An Analysis of Reading Errors in Chinese Language

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Abstract

The purpose of this study is to explore different types of errors made by students with Chinese reading difficulties. Based on dual-route model of reading, readers may use either the lexical (words are recognized as wholes) or sub-lexical (words are recognized through grapheme-phoneme correspondence) procedure to read. Castles & Coltheart (1993) have provided evidence for the existence of these two mechanisms in English reading. They suggest deficits in one and/or the other mechanism lead to different patterns of reading disability. Surface dyslexia results from impairment of the lexical procedure with an intact phonological route to reading. Phonological dyslexia results from a highly selective deficit in the grapheme-phoneme transformation mechanism. It was found that the proportion of phonological dyslexia was higher than that of surface dyslexia in English language. In usual practice, reading errors are categorized into: semantic, phonological and visual. Siegel (1993) suggested that the reading disabled children made more semantic errors in English language. This is due to the fact that many of these children use the lexical route to read. In the case of Chinese reading, Ho & Elliott (2001) claimed that a relative higher proportion of surface dyslexia was found. The result of this study showed that more phonological errors were made by the Chinese reading disabled children.

In English language, the principles of word decoding can be realized in various ways. Dual route theories of word identification (e.g., Besner, 1990; Coltheart, 1978; Paap & Noel, 1991) assume that phonological conversion processes occur along one route, while direct access, unmediated by phonology, occurs along the other route. Using Coltheart's terminology, readers may use either the lexical or sub-lexical procedure to read, depending on their purposes and skills. When reading aloud through the lexical procedure, words are recognized as "wholes" and their corresponding pronunciation retrieved as "wholes". When readers use the sub-lexical procedure to read, they are reading words through grapheme-phoneme correspondences which specify sub-grapheme orthographic and phonological segments.

Castles and Coltheart (1993) suggest deficits in one and/or the other mechanism lead to different patterns of reading disability. Surface dyslexia results from impairment of the lexical procedure with an intact phonological route to reading. Phonological dyslexia results from a highly selective deficit in the grapheme-phoneme transformation mechanism. Castles and Coltheart also suggest that the proportion of phonological dyslexia among the reading disabled children in their study was higher than that of surface dyslexia. This result is not difficult to understand. As there is a consensus that phonological awareness is important in English reading, children who are not able to master the grapheme-phoneme correspondences may have problems to become fluent readers.

Based on the phonological, semantic, and visual properties of a language, Siegel (1993) that more semantic errors were observed among the reading disabled children. This is due to the fact that a large proportion of this target group has problems in using phonological analytic
skills to read and they are forced to use lexical procedure to decode words. Based on this suggestion, it is assumed that a relative higher percentage of semantic and/or visual errors would be made by phonological dyslexic readers and phonological errors by surface dyslexic readers. This is due to the fact that phonological dyslexic readers rely heavily on a lexical procedure to read and surface dyslexic readers on a sub-lexical procedure.

In the case of Chinese language, whether phonological awareness is an essential process in reading is still a controversial issue. Sasanuma (1974) provides convincing evidence of differential mechanisms by suggesting that logographic and alphabetic processing may represent distinctively different modes of linguistic operation. It is believed that the visual direct route is used to read in logographic writing systems, whereas the phonological route is used to read in alphabetic writing systems. Reading Chinese words, therefore, depended mainly on the visual route without the need to recognize the phonological structure of words. If this is true, dual-route model of reading in Chinese should not be meaningful. Until recently, the view that a direct visual access to meaning, for written Chinese is the major route for reading, was still supported by a number of researchers (e.g., Chen, 1993; Zhou, Marslen-Wilson, Shu, Bi, & Tang, 1996; Zhou, Shu, Bi, & Shi, 1999) although these researchers did not totally deny the phonological mediation in Chinese.

