PHONOLOGICAL ASPECTS OF READING AND LEARNING VOCABULARY

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INTRODUCTION

Printed or graphic information is an integral part of information technology. This information which we encounter everyday is recoded in phonological form to be held in phonological short-term memory (PSTM) for temporary storage. However, since short-term memory capacity is limited to about seven plus or minus two items (Miller, 1956), the phonologically coded information decays within seconds unless it is maintained. How coded information is maintained in PSTM has been the subject of much rigorous research for several decades. Baddeley (1986, 1990; Gathercole and Baddeley, 1993) explains efficiently how incoming information can be maintained in the limited capacity of the PSTM through rehearsals in the phonological loop. This article reviews the various implications of the loop theory as it applies to reading and the learning of new vocabulary.

REVIEW OF RESEARCH

Phonological coding, PSTM and articulatory fluency

Phonological representations of words are formed through the development of a phonological code, better known as the 'inner speech in reading' (Huey, 1908). This code is not dependent on outer speech for its development or its operation (Baddeley, 1990: 87), nor on feedback on overt speech (Bishop & Robson, 1989). It is monitored by the acoustic shapes the person experiences. Children have been found to listen to their own speech rather than to external sources when they engage in activities that require attention to external input (Hsia, 1992, p. 367; Schwartz, 1988; Vihman & Miller, 1988). According to Gathercole and Baddeley (1993), phonological coding is most effective in helping the reader identify unfamiliar words by rehearsing them in the PSTM for easy retrieval and manipulation in long-term memory (LTM) and rapid integration of reading material once they are semantically and phonologically coded. The phonological code develops via two very important skills awareness of phonemes (implicit phoneme awareness) and specific knowledge of letter-sound correspondence (explicit phoneme awareness) in addition to phonological memory (Ellis & Cataldo, 1990; Gathercole & Baddeley, 1993, pp. 149-150; Morais, 1987, p. 132). These are skills that can be taught to beginning readers to help them read faster and more accurately.

Speed in articulation seems to be the key to efficient PSTM processing, crucial to success in information processing and in reading. Above all, articulation of words relies heavily on one's ability to code. PSTM for words is determined by the spoken duration and by the time interval in which one can store the items (Hulme, Thomson, Muir & Lawrence, 1984). Once
the rate of articulation is increased, phonological memory processing is speeded up, and speed increases throughout childhood and adolescence, peaking in young adulthood (Cowan & Kail, 1996).

Hsia (1997) found that Hong Kong tertiary level ESL learners' recall of word and sentence strings was a function of articulatory accuracy and speed. The more proficient subjects were in the language, the faster they were able to recall the strings and the more items they were able to recall.

**Phonological coding and the reading of Chinese characters**

In spite of current evidence that Chinese university students prefer a visual mode in processing Chinese characters (Liu, Zhu & Wu, 1992), Hsia (1997) found that the phonological loop theory applies to the reading of Chinese characters and is crucial to subjects' retention of characters during processing. In a study she conducted of Hong Kong university students, subjects were tested on two categories of items, based on a data base of frequency lists compiled by Liu & Ng (1990). All items were components of real characters but were semantically pseudo in nature. One category consisted of unnameable character components (A) while the other category consisted of independently nameable phonetic elements (B). The reasoning was that nameable phonetic elements would mediate recall in PSTM more directly than unnameable elements as recalling phonetic elements involves a direct phonological-orthographic association in LTM for immediate representation in PSTM. These items were programmed to appear in spans of two, three, four and five, with four strings to each span. The items appeared in serial order, each for 750 msec, with a pause of 0.3 sec before the next character appeared. At the disappearance of each string, subjects were prompted by a beep to immediately write down the target items in exactly the same order they appeared. As predicted, subjects recalled significantly more nameable (Task B) than unnameable characters (Task A).

**Interference of phonological codes within the same orthographic system: caveats to watch out for**

Since phonological codes become such an integral part of one's perceptual system in encoding incoming information, how does one code affect another when reading the same orthography? For example, if one has learned to read Chinese in Mandarin, one should have developed phonological codes in Mandarin as the learning process itself heightens one's phonological awareness of Mandarin sound segments (see Hsia, 1992). If one has to switch to Cantonese because one is obliged to, how will the newly learned code affect the Mandarin code? This author has experienced this switch from one code to another during the crucial years of her development, an interaction which interfered with her fluency in reading Chinese texts.

