonous in speech, eventually it might become the same character in the written form as well.

Table 1:Classifier Production in Normals (Listed alphabetically in English)

Classifier	% Neutral	Total Number of Classifiers	Total Number of Neutral Classifiers	Total Number Preserved
airplane/jia	60%	25	15	10
arrow/zhi	3%	29	2	27
axe/ba	46%	35	16	19
banana/gen	34%	38	13	25
bed/zhang	31%	36	11	25
boat/zhi	20%	30	6	24
book/ben	8%	51	4	47
cannon/chen	69%	80	55	25
car/liang	41%	49	20	29
donkey/pi	84%	26	22	4
fan/ba	46%	26	12	14
fish/tiao	77%	34	26	8
flower/duo	6%	30	2	28
gun/ba	56%	36	20	16
hat/ding	52%	27	14	13
horse/pi	59%	39	23	16
house/dong	53%	28	15	13
lamp/zhan	88%	25	22	3
painting/fu	12%	33	4	29
pants/tiao	15%	32	5	27
paper/zhang	0%	38	0	38
pen/zhi	0%	51	0	51
pencil/zhi	15%	13	2	13
room/jian	88%	24	21	3
rope/tiao	27%	11	3	8
shark/tiao	84%	26	22	4
snake/tiao	53%	35	19	16
sofa/zhang	62%	50	31	19
table/zhang	46%	85	39	46
tree/ke	9%	68	6	62

Table 2: Production of Classifiers in Normals (Ranked by rate of Neutralization)

Percent Neutral	Classifier	Total Number of Classifiers	Total Number of Neutral Classifiers	Total Number Preserved
0%	paper/zhang	38	0	38
0%	pen/zhi	51	0	51
3%	arrow/zhi	29	2	27
6%	flower/duo	30	2	28
8%	book/ben	51	4	47
9%	tree/ke	68	6	62
12%	painting/fu	33	4	29
15%	pants/tiao	32	5	27
15%	pencil/zhi	13	2	13
20%	boat/zhi	30	6	24
27%	rope/tiao	11	3	8
31%	bed/zhang	36	11	25
34%	banana/gen	38	13	25
41%	car/liang	49	20	29
46%	axe/ba	35	16	19
46%	fan/ba	26	12	14
46%	table/zhang	85	39	46
52%	hat/ding	27	14	13
53%	house/dong	28	15	13
53%	snake/tiao	35	19	16
56%	gun/ba	36	20	16
59%	horse/pi	39	23	16
60%	airplane/jia	25	15	10
62%	sofa/zhang	50	31	19
69%	cannon/chen	80	55	25
77%	fish/tiao	34	26	8
84%	donkey/pi	26	22	4
84%	shark/tiao	26	22	4
88%	lamp/zhan	25	22	3
88%	room/jian	24	21	3

The data show that there is a high degree of variability in normals' production of classifiers. There was also a high degree of neutralization of classifiers in normals' production. However, as can be seen from the results in Table 1, some classifiers, such as the ones for 'car', 'house', 'snake', 'airplane', and 'lamp' tend to neutralize, while others, such as the classifiers for 'paper', 'flower', 'book', and 'tree' do not. The question that needs to be answered then is what the pattern of neutralization for classifier production among normals is.

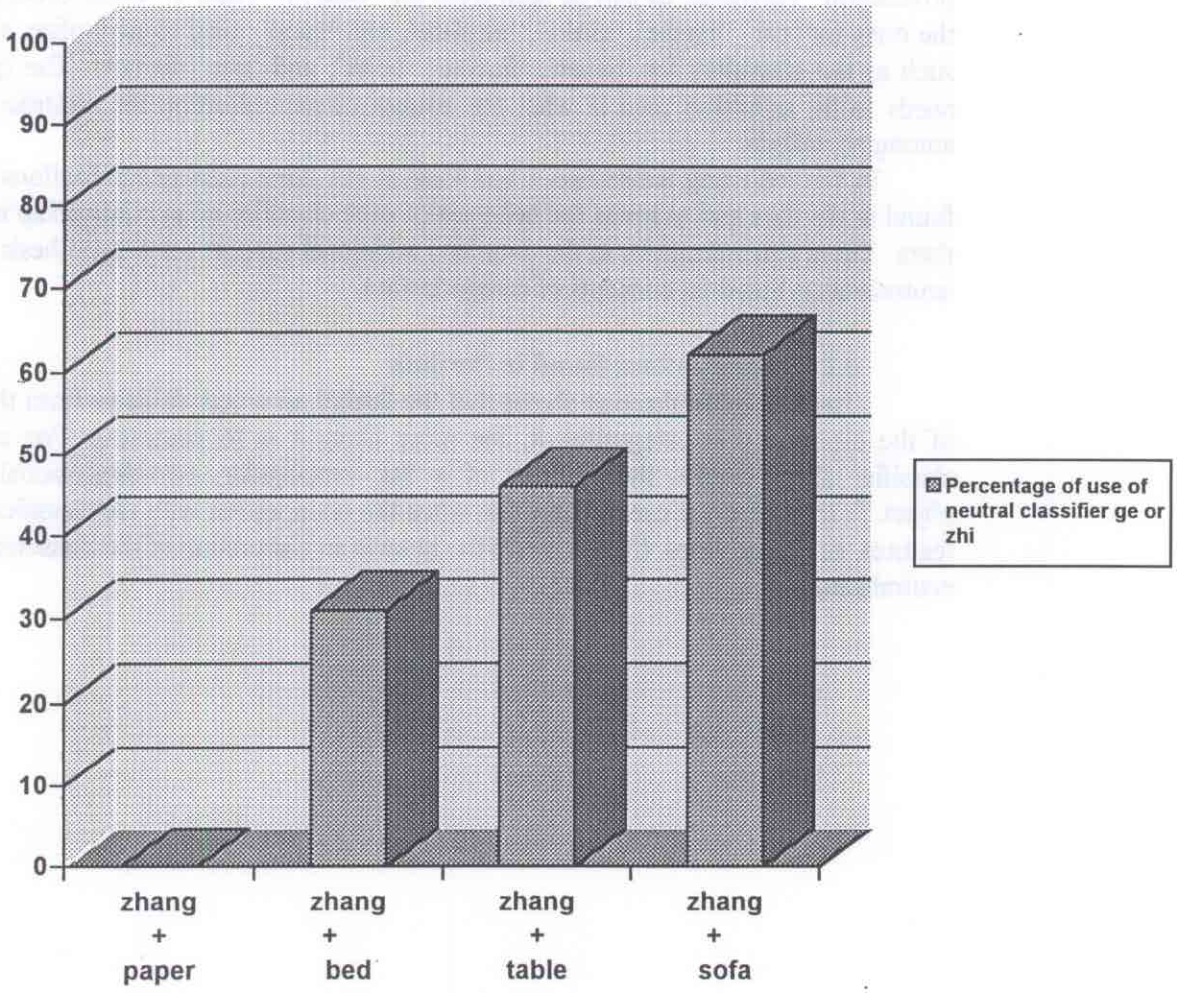
In the following subsection I will look at the three main generalizations that can be found in the data and examine the behavior of each classifier-noun relationship in relation to them. These generalizations in the data lend additional support for a hypothesis of classifier neutralization based on concepts of categorization.

