Application of Cognitive Strategies to Chinese Noun Classifier E-learning

Wei Ni, Helena Hong Gao*, and Shixiao Ouyang
Nanyang Technological University, Singapore
{helenagao}@ntu.edu.sg

1   Introduction

Linguistically, a noun classifier is a morpheme or word used to classify a noun according to its inherent semantic features. Noun classifiers in Chinese are obligatory as a category of its own and used to specify a noun when it is used with a determiner or a numeral. In other words, classifiers are never used independently. It must occur with a numeral (e.g., *yi* "one", *er* "two", *san* "three") and/or a determiner (e.g., *zhe* "this", *nei* "that"), or certain quantifiers (e.g., *ji* "how many", *mei* "every") before the noun. Such a combination is referred to as a classifier phrase. Its basic construction can be illustrated in the following schema:

(Determiner)	+	Numeral	+	Classifier	+	Noun
zhe		*san*		*ben*		*zidian*
this		three				dictionary

The counterparts in English for the above Chinese classifier phrase are "these three dictionaries". The determiner *zhe* "this" is not obligatory in a classifier phrase. The numeral *san* "three" marks the object *zidian* "dictionary" as is in the state of being plural. The classifier *ben* inserted between the numeral and the noun is a classifier for bound materials, such as books, dictionaries, and magazines.

2   Cognitive strategies: top-down vs bottom-up

Bilingual Chinese children and L2 learners of the Chinese language often encounter difficulties in their learning of Chinese noun classifiers [2, 3, 5].

This is mainly due to multiple categorization of a noun referent, i.e., a single entity may belong to more than one category, depending on the properties we attribute to it rather than on its intrinsic ones [6]. We expect this obstacle in noun classifier acquisition to be overcome more effectively if attention to pragmatic discourse is given on a cognitive basis. In practice, however, the acquisition is further cumbered by the conventional focus on sentence level practice rather than on pragmatic level discourse in the learning process.

Recently a replication comparative study of Gao's 2001 study was conducted on Chinese noun classifier production between a group of Swedish-Chinese bilingual children and a group of Swedish L2 learners [5]. Same as the observation of the previous study, the noun classifier production by the bilingual children was higher than that by the adult L2 learners. The Swedish L2 learners tended to ignore noun classifiers' semantic and cognitive meanings, and to evaluate noun classifiers as merely syntactic terms. Unable to make a semantic association between a classifier and a noun, they were inclined to rely on their knowledge of measure words in Swedish and rote memory of classifiers. Their top-down pattern in noun classifier acquisition limited their horizon in understanding the more complicated yet more meaningful semantic interpretations of noun classifiers on a cognitive basis.

In contrast, the bilingual children did not tackle noun classifiers with strong top-down expectations. Their acquisition of noun classifiers was based on the categorization schemes built from their semantic and cognitive understanding of Chinese. They proceeded with classifier learning very conservatively, in a bottom-up manner that relied largely on input. Taking into consideration the semantic complexity of the noun classifier system, the bilingual children's bottom-up approach is more recommended.

3   Application in noun classifier e-learning

We describe an e-learning approach to enhance L2 learners' acquisition of Chinese noun classifiers. Developed in the software environment of File-Maker Pro 8.5, the e-learning tool is established on a database with classes of nouns and classifiers stored in individual records..

The records in the database could be organized according to the lexical meanings of the words and categorized into "nature", "humans & body parts", "animals", "vegetables & fruits" and "man-made objects". Such a categorization appears explicit, but its top-down approach fails to reveal the cognitive mapping between the noun classifier and the noun referent. The objective of the e-learning approach, on the other hand, is to guide L2

learners to build their categorization scheme from the noun referents' salient semantic features, specified by their shape, size, thickness, length, function, etc.

