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An Assessment of Chinese Adult Learners' English Phonological Awareness*

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***Abstract*—The present study aims to conduct a valid comprehensive assessment of Chinese adult learners' phonological awareness (PA) in English. To do so, 408 college students were classified into three groups based on their English proficiency; four tasks (oddity, segmentation, blending, and deletion) with varying complexity employed to test all three levels of PA (syllable awareness, onset-rhyme awareness, and phoneme awareness). The results revealed that 1) overall PA improved with English proficiency; 2) among four tasks, only the performances on oddity were not significantly affected by English proficiency; 3) English proficiency attained significance for all three levels of PA; and 4) in terms of subtest where task and PA interacted, English proficiency's impact was mediated by the complexity of task and level of PA. This study is meant to guide PA researchers on a valid PA assessment and Chinese English teachers on PA training for their Chinese English learners.**

***Index Terms*—phonological awareness, PA assessment, Chinese English learners**

I. Introduction

Phonological awareness (PA) is an important language skill unfamiliar to Chinese English teachers. They have gone to great lengths to improve their Chinese learners' English proficiency with neglect of the causes of their students' problems with English learning. PA has been found to a factor integral to L1 or L2 language skills such as pronunciation, spelling, listening, and reading (e.g., Carson, Gillon & Boustead, 2013; Cheung, 1999; Fracasso, 2016; Liberman et al., 1974; Stainthorp et al., 2013; Tang, 2009; Wade-Wolley, 2016). Therefore, knowledge of PA research is indispensable to Chinese English teachers in that the former will guide the latter on enhancing their students' English skills by boosting their PA first. Then, what is PA? According to Treiman and Zukowsik (1996), PA is an awareness of a word's phonological structure. Specifically, a word can be divided into syllables, a syllable segmented into an onset and a rhyme, and then a word further divided into phonemes. Accordingly, PA is commonly accepted as a holistic skill consisting of three levels of awareness: syllable awareness, onset-rhyme awareness, and phoneme awareness. Research on Chinese learners' PA in English is abundant, but with limitations: 1) primarily targeting child learners in an ESL environment, 2) focusing on phoneme awareness, and 3) testing three levels of PA using different tasks. As a result, the present study intends to not only add to PA research on Chinese English learners, but also provide implications for Chinese English teachers by assessing PA in English of adult English learners in China.

II. Literature Review

In the past 30 years, research on English PA of Chinese English learners in China have been focused on the relationship between PA and children's reading, with the finding that PA is essential to the improvement of beginning English learners' reading skills (e.g., Dong & Wen, 2010; Li, Tao & Dong, 2011; Sun et al., 2015). Other researchers (e.g., Holm & Dodd, 1996; Li et al., 2011; Lin et al., 2011; Xu & Dong, 2005) have investigated factors that could facilitate or hinder Chinese English learners' PA and found that language experience such as spoken language, bilingualism, or Mandarin learning can actually boost Chinese learners' PA in English. However, scarce research has centered on a comprehensive assessment of English PA skills of Chinese learners, either child or adult.

Pan (2012) investigated the phoneme awareness of Chinese students (N=294) in elementary school, middle school, high school, and university. Adapted from Stahl & Murray (1994), the testing measures included four phoneme tasks: 1) blending several sounds (say, /k/, /a/, /t/) into a word (/kat/); 2) isolating one sound from a word (e.g., /fud/—/f/); 3) deleting one sound from a word and then pronouncing the rest (e.g., /cat/-/at/); and 4) segmenting a word (say, /fat/) into phonemes (/f/-/a/-/t/). The results showed that in terms of task, isolation was the easiest, followed by blending, deletion, and segmentation. Pan attributed this finding to more difficult processing skills required by deletion and segmentation. In terms of age, development of phoneme awareness was the fastest from grades one to three, arriving at the peak at grade three, and then declined to a slow but steady growth after grade three.