4.2 Generalizations found in the data

The first generalization shows that the farther an object deviates from the prototype of the classifier that categorizes it, the more likely it is to neutralize. For example, the classifier zhang entails the features of a flat, rectangular, two-dimensional, horizontal object.[14] In Figure 1 it can be seen that when the noun agrees with the classifier in all these features, as 'paper' does, (that is, when the noun is an elaboration of the classifier) there is no neutralization.

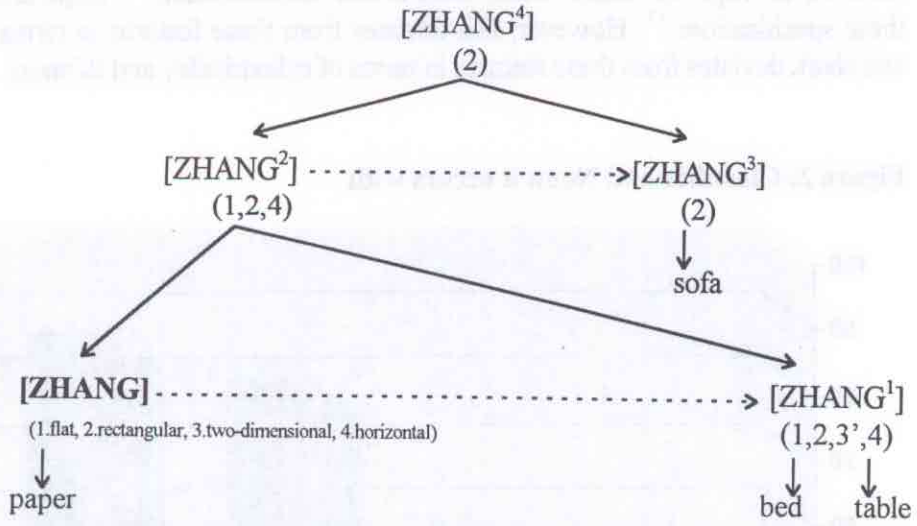
[14]I postulate that zhang entails the four features mentioned above for the following reasons: 1) zhang is used in the noun phrase zhi-zhang 'paper-zhang' where the whole noun phrase means 'stationery'; 2) zhang has historically always referred to thin, flat, rectangular objects; and 3) when new objects enter the language, such as the word for a computer diskette, the classifier zhang is typically used. Features of zhang are also briefly discussed in Tai (1990b).

Figure 1: Classifier and Noun it occurs with



However, 'bed' and 'table' deviate from the salient features in terms of dimensionality and show a higher degree of neutralization. 'Table' is even less "two-dimensional like" than beds, since beds are lower to the ground than tables, and usually have no legs. In addition, 'sofa' deviates from the salient features in both dimensionality and an additional vertical surface, and this noun shows the highest degree of neutralization.

As I noted in Section 3.1, the relationship of a prototype to its target consists of a "horizontal" extension from the prototype, where the target exhibits only some of the specifications of the standard/prototype. In the case of the classifier zhang below (Diagram 4), 'paper' is the target that satisfies all of the specifications of the standard/schema. (This relationship is elaborative.)



Prototype Model
Diagram 4

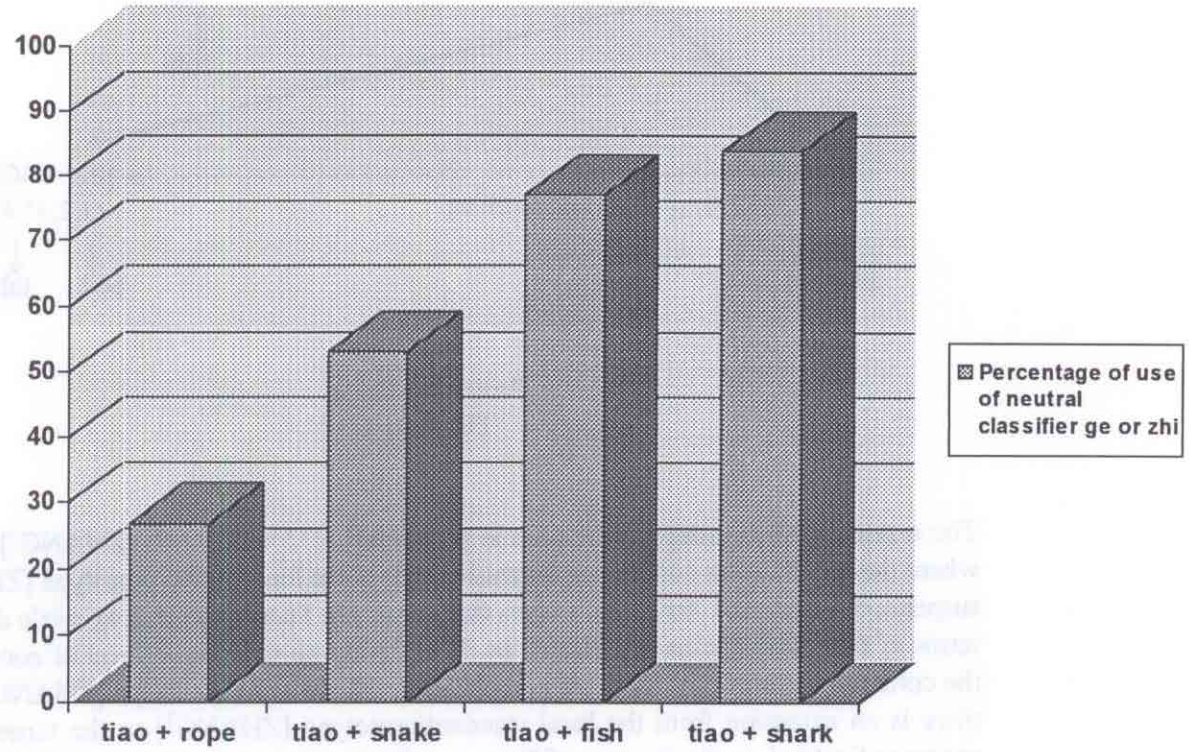
The extension relationship can be seen in [ZHANG] ----------> [ZHANG^1](1,2,3',4), where the specification concerning dimensionality of the local/global prototype [ZHANG] is suspended. 'Bed' and 'table' are targets that satisfy the features of (1,2,4), while differing in terms of dimensionality as represented by 3'. Moving on to the next level of commonality, the common features of (1,2,4) are percolated to the standard/prototype [ZHANG^2]. Then there is an extension from the local standard/prototype [ZHANG^2] to the target. In the process of extension, the features of flatness and horizontalness are suspended. 'Sofa' is an example that satisfies the specifications of this local standard/schema. In abstracting to the highest level, we abstract the common features from the second level, and are left with rectangularity as the commonality feature for [ZHANG^4].