Zhou, Shu, Bi and Shi (1999) assume that each word has, at least, orthographic, phonological, and semantic representations in the lexicon. Visual word recognition involves the mapping from orthography to semantics, from orthography to phonology, as well as from phonology to semantics. The efficiency of mapping depends very much upon the regularity of the correspondence between different domains (e.g., Plaut, McClelland, Seidenberg, & Patterson, 1996).

Zhou, et al. (1999) claimed that, for Chinese, both the mapping from orthography to semantics and the mapping from orthography to phonology are rather arbitrary.

The following are some of the examples used to illustrate the abstractness of the relationship between orthography and semantics, for example:

- orthographically similar characters with different semantics properties: [e.g., "木" (sound: "muk", meaning: "wood"); "禾" (sound: "mei", meaning: "not yet"); "末" (sound: "mood", meaning: "end"); "禾" (sound: "wo", meaning: "straw")]
- orthographically different characters with similar semantic properties: [e.g., "水" (sound: "shui", meaning: "water"); "霧" (sound: "sup", meaning: "wet"); "滑" (sound: "wad", meaning: "slippery")].

and relationships between orthography and phonology, for example:

- Phonologically similar characters with similar orthographic components: [e.g., "倉" (sound: "chong", meaning: "warehouse"); "倉" (sound: "chong", meaning: "pale"); "鎗" (sound: "chong", meaning: "pistol").
- Phonologically different characters with similar orthographic components: [e.g., "猜" (sound: "tsai", meaning: "guess"); "濁" (sound: "ching", meaning: "clear"); "倩" (sound: "sin", meaning: "beautiful").

It can be seen that the mapping from orthography to phonology is approximately as arbitrary as the mapping from orthography to semantics. Based on the theory of the time course of processing, the route from orthography to semantics is more efficient than the route from orthography to phonology and then from phonology to semantics, with the condition that phonology does not have many opportunities to influence semantic activation. The direct
flow of activation from orthographic representation to semantic representation should be faster than the indirect flow of activation through phonological representations.

The opposite position, that phonology plays a more important part in processing characters, is also supported by experimental evidence (e.g., DeFrancis, 1989; Jackson, Lu, & Ju, 1994; Perfetti & Tan, 1999; Tan & Perfetti, 1997; Tzeng, Hung, Wang, 1977).

This is due to the fact that 85% of Chinese characters are phonograms in the six categories of Chinese characters (Perfetti & Tan, 1999). Among the phonograms, most of them are formed by two parts; on the right, a phonetic, dictating the sound, and on the left, a radical (signific), dictating the meaning (Wang, 1973). Zhou (1978) maintained that with the ability to pronounce a limited number of basic logographs and knowledge of orthographic rules in the construction of logographs, readers of Chinese can, in fact, make reasonably successful guesses about how to pronounce logographs that share the same phonetic component, even those that they have never encountered before. Taylor and Taylor (1990) suggested that the phonetic part of a phonogram provides at least a hint linking pronunciation of the character to the approximately 400 syllables in the Chinese dialects. In about 25% of phonograms, the phonetic gives the full pronunciation of the character (Hoosain, 1991), and it gives guidance in about 39% of the phonograms (Perfetti, Zhang, & Berent, 1992). The efficiency coefficient of such sound reading is estimated to be .36 (see Tzeng & Hung, 1980).

In addition, Perfetti, et al (1992) suggested that the use of phonology is a general characteristic of reading that exists across writing systems. Contact with printed words in any writing system automatically arouses phonological properties associated with the words. Perfetti, et al. (1992) argued this for writing systems in which orthographic-phonological relationships are more reliable than graphic-semantic (or phonological-semantic) relationships in identification. "生" is an example to illustrate the likelihood of a more rapid activation of orthographic-phonological relationships. The meanings of "生" could be (1) life; (2) produce; (3) Mr; (4) baby delivery; or (5) lively. The pronunciation of this character is restricted to "san". In this case, Chinese readers can build up stronger graphic-phonological associations than graphic-semantic associations. There is evidence that phonological forms of characters are activated very rapidly in Chinese, more rapidly than meanings under some circumstances. There is a greater degree of one-to-one mapping between graphic forms and phonological forms compared with the mapping between graphic forms and meaning (Tan & Perfetti, 1997).