In the same vein, if one has developed a set of phonological codes in English during childhood but has to switch to another set of codes drastically different from the original, will this switch affect one's speed in processing?

**Phonological awareness and beginning reading**

Phonological awareness pertains to an awareness of discrete segmental units in words and syllables and to one's ability to
segment them in a sequence and to blend them into words and syllables. Phonological awareness skills have been found to be causally related to and predictive of beginning reading among preschoolers (Leong, 1991; Morais, 1987). They are usually tested by asking subjects to delete initial or final consonants in a word, or to blend segments into a word, etc. Hsia (1992) further found that phonological awareness skills developed among preschoolers through phoneme segmentation in Chinese transferred across to English, regardless of differences in the two orthographic systems. This can be understood in the light of the loop theory: segmental analysis skills facilitate phonological coding. The faster one can code incoming information, the faster the rehearsal and storage, and the faster space in PSTM is freed for new information. The conclusion is that phonological awareness skills which facilitate articulatory rehearsal, facilitate the process of reading.

**Phonological awareness and learning of new vocabulary**

The ability to articulate unfamiliar words also requires a phonological awareness of the interaction of activated patterns and knowledge of phonotactic rules (Gathercole & Martin, 1996). Articulation enables repetition and rehearsal of the same pattern of unfamiliar sounds to be maintained in PSTM during the learning stage until they are lexically and semantically coded for LTM storage. Failure to rehearse the unfamiliar material results in loss of their retention in PSTM. (Ellis & Beacon, 1993). Thus, phonological awareness enables unfamiliar material to be rehearsed until it is learned and stored in long-term memory. Programs that were developed to train these skills have demonstrated an increase in fluency and memory among beginning readers (Hulme, Maughan & Brown, 1991) and adult students of ESL (Hsia, 1999).

**CONCLUSION**

This article has briefly introduced the crucial role of phonological coding, phonological memory and phonological awareness in the process of learning new material and in rapid reading. Research findings all point toward the importance of teaching these phonological skills not only to beginning readers in preschools and primary one but to L2 learners as well. Once learners have mastered the ability to code words rapidly and efficiently, reading becomes much more fluent and enjoyable and the learning of new words much less tedious than anticipated.
IMPLICATIONS FOR TEACHING

1. Prior consideration should be given to the development of the phonological code in reading and language arts programs in primary schools.

Before children learn to read print, they have been living in a world of language sounds and words. In order to make sense of what the sounds and words are represented in, young children should be taught to explicitly detect sound segments in words and be aware of their positions in words so that they can later map them on to their corresponding letters in print. This would be even more important for young children who haven’t been exposed to spoken English in their environment but begin to learn English in preschools.

2. Introduce programmes to help young children develop English phonological codes through training in phonological awareness.

Phonological awareness programmes have been introduced in recent years in the USA. These programmes emphasize awareness of phoneme (sound) segments and their positions in words, segmenting and blending skills, learning about sound sequences and multi-syllabic words, learning about syllable and word boundaries. As children are introduced to reading, they learn to articulate words they encounter, whether they know them or not.

3. Kindergarten teachers can guide children in sounding out segments first and then introduce games to involve children in various training exercises.

For example, the teacher can use chips, blocks or similar objects to represent sound segments and ask children to blend segments to form a word or to delete certain segments in the word. By using an array of concrete objects, children can see the sequence of the sound segments in a word. The exercises also become more meaningful to them as they can move the objects around and manipulate them as they would sounds in words. In addition, rhymes can be introduced to teach children to discriminate sound segments within minimal pairs of words.

4. Kindergarten teachers can involve their children in exercises that train their phonological memory.

For example, young children love to play with sounds and nonsense syllables. They can be asked to repeat multi-syllabic words and nonwords which can increase in length as repetition continues. This exercise will stimulate young children's imagination and prepare them for the learning of long and multi-syllabic words.
SOURCES


Liu, I. M. & Ng, S.D. (1990). Frequency counts of the most commonly used Chinese


*lexical units.* (translated from Chinese). Chinese University Press