Another example that demonstrates that the farther an object deviates from the prototype of the classifier that categorizes it, the more likely it is to neutralize concerns the classifier tiao. The specifications for the standard of tiao are long, thin, cylindrical and flexible.[15] In Table 3 we see that when the noun agrees with the classifier in all these

[15]These features were independently arrived at by a study done on tiao by Tai (1990a). However, as I mentioned previously, features are used in order to facilitate the discussion of an extension from a prototype, and I am not saying that these are the only features allowable.

features, as 'rope' or 'snake' does, there is less neutralization.[16] Rope and snake entail all these specifications.[17] However, fish deviates from these features in terms of cylindricality and shark deviates from these features in terms of cylindricality and thinness.

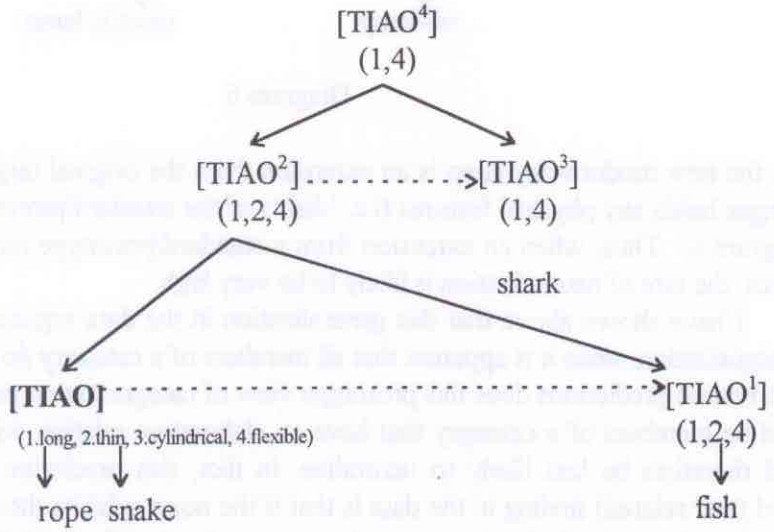
Figure 2: Classifier and Noun it occurs with



[16] Also, note that 'pants' which is also used with the classifier tiao has a lower rate of neutralization (15%) than 'rope' (27%). This is surprising in light of the fact that it does not instantiate the feature of 'thinness', and therefore should show a higher rate of neutralization than 'rope'. In addition, 'pants' can also occur with the general classifier for clothes jian, which should also lead to a higher rate of neutralization (Sec. 4.3). I leave this question open for further research.

[17] The higher rate of neutralized classifiers with the noun 'snake' as compared to 'rope' (cf. Table 3) will be discussed in Section 4.3.

In Diagram 5 below, 'snake' and 'rope' are targets that fulfill all the specifications of the standard/schema [TIAO]. The first extension relationship can be seen from the local/global prototype [TIAO] to its target [TIAO^1] (1,2,4), where the feature cylindrical is suspended. The target that satisfies the standard/schema is 'fish'. The common features from [TIAO] and its extension are abstracted and held in [TIAO^1]. There is an extension from this standard/prototype that supersedes the feature of thinness: 'shark' as a target instantiates only the features of length and flexibility. Finally, [TIAO^4] holds the features that are common to [TIAO^2] and its target [TIAO^3], namely the features of length and flexibility. All the targets or nouns that we have discussed hold these two features in common.



Prototype Model
Diagram 5

The high neutralization of the classifiers for 'hat' and 'lamp' can be attributed to an extension that has to do with the visual salience of the object. For example, the classifier for hat, ding, semantically refers to the 'peak' of an object. Hats that are typically worn by Chinese scholars are in the shape of a cap with a button-like object at the top of the hat. However, the hat that was used in the stimulus drawings was an English top hat, which has a totally flat top. I attribute the neutralization to the classifier ge (58% of the time) to the fact that the visually salient property that the classifier refers to was absent in the stimulus.

Another example, 'lamp', occurs with the neutral classifier 88% of the time. It is an interesting case since nothing elaborates the schema in modern times. The particular classifier for lamp is zhan. Although originally the noun "(oil)lamp" was visually very similar

to that of the classifier zhan, which means "dish", the modern day "lamp" no longer shares the visually salient features of the classifier zhan, and so it neutralized.

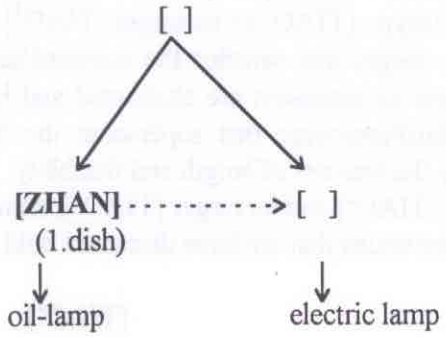


Diagram 6

Thus, the new modern-day lamp is an extension from the original target of an oil-lamp, but no longer holds any physical features (i.e. 'dish') of the standard/prototype, as is exemplified in diagram 6. Thus, when an extension from a standard/prototype no longer instantiates its features, the rate of neutralization is likely to be very high.