The focus of the controversy is now on how much phonological information can be recovered in reading Chinese characters rather than on whether phonological information is included in Chinese reading. If Chinese characters give clues to sound, it can be inferred that the dual-route model of reading is plausible in Chinese reading. The reading patterns of dyslexia shown in English readers may also occur in their Chinese counterparts.

It can be seen that both phonological and visual variables do contribute to reading difficulties in Chinese language. In English, there is a consensus that the major factor accounting for the reading problems is the deficit in phonological processing. In the case of Chinese reading further investigation is still required in determining the relative importance of the phonological and visual variables.

In fact, Ho & Elliott (2001) suggest that a higher incidence of surface dyslexia was observed in Chinese orthography. A higher percentage of surface dyslexia was observed in Chinese among the reading disabled children. Based on the assumption in English language, it is predicted that the surface dyslexic readers in Chinese would make more phonological errors and the phonological dyslexic readers the semantic errors.
There are very few errors analysis studies available in Chinese reading. The purpose of this study is to examine the common errors in Chinese Language; these errors will reflect their use of different processes in reading. The present investigation, therefore, focused on testing the different patterns of reading errors of the two sub-types of dyslexia in the Chinese writing system.

Method

Participants

10 participants of each sub-type of dyslexia were chosen for this study. The participants were Primary 3 and 4 pupils.

Stimuli

A passage of Primary 4 basal textbook was selected for the testing.

Procedure

Each child was withdrawn from class for individual testing, for a period of approximately 25 minutes. Children were asked to sit opposite to the investigator in a quiet room. They were then asked to read out aloud the passage. Each error was then recorded.

Categorization of Errors

These errors were categorized as semantic, visual and phonological errors.

Examples of semantic errors:

Text item: 吹 (blow)
Reader: 風 (wind)

Text item: 牛 (cow)
Reader: 羊 (goat)

Examples of visual errors:

Text item: 汁 (juice)
Reader: 汗 (sweat)

Text item: 清 (clean)
Reader: 潮 (tidy)

Examples of phonological errors:
Results and Discussion

Table 1. Mean Number of Errors in Each Sub-type of Dyslexia

<table>
<thead>
<tr>
<th></th>
<th>Surface</th>
<th></th>
<th>Phonological</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S.D.</td>
<td>Mean</td>
<td>S.D.</td>
</tr>
<tr>
<td>Semantic errors</td>
<td>2.2</td>
<td>1.23</td>
<td>3.25</td>
<td>1.97</td>
</tr>
<tr>
<td>Phonological errors</td>
<td>5.2</td>
<td>1.54</td>
<td>2.90</td>
<td>2.56</td>
</tr>
<tr>
<td>Visual errors</td>
<td>3.3</td>
<td>1.57</td>
<td>3.60</td>
<td>1.84</td>
</tr>
</tbody>
</table>

The number of errors was analyzed using a two-way ANOVA, with Reader Type varied between subjects, and Word Type varied within subjects. In the comparison of surface and phonological dyslexics, the analysis detailed a significant two-way interaction of this comparison by Error Type [F(1, 18)=9.7, p<.05]. More phonological errors (5.2) were found in surface dyslexics and semantic errors (3.25) in phonological dyslexics.

These results support the prediction that the phonological dyslexics rely heavily on the lexical procedure to read and it is therefore to make more semantic errors in their reading. In contrast, more phonological errors were observed in those surface dyslexics. This is due to the fact that this group of readers uses the sub-lexical procedure to read.

REFERENCES


Educational Research Establishment, Education Department (1979). *A study of the Chinese vocabulary used in primary schools in Hong Kong*. Hong Kong: Education Department.