Pan & Gai (2013) compared English PA between 294 Chinese speakers and 109 English speakers ranging from elementary school to college. The subjects completed blending and segmentation for syllable awareness; blending and

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oddity for onset-rhyme awareness; and blending, isolation, deletion, and segmentation for phoneme awareness. The results revealed different developmental patterns for both groups: English speakers had already developed strong PA skills by grade three while Chinese speakers' PA developed the fastest from grades one to three, but still comparatively weak. As the grade increased, the gap between two groups did not decrease because Chinese speakers lacked sufficient English input to improve their PA skills.

Bai's study (2014) focused solely on Chinese adult learners' PA in English. The study examined 178 college students who were divided into two groups based on their English proficiency with dissimilar tasks for three levels of PA. For syllable awareness, syllable counting and segmentation were used. For rhyme awareness, there were rhyme oddity (select the word that did not rhyme with the other two) and identification (find the word out of four that rhymed with the token). For onset-rhyme awareness, employed were isolation (isolate the onset or rhyme of a token) and creation (give a word that had the same onset or rhyme with the token). For phoneme awareness, the subjects were tested on phoneme processing by means of identification, segmentation, blending, substitution, and deletion as well as on phoneme creation by telling a required sound in letters or words. The results displayed that the upper-level group had significantly better PA skills than the lower-level group on all measures.

Xu & Zhang (2015) also examined college students (N=159). They employed two tasks for all three levels of PA: syllable same or different and syllable counting; onset or rhyme oddity as well as onset and rhyme transposition (swap the onset and rhyme and then write down the IPA of the resulting new word); and phoneme differentiation and counting. The results manifested that the performance on onset-rhyme awareness was significantly better than that on syllable awareness which was significantly better than that on phoneme awareness. The authors interpreted this finding as consistent with the developmental trajectory of PA in which rhyme awareness develops the earliest. They were surprised that the subjects failed to score high enough on syllable awareness tasks, but attributed this result to Chinese students' poor phonetic knowledge, esp. of syllables. In terms of task, the score on differentiation was significantly higher than that on counting because, based on the authors, the two tasks imposed differing cognitive processing skills on the subjects: Differentiation required a holistic awareness while counting called for a more difficult skill—deletion.

Some other PA studies also targeted Chinese college students, but for different purposes. For example, Yu (2010) investigated the relationship between PA and vocabulary output. He used a battery of tasks to test 52 non-English majors: syllable counting and differentiation; rhyme differentiation and oddity; and onset or coda differentiation and oddity. The results revealed a positive correlation between the subjects' PA and their use of vocabulary as well as a predictive effect of the former on the latter. Yang & Zhang (2015) studied the relationship between PA and reading skill. Thirty English majors completed syllable blending and segmentation; onset-rhyme blending and oddity; and phoneme blending, deletion, isolation, and segmentation. The results showed that PA was positively correlated with reading and that onset-rhyme awareness was most closely correlated with reading. Hu (2013) explored the effect of PA in Mandarin on English PA using six tasks: syllable oddity, syllable counting, onset oddity, rhyme oddity, phoneme oddity, and phoneme counting. The results displayed that the subjects' performances on the four oddity tasks suggested a difficulty order for the four types of PA: syllable < phoneme < onset < rhyme and that PA in Mandarin significantly affected overall PA and all types of PA. Hu ascribed the lowest score on rhyme tasks to the difference in testing materials in that two-syllable words were employed for rhyme tasks while only one-syllable ones for phoneme tasks.

The literature review has pointed to insufficient research on an assessment of Chinese adult learners' PA in English and thus a necessity for more studies in this field. The question then is how to assess PA in a valid way. To answer this question, Lewkowicz (1980) reviewed previous PA studies and observed that researchers usually did not consider the variety and complexity of PA tasks, which could threaten the validity of research results. To solve this problem, Adams (1990) divided PA measures into five levels in the order of difficulty: 1) memorizing familiar rhymes, 2) oddity tasks of detecting the rhyme and alliteration, 3) blending and syllable-splitting tasks, 4) phoneme segmenting tasks, and 5) creating a new word by manipulating a phoneme in the original word.