I have shown above that this generalization in the data argues for a prototype view of categorization, since it is apparent that all members of a category do not have equal status. What related predictions does this prototype view of categorization make? One is that there should be members of a cateogry that have an elaborative relation with the target and that would therefore be less likely to neutralize. In fact, this prediction does hold. Thus the second (and related) finding in the data is that if the noun exhibits the exact same properties as the classifier with which it is supposed to occur, the classifier is likely to remain.[18] This is the case for the nouns 'paper', 'pen', 'arrow', 'flower', 'book', 'tree', 'painting', 'rope', and 'pencil'. For example, 'paper' has the exact same properties as the classifier zhang, which denotes a flat, rectangular, two-dimensional, horizontal object. 'Arrow', 'pen' and 'pencil' also entail all the properties of their classifier, zhi, which is associated with long, rigid,

[18]It is interesting that this trend reflects the fact that languages like redundancy. That is, it could be the case that when the classifier gives the same information as the noun, the classifier would become neutralized. It is not surprising that this is not the case, however, since languages seem to prefer redundancy in many instances, especially in cases of agreement, as with classifiers and nouns, or subject and verb agreement, etc. However, why languages prefer redundancy, and in what cases it does so, are questions that need to be explored further.

cylindrical objects.[19] 'Book' has the same properties as the classifier for book, ben, which refers to book-like objects. 'Tree' also entails all the properties of its classifier ke, which refers to plants. Another example is 'painting'. It has all the properties of its classifiers fu, since it is in fact the only noun that is used with this classifier.[20] 'Flower' entails all the properties of its classifier duo, which refers to a flower bud.[21] 'Rope' holds all the properties of tiao, namely being long, thin, cylindrical and flexible.[22]

As I discussed in Section 3.2 above, S is a standard that has certain specifications, while T is the target. When all the specifications of S are satisfied by T, the S is referred to as a schema and the categorizing relationship between S and T is one of elaboration. That is to say the standard/schema and the target are fully compatible, but the target is elaborated or delineated in greater detail.

---

[19]It is interesting to note that of the two out of 13 instances where the neutral classifier was used, in one instance the speaker said the English word 'pencil'. It is not really an instance of neutralization when the speaker uses an English word, therefore, I think with more data, a lower percentage in the range of 5% would be more likely.

[20]Note that in some dialects, such as Amoy and Hakka, the classifier zhang is also an acceptable classifier for 'painting' (Matthew Chen , p.c.). This would mean that in these dialects there would be a competition between fu and zhang, and thus there should be a higher rate of neutralization (see discussion below). In fact, it is probable that the influence of these southern dialects can be felt among the Mandarin speakers in Taiwan, and that would account for the 12% rate of neutralization. Matthew Chen (p.c.) also suggested that the classifier fu (rising tone) has many competitors, if one takes into account another classifier fu 'classifier for eyeglasses' (falling tone) which has a different tone and different written form. I do not think that this second fu poses competition for the classifier for paintings, since the tones are different.

[21]However, if a speaker wanted to emphasize the long, thin, cylindrical aspects of the stem of a flower, s/he could do so by using the classifer zhi.

[22]However, we will see below that the fact that 'rope' can have other classifiers occurring with it somewhat mitigates the elaborative relationship with the classifier tiao. In addition, although 'snake' could be considered to hold an elaborative relationship with 'tiao', the fact is that the animal classifier zhi is strongly competing with it, and thus the elaborative relationship is strongly compromised. Please refer to the discussion in Section 4.3.

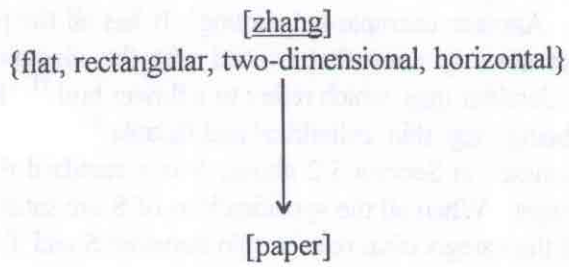
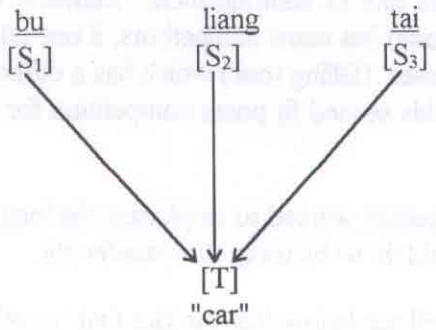


Diagram 7

In the data we are discussing here the target noun [BOOK] is an elaboration of the standard/schema, namely the classifier [BEN]. The target noun [PAPER] is an elaboration of the standard/schema [ZHANG], as shown in diagram 7. Similar elaborations between the target nouns and their respective standards/schemas hold for 'pen', 'pencil', 'arrow', 'flower', 'painting', 'rope' and 'tree'. The first two generalizations have accounted for a large portion of the data. However, there still remains a group that is showing a high degree of neutralization. The characteristics of the remaining group can be handled with a principle of competition. Briefly stated, two or more classifiers competing for occurrence with a noun give the neutral classifier a greater opportunity of co-occurring with the same noun.

In the case of 'car', for example, there are three classifiers that can occur with the noun, liang, bu, and tai. This situation sets up a kind of competition, which can be represented as follows:



Competition Model
Diagram 8

Here there are three schemas competing for a single target. When this competition arises, the relationship between the schema and target is weakened and it is more likely that the neutral classifier will occur. Other examples of nouns that have competing classifiers are 'airplane', 'arrow', 'axe', 'banana', 'boat', 'cannon', 'donkey', 'fan', 'gun', 'horse', 'house', 'rope' and 'snake'. All of these nouns except for 'arrow' and 'boat' show occur with the neutral classifiers ge and zhi at least one third of the time.[23] However, the specific classifier for both 'arrow' and 'boat' is zhi. It is unlikely that zhi, which is already a common classifier (and a neutral classifier for Taiwanese speakers), will further neutralize to ge.

4.2.1 A Problematic Case

It is not immediately apparent why the classifier for 'room' should neutralize so often. There are no competing classifiers, and there does not seem to be any reason to postulate that the noun 'room' is extending its sense from that of the classifier, jian, which historically derives from 'a divide between rooms, a room'. However, the noun for room is fang-jian and the classifier for room is also jian. I posit that the high rate of use of the neutral classifier (88%) occurs because the noun already incorporates the classifier. That is, the classifier is repeated in the noun and is thus quite phonologically salient within the noun itself.[24] It then seems phonologically redundant for the same classifier to occur before the noun as well.

4.3 Competition Between the Three Models

These three generalizations may sometimes cooperate and sometimes compete with one another. For example, 'paper' is the prototypical token for the classifier zhang. In addition, there are no competing classifiers for 'paper'. Therefore, there are no reasons for the classifier to neutralize, and in fact it rarely does.

However, in the case of the token 'rope', although it instantiates the prototypical features of the classifier tiao (long, thin, cylindrical and flexible), it also has a competing classifier, gen, which is the classifier for long, rigid, three-dimensional objects. In fact, as can be seen in the appendix, the picture used to elicit 'rope' was one which emphasized "rigid" properties of rope since the rope was pulled taut in order to hang clothes. Thus, 'rope'

---

[23]Nouns which are not associated with the classifier zhi are considered to neutralize when they occur with zhi.