Therefore, in light of the recommended bottom-up approach, the e-learning tool urges users to learn the salient external or functional features of the noun referents in a case-by-case fashion. In this way they could better understand the point that a noun classifier reflects the cognitive classification of its associated noun referent. Each individual record is thus designed in the following format. It contains the noun as one of its data entries, and it also provides in other data entries information of the corresponding noun classifier(s) and its description. Most importantly, the salient semantic feature of the noun referent is decomposed and illustrated explicitly in an independent data entry.

For instance, *tiao* is the correct noun classifier for "a rainbow", "a leg", "a snake", "a cucumber" and "a scarf". To decide the appropriate noun classifier that occurs in these phrases, L2 learners need to understand that *tiao* reflects the longitudinal property of "rainbow", "leg", "snake", "cucumber" and "scarf", which is perceptually salient. *Tiao* is chosen since it matches with the longitudinal attribute the five noun referents have in common, despite that the intrinsic properties of the five objects vary, which is illustrated in Table 1.

English	Chinese classifier phrase			Properties	
equivalent	numeral	classifier	noun	cognitive	intrinsic
a rainbow	*yi*	*tiao*	*caihong*	longitudinal	nature
a leg	*yi*	*tiao*	*tui*	longitudinal	humans
a snake	*yi*	*tiao*	*she*	longitudinal	animals
a cucumber	*yi*	*tiao*	*huanggua*	longitudinal	vegetables
a scarf	*yi*	*tiao*	*weijin*	longitudinal	man-made

Table 1: A Selection of Classifier Phrases of *tiao*

Compared with noun classifiers with specific applications (e.g., *tiao* for snakes and *ben* for books), other classifiers are commonly used with more generalized sets of nouns. These general noun classifiers are more semantically complex, since they are inhabited with multi-layer meanings. It hence requires deeper cognitive understanding to master them. Erbaugh examined the acquisition order of noun classifiers and suggested learners acquire noun classifiers specific to single items before they acquire those of generalized

sets, such as *ge* applicable to both animate and inanimate noun referents of most kinds and *zhi* to nouns of body-parts of humans and animals as well as man-made objects [1]. L2 learners are recommended to follow the same bottom-up approach to acquire general noun classifiers. In the e-learning environment L2 learners are exposed to a selection of classifier phrases with general noun classifiers. Take *zhi* for example. It is associated with nouns such as "bird", "bear", "hand" and "ear". Regarding which noun classifier is associated with these four nouns, animacy is the critical semantic feature of these noun referents, which is analyzed in each record of the nouns.

Besides utilizing textual explanations, this e-learning tool will also develop a computer-based model of noun classifier acquisition for automatic noun-classifier association. By implementing Holland's agent-based model [4], we aim to include in our prototype 150 nouns and 12 noun classifiers as two groups of interactive agents. To design a semantic interface between the two types of agents in a computational perspective, a tag is attached to each agent. Each tag is a pseudo-binary bit string of $\{0, 1, \#\}$, representing the semantic features of the agent. "#" is known as the "doesn't care" symbol, and is used to indicate that the corresponding semantic feature is not critical for the formulation of the classifier phrase, even though the noun referent owns such a feature.

The first simple model is illustrated as follows. In this model each tag consists of 4 pseudo-binary bits. The tag "11##" is assigned to the agent (noun) "snake". By this we represent the noun referent's longitudinal semantic feature with the first two symbols "11". Despite the noun referent also has the cognitive property of animacy which could be indicated by the last two symbols, it is not of primary importance for the concern of classifier phrase composition, and is hence denoted by "##". When it is compared with the tag "1100" of the agent (noun classifier) *tiao*, the matching score is reported high. This indicates *tiao* is likely to occur in the classifier phrase of "snake". In contrast, its matching score with the tag "0011" of the agent (noun classifier) *zhi* is reported low, which implies an undesirable match.

Further simulation tests are required to verify the robustness of the proposed model, with a more systematic classification of the agent's semantic features, a larger number of inputs, and closer scrutiny on those marginally acceptable classifier phrases.

Acknowledgement

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