Apart from task variety and complexity, two more factors vital to the validity of PA research should be considered. The first one is to assess three levels of PA with the same tasks for valid comparisons between the three levels; the second one consider different levels of subjects' English proficiency for a more accurate investigation of learners' English PA. The aforesaid studies on Chinese college students' PA failed to take into consideration all the above factors. Accordingly, the present study aimed to conduct a valid comprehensive assessment of Chinese college students' English PA. To achieve this goal, we not only varied PA tasks but homogenized tasks for the three levels of PA; we also categorized the subjects based on their English proficiency to explore how PA skills would vary with the English level.

III. Method

A. Participants

The participants were 408 sophomores with non-English majors from a first-class university in Mainland China. All with at least seven-year English learning, they varied in English proficiency. They were classified into three groups based on their scores on the English final exam of last semester, which tested speaking, listening, reading, and writing skills. The upper-level group had 85 students with a score 75 or above (M = 78.56, SE = 0.47); the intermediate group consisted of 220 ones with a score between 60 and 74 (M = 67.64, SE = 0.29); and the lower-level group had 103 ones with a score of 60 or below (M = 53.50, SE = 0.43). The one-way ANOVA revealed that there was a significant group

difference (F = 791.6139, p < .0001). The Turkey-Kramer HSD analysis showed a significant difference between any two groups (all ps < .0001).

B. Materials

Adapted from Hu (2018), the audio English PA test included three sets of subtests for each level of PA (syllable, onset-rhyme, and phoneme); each set consisted of the same four tasks (oddity, blending, segmentation, and deletion) with varying difficulty. All together, there were 12 subtests with ten items each. Since using the same tasks to assess the same level of PA, this design assured more valid comparisons between different levels of PA skills. So did it a comprehensive assessment because the subjects' PA was examined across both task and level of PA.

Oddity instructed the subjects to identify the word out of three which had a different syllable, onset or rhyme, or initial phoneme. Segmentation asked the subjects to divide a word into its components: syllables, an onset and a rhyme, or phonemes. Blending required the subjects to blend into a word several sounds (two syllables, an onset and a rhyme, or four phonemes). Deletion instructed the subjects to delete a syllable, an onset or rhyme, or an initial phoneme and then provide the remainder. All test items, recorded by one English native speaker into mp3 files, were fake words complying with English phonological structures to control for the word frequency.

C. Procedure

We divided the subjects into three groups at random with approximately the same number of students and assigned a different experimenter to each group. The subjects of the same group were tested one by one in the experimenter' office. For each subtest, the experimenter instructed the subjects with simple guidance, two demonstration items, and three practice items with answers. After that, the experimenter played the test items in the mp3 files via the Window Media Player on the office computer. The subjects were allowed five seconds for each item to provide their answers which were recorded by a recorder on the computer. It took approximately one hour to test one subject.

IV. Results and Discussion

Tables I and II display the subjects' performances as four sets of mean scores and standard errors by overall PA, task, level of PA, and subtest. The PA performances of participating college students will be analyzed based on their English proficiency as follows.

TABLE I.
MEANS AND STANDARD ERRORS BY OVERALL PA, TASK, AND LEVEL OF PA

Measures \ Subjects		All N = 408	English proficiency		
			Upper-level N = 85	Inter-mediate N = 220	Lower-level N = 103
Overall PA		5.96 (0.08)	6.29 (0.09)	6.09 (0.09)	5.50 (0.08)
Task	Oddity	8.61 (0.07)	8.64 (0.08)	8.70 (0.06)	8.49 (0.08)
	Segmentation	7.32 (0.10)	7.53 (0.13)	7.74 (0.08)	7.06 (0.11)
	Blending	3.22 (0.08)	3.79 (0.10)	3.45 (0.07)	2.58 (0.10)
	Deletion	4.51 (0.09)	5.20 (0.12)	4.72 (0.07)	3.89 (0.11)
Level of PA	Syllable	6.52 (0.10)	6.89 (0.14)	6.70 (0.09)	6.10 (0.13)
	Onset-rhyme	6.01 (0.13)	6.43 (0.17)	6.19 (0.11)	5.53 (0.16)
	Phoneme	5.22 (0.12)	5.54 (0.12)	5.37 (0.08)	4.88 (0.11)

TABLE II.
MEANS AND STANDARD ERRORS