[24]I noted in a previous footnote that there was a noun for 'stationery', zhi-zhang. Following the line of reasoning that phonological salience could be a factor in the neutralization of jian, the classifier for room, we can predict that the classifier zhang should also neutralize before 'stationery'. However, I do not have the data for this at hand. In addition, other possibly conflicting factors are the fact that 'room' occurs much more frequently and is more colloquial than the word for 'stationery'.

shows a higher degree of neutralization (to ge, 3 out of 11 elicitations, 27%) than 'paper', which does not have any competing classifiers (0 out of 38 elicitations, 0%). Lastly, snake has a higher rate of neutralization (19 out of 35 elicitations, 53%) than 'rope'(27%), even though they both are elaborations of the schema of long, thin, cylindrical and flexible objects. Note though that 'rope' has two classifiers competing for it. The differences between the two are contingent on the feature of flexibility. 'Snake', however, has the animal classifier zhi competing for it along with tiao. The feature of animacy in the animal classifier is a strong competitor for tiao, and that is why zhi wins the competition for occurrence with 'snake' as compared with the competition of gen and tiao for 'rope'. The feature of flexibility is not a very strong one one way or another, and that is why there is not as sharp a rate of neutralization for classifiers occurring with 'rope' as compared with 'snake'.[25] Therefore, 'snake' neutralizes to zhi more often than 'rope' does to ge.

In the above section, I have demonstrated that neutralization in normals' production is prevalent, and I have argued for a prototype model of categorization, combined with a competition model to account for the generalizations in the data. In the following sections, I will look at how my account holds up for the aphasic population, and I will make a prediction for classifier neutralization in both normal and aphasic populations.

5.0 Classifier Neutralization in Bilingual Aphasics

Tzeng, Chen and Hung (1991) argue that Wernicke's and Broca's aphasics make different types of substitution errors in classifier usage in Chinese, with Wernicke's aphasics committing substitution errors that cross semantic class, while Broca's aphasics do not. Their finding deserves review since it bears on the fundamental issue of intrahemispheric organization for language. Thus, the question to be addressed in this section concerns whether Wernicke's aphasics show evidence of substitution errors that cross semantic classes, or whether classifier production in Broca's and Wernicke's aphasics should be defined along different lines.

In what follows, I will first define terms, and then review Tzeng et al.'s study. Then, I will propose an alternative analysis of the data and discuss its importance for the intrahemispheric organization of language. In section 5.3, I will make predictions for neutralization of classifiers in both aphasic and normal populations.

5.1 Review of Tzeng et al.'s Study

Tzeng et al.'s (1991) study of classifier production in Chinese aphasics showed that the omission and substitution of classifiers was prevalent in aphasic speech. Omission refers to the absence of a classifier before a noun when its occurrence is obligatory. Substitution

[25]I suggest that the cue of animacy is stronger than that of flexibility, based on cross-linguistic evidence in which animacy plays an important role in determining which category an object may fit into.

refers to either (a) substituting a specific classifier of a certain semantic class for a specific classifier of another semantic class, or (b) substituting a common, or neutral classifier (ge in Mandarin or zhi in Taiwanese) for a specific classifier.

The classifiers ge and zhi are the two most common classifiers in Mandarin Chinese. Ge is used for people, objects and abstract nouns. Zhi is used for animals, boats and chairs in one written form, and for long, rigid cylindrical objects, in another written form. Ge is the neutral classifier in Mandarin Chinese, and zhi is on its way to becoming a neutral classifier. The classifier zhi is already the neutral classifier for objects in Taiwanese. The neutral classifiers are used when a speaker can not remember the classifier s/he wants to use, or for other performance reasons.

A brief summary of Tzeng et al.'s findings is as follows:

Broca's aphasics chose to use a classifier before a noun 27% of the time and chose not to use a classifier 73% of the time.[26] (However, they never omitted a classifier in a required context.) When Broca's aphasics did produce a classifier, 10% of the time it was "incorrect", and all of these incorrectly produced classifiers were of the neutral form ge.

Normals chose not to use classifiers only 17% of the time, and produced classifiers 83% of the time. Of these productions, 10% were incorrect, with all of the incorrect forms being the neutral form ge. Thus Broca's aphasics and normals always produced the neutral classifier ge when they were incorrect.

Wernicke's aphasics produced a classifier almost as often as normals, about 70% of the time, with an omission rate of 30%.[27] 28% of the classifiers they produced were incorrect. The Wernicke's incorrect production contained the neutral classifier ge only 68% of the time. The other 32% of the time they substituted the classifier zhi. This latter type of substitution was not seen in either Broca's or normals.

Tzeng et al. postulated that these substitutions in Wernicke's aphasics were semantic category errors, since they felt that the patients substituted the animal classifier, zhi, for the vehicle classifier, liang, before the noun 'car'. Tzeng et al. did not conclude that substitution of the neutral classifier ge for any other classifier was crossing a semantic class. The "semantic substitutions" were related to classifier substitutions found in an ASL Wernicke's aphasic, PD, reported on in Poizner, Klima & Bellugi (1987). There is one documented case of PD substituting the person-classifier for the car-classifier on the verb 'go-by' as in 'the car goes by'. Thus, Tzeng et al. surmised that semantic substitutions occur cross-modally in Wernicke's aphasics.

---

[26]Broca's aphasics were defined as having reduced fluency and phrase length, and a tendency towards omission of function words relative to normals in that language.

[27]Wernicke's aphasics are fluent or hyper-fluent. This fluency is accompanied by marked word-finding difficulties.

Tzeng et al. concluded from their experiment that Broca's aphasics and Wernicke's aphasics were committing different types of errors, since the Broca's aphasics only substituted to ge (as did normals), while the Wernicke's aphasics substituted to both ge and zhi. The main point of the following section is to take issue with this finding.[28]

5.2 Implications for Intra-hemispheric Organization of Language

The main finding of Tzeng et al. was that aphasic patients understand what discourse constraints require classifier use and try to adhere to them. This conclusion is robust, and argues against a traditional syndrome-oriented dichotomy, where linguistic disorders in Broca's and Wernicke's aphasics are explained as production and comprehension deficits respectively. The main finding also does not support theories that assign grammatical deficits to Broca's aphasics, and posit semantic deficits, but spared grammar, in Wernicke's aphasics.

However, I do not agree with Tzeng et al.'s second conclusion that Broca's and Wernicke's exhibit two different types of substitution errors, which correlate to a distinction in the intrahemispheric processing of Broca's and Wernicke's aphasics. After reviewing the data of the original experiment (provided by the authors), I conclude that errors produced by both Broca's and Wernicke's aphasics are representative of neutralization, not substitution. By neutralization I am referring to substituting a common or neutral classifier for a specific classifier. Under this definition substitution is restricted to substituting a specific classifier of a certain semantic class for a specific classifier of another semantic class. This refined definition allows us to discuss the possible differences between Broca's and Wernicke's aphasics more succinctly.

Broca's aphasics use the neutralized classifier ge in all cases. The only instances of possible semantic substitution involve two bilingual Wernicke's aphasics using the classifier zhi (which Tzeng et al. interpret as the classifier for animals) for the noun car instead of the more acceptable alternatives including liang, bu or tai.

However, I would like to argue that the classifier zhi is in fact the most acceptable classifier for the noun car in the patients' other language, Taiwanese. Moreover, zhi is the neutral classifier in that language for non-humans. Since Wernicke's aphasics only produced the classifiers ge and zhi, and since there is reason to consider zhi as the correct classifier for the bilingual Wernicke's aphasics, I propose that the Wernicke's aphasics in Tzeng et al.'s

---

[28]Tzeng et al.'s paper also raises interesting questions concerning the "correctness" of classifier usage among normals and aphasics. No functional criteria were given as to how correctness was determined in their study, since they said that they made judgements on the basis of their own intuition. Moreover, they did not take into account that normals often show a great degree of variability as well as neutralization in their classifier production. In addition, Tzeng et al. did not ask what types of classifier-noun combinations seem to be more susceptible to neutralization. Answers to these questions can be found in Section 4.

study were not substituting classifiers that cross semantic class.[29] Instead, I am arguing that they were codeswitching between Taiwanese and Mandarin. Codeswitching is defined as 'the juxtaposition within the same speech exchange passages of speech belonging to two different grammatical systems or subsystems' (Gumperz 1982). This is quite plausible given the fact that these two bilingual patients had long passages of speech that contained both Mandarin and Taiwanese phrases.

This proposal might seem to suggest that there is no difference in the production of classifiers between Wernicke's and Broca's aphasics, which would be surprising given the crosslinguistic evidence that there are substitution contrasts in morphological usage for these two subject groups (Bates, Friederici, Wulfeck & Juarez 1988). However, when one looks only at the bilingual (Mandarin/Taiwanese) subjects (6 out of 9 of the Broca's aphasics and 3 out of the 5 Wernicke's aphasics) in Tzeng et al.'s study, one notes that bilingual Broca's aphasics usually draw on one lexical item, namely the demonstrative that consists of a determiner and a generic classifier: Chinese zhege or Taiwanese jitle ('this' + classifier). This item zhege ('this') is often used in speech in normals when they are groping for a word. The bilingual Broca's use it before nouns when they want to satisfy the classifier requirement.

The bilingual Wernicke's aphasics, on the other hand, not only use the demonstrative zhege or jitle, but also use the determiner with other classifiers (such as zhe tai che 'this-CL-car'), as well as quantifiers plus classifiers in a noun phrase (such as si zhang deng-zi 'four-CL-stool'), something Broca's aphasics never do. Thus, the subject group difference lies in the fact that Broca's aphasics only produced a classifier within a compound with a demonstrative. This is a single generic lexical item that is very easy to access and yet still allows the speaker to cope with the grammar's demands of classifier usage. However, as we saw above, Wernicke's aphasics do not show such impairment.

Tzeng et al. propose that errors manifested by Broca's aphasics involve areas of the anterior cortex that subserve the maintenance of lexical and morphological alternatives. Damage to these regions would mean that the subject must choose frequent forms that are easy to access and produce. The review of the above data suggests that not only are the Broca's aphasics selecting the neutral classifier, they are in fact selecting a very frequent lexical item. However, Wernicke's aphasics, who do not have damage in this area of the cortex, are able to produce classifiers both within a compound and in a numeral classifier phrase.

Tzeng et al. also propose that Wernicke's errors of crossing semantic classes are compatible with a theory of attentional processes that assigns alerting and filtering roles to the posterior regions of the brain. My reanalysis of the data suggests that Wernicke's aphasics are not crossing semantic classes, but that instead there is code-switching occurring, with the Taiwanese form of the classifier occurring in Mandarin speech. This finding does

---

[29]Wu (1993) also found no evidence that Wernicke's patients were crossing semantic classes in their classifier usage.

not rule out the hypothesis that alerting and filtering roles are assigned to the posterior regions of the brain, since it is possible to relate the code-switching finding to the fact that Wernicke's aphasics are having difficulties with filtering information from two languages. This hypothesis would predict that monolingual aphasic subjects should not produce the Taiwanese classifier (zhi/le) with 'car', since I am postulating this could only occur because of code-switching in bilingual subjects. However, for this particular case this prediction may be somewhat confounded with the rise of zhi as the second neutral classifier in Mandarin.

5.3. Predictions for Classifier Production in Normals and Aphasics

The models discussed in Section 4 and the reanalysis of the aphasic data in this section, lead us to make a prediction concerning what classifiers are more likely to neutralize when occurring with certain nouns. I put forth the following hypothesis concerning the probability of the neutral classifier occurring:

Hypothesis for Neutral Classifier Use in Chinese

If the relationship between a noun and a certain classifier is unique and elaborative, the neutral classifier is less likely to occur.

By unique I mean that the classifier occurs in a non-competitive scenario. So if a noun has a unique (non-competitive) and elaborative relationship with the classifier, the classifier is not likely to neutralize, as in the case of 'book' and 'paper'. If, on the other hand, there is a non-unique (competitive) scenario, or an extension relationship, then the classifier is likely to neutralize.

I predict that this hypothesis will hold for both normals and aphasics. That is, while it is very likely that aphasics will overall use the neutral classifier much more frequently than normals, they should show the same relative pattern of neutralization for certain classifiers based on the models I have sketched above. For example, I would expect that as in normals, aphasics would show a higher degree of neutralization for 'sofa' than for 'paper', although perhaps 'paper' would also neutralize to a greater extent than in normals.

Tzeng et al. did demonstrate that Broca's aphasics overall neutralize more often on an absolute scale compared to Wernicke's aphasics and normals. My predictions, therefore, do not directly pertain to the quantitative patterns of neutralization, since I do agree with Tzeng et al.'s findings that Broca's aphasics neutralize more often than Wernicke's aphasics, and in turn, Wernicke's aphasics use the neutral classifier more often than normals. However, my predictions do say that normals, Wernicke's and Broca's aphasics should produce the neutral classifier in accordance with the above hypothesis for neutral classifier use, but they will do so at different rates. That is, qualitatively all three subject groups should follow a similar pattern of neutralization; the difference between the subject groups lies in the amount of neutralization in production. Unfortunately the data collected by Tzeng et al.

neither confirm nor disconfirm this hypothesis since the nouns they used did not cover the range of possibilities that would be needed in order to draw such a conclusion.

Note also that the above hypothesis does not predict that there should be differences in performance for Broca's and Wernicke's aphasics. That is, Wernicke's aphasics should not be crossing semantic classes when they produce classifiers. Instead they should only produce the neutral classifier as the Broca's aphasics do. As I have shown in the preceding section, this is indeed the case.

In addition to empirically testing this hypothesis with aphasic data, there are two other research areas that would lend confirming evidence. The first method would be to look at the neutralization of classifiers in other languages to see if the hypothesis for neutralization of classifiers holds cross-linguistically. The second method would be to see if these predictions concerning classifier neutralization hold up for metaphorical uses as well.[30] That is, it would be interesting to design an experiment to test whether more central uses of metaphors neutralize less, as I predict will be the case.

6.0 Conclusion

Classifiers in Chinese pose an interesting testing ground for theories of categorization and cognition. This study takes a psycholinguistic approach to previous theoretical investigations concerning categorization of Chinese classifiers (Tai 1990a,1990b, 1992), and expands on the neurolinguistic results discussed in Tzeng, Chen and Hung's (1991) study of classifier production in Chinese normals and aphasics. The results of my study demonstrated that both normal and aphasic subjects adhere to the same constraints on classifier production.

In this paper I proposed to answer the following four questions:

1. To what extent is neutralization of classifiers prevalent among normals?

2. Is there a pattern of neutralization and what type of account can explain the data?

3. What prediction does this account make for classifier production in normals and aphasics?

4. Do Wernicke's aphasics show evidence of semantic substitutions, and if not, what explanation can be given for the results Tzeng et al. obtained?

My results show that neutralization of classifiers is prevalent among normals. Normals produce the neutral classifier in place of a specific classifier anywhere from 5 to 88 percent of the time. I reviewed the situations in which a classifier is neutralized and concluded that the pattern of neutralization can be predicted with a hypothesis for neutral

---

[30]James Tai (p.c.) and Matthew Chen (p.c.) have both suggested this line of research.

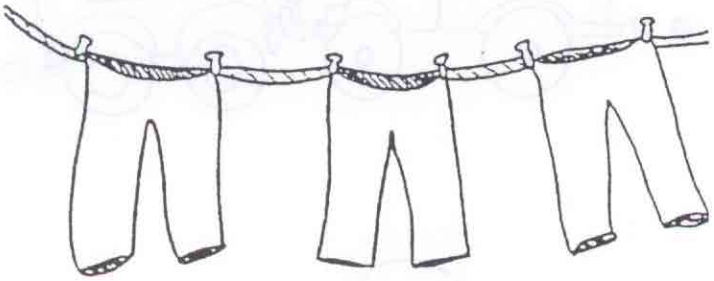
classifier use which says that if the relationship between a noun and a certain classifier is unique and elaborative, the neutral classifier is less likely to occur. This account predicts that classifier neutralization in normals and aphasics will follow the same lines, and should not differ qualitatively according to subject group. Lastly, I evaluate Tzeng et al.'s data and show that Wernicke's aphasics are not crossing semantic classes when they neutralize to the classifier zhi; instead they are practicing a form of code-switching.

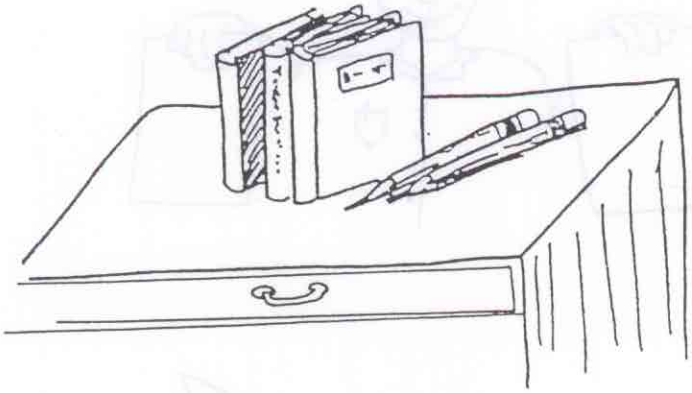
Previous work in classifier studies (Erbaugh 1987) suggested that classifier neutralization was occurring in normals. However, up until now, there has been no systematic study of this phenomenon. This fact, in turn, led to a misinterpretation of the results of an experiment on aphasics' productions of classifiers. Thus, I hope this paper has taken the first step in understanding the intracacies involved in both normal and aphasic classifier production, as well as set up the ground work for future studies on the relationship between cognition, categorization, and processing in the brain.

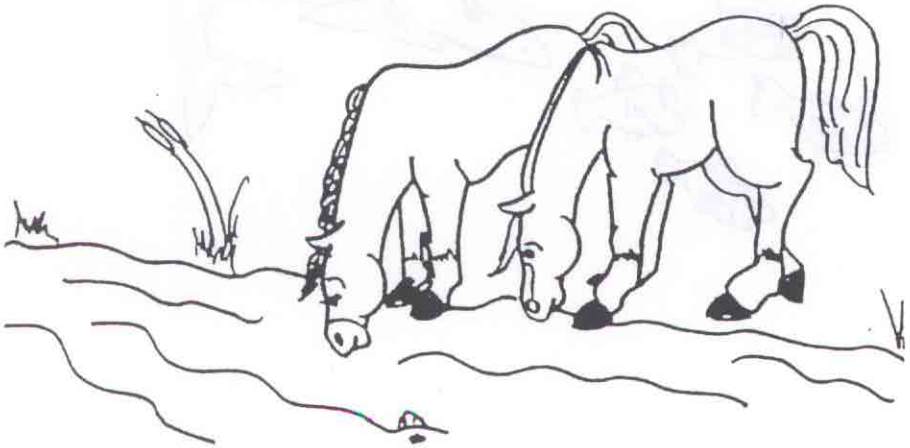
Acknowledgements: A revised version of this paper entitled 'Classifier Production in Normals and Aphasics' appeared in the June 1994 issue of the Journal of Chinese Linguistics. Please refer to the Journal of Chinese Linguistics paper in the case of quoting and/or citing this work. Both this LNLJ working version and the JCL paper were written while I was pursuing my Ph.D. at the Department of Linguistics, UC San Diego.

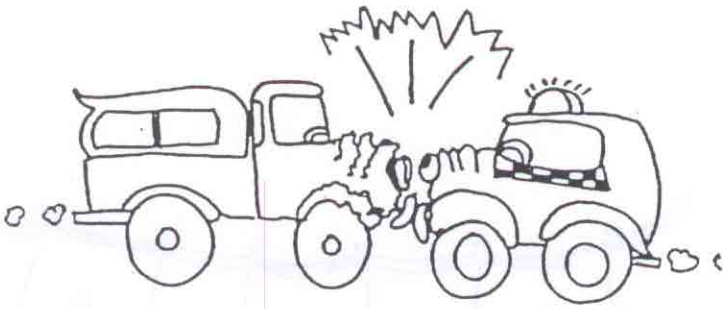
I would like to thank Farrell Ackerman, Matthew Chen, Adele Goldberg, Karen Emmorey, Chu-Ren Huang, Robert Kluender, Ron Langacker, and Ron Sheffer for their comments on previous written versions of this paper. I would also like to thank participants of the following conferences for their comments: the 1992 North American Conference on Chinese Linguistics at Ann Arbor, Michigan; the 1992 Cognitive Linguistics Workshop at UC Berkeley, the 1993 Meeting of the Linguistic Society of America, the 1993 International Conference on Chinese Languages and Linguistics and the 1993 Workshop on Interfaces and the Chinese Language at the LSA Summer Institute. Special thanks go to Ovid Tzeng, James Tai and William Wang for their insightful criticisms and comments. I alone am responsible for any errors.

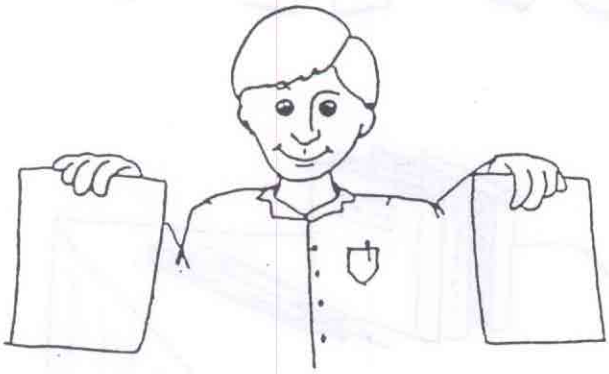
Appendix I
6 Examples from the Stimulus Set

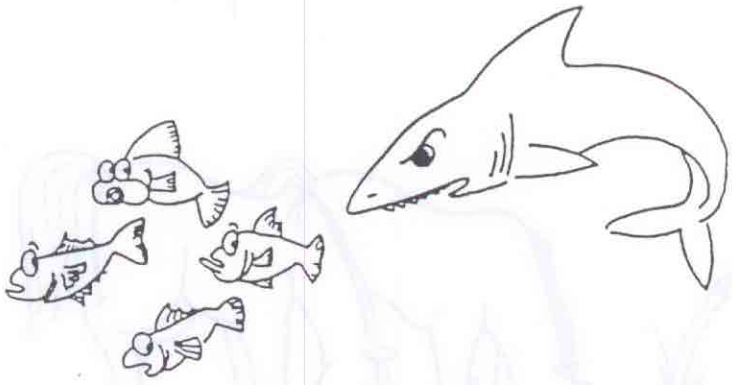












References:

Allan, K. 1977. Classifiers. *Language*, 53, 285-311.

Bates, E., Friederici, A., Wulfeck, B., & Juarez, L. (1988). On the preservation of word order in aphasia: Cross-linguistic evidence. *Brain and Language*, 33, 323-364.

Bates, E., Wulfeck, B., & MacWhinney, B. 1991. Crosslinguistic Research in Aphasia: An Overview. *Brain and Language*, 41.

Collins, B. 1962. *Tonga Grammar*. London: Longmans. Chao, Yuen-Ren. 1968. *A Grammar of Spoken Chinese*. UC Press, Berkeley.

Craig, Collette. 1986. *Noun Classes and Categorization*. Amsterdam: John Benjamins Publishing Co.

Erbaugh, Mary, 1986. Taking Stock: The Development of Chinese Noun Classifiers Historically and in Young Children. *Noun Classes and Categorization*, ed. by Collette Craig, 399-436. Amsterdam: John Benjamins Publishing Company.

Gumperz, J. 1982. *Discourse Strategies*. Cambridge: Cambridge University Press.

Haas, M. 1945. The Use of Numeral Classifiers in Thai. *Language*, 18, pp. 201-206.

Hoijer, H. 1945. Classificatory Verb Stems in Apachean Languages. *IJAL*, 11, pp. 13-23.

Lakoff, G. 1987. *Women, Fire and Dangerous Things*. University of Chicago Press.

Langacker, R. 1986. *Foundations of Cognitive Grammar*, vol. 1. Stanford: Stanford University Press. Norman, Jerry. 1988. *Chinese*. Cambridge University Press, Cambridge.

Poizner, H., Klima, E. and Bellugi, U. 1987. *What the Hands Reveal About the Brain*. Boston: MIT Press.

Rosch, E. 1973. Natural Categories. *Cognitive Psychology*. 4:328-50. Rosch, E. 1975. Cognitive Reference Points. *Cognitive Psychology*. 7:532-47.

Rosch, E. 1978. Principles of Categorization. In E. Rosch and B.B. Lloyd (eds.), *Cognition and Categorization*. 27-48. Hillsdale: Lawrence Erlbaum.

Tai, J. 1990a. A Semantic Study of the Classifier TIAO. *Journal of the Chinese Language Teacher's Association*, Vol. XXV: No. 1, pp. 35-56.

Tai, J. 1990b. Variation in Classifier Systems across Chinese Dialects: Towards a Cognition-Based Semantic Approach. *Proceedings of the First International Symposium on Chinese Languages and Linguistics*, pp. 308-322.

Tai, J. 1992. Chinese Classifier Systems and Human Categorization. (ms.) Ohio State University.

Taylor, J. 1989. *Linguistic Categorization*. Oxford University Press.

Tzeng, O., Chef, S. Hung, D. 1991. The Classifier Problem in Chinese Aphasia. *Brain and Language*, 41.

Wang, L. 1958. *A History of the Chinese Languag*e. (in Chinese). Beijing: Ke-Xue Publishing Company.

Wang, L.-Q. In prep. A Semantic Study of the Chinese Classifier System. Ph. D. Dissertation. Ohio State University.

Wittgenstein, L. 1945. *Philisophical Investigations*. Translated by G.E.M. Anscombe (1978). Oxford: Basil Blackwell.

Wu, Jin-wei. 1993. An Investigation on the Classifier from the Evidence of Chinese Aphasics. Unpublished master's thesis. Taiwan: National Tsing Hua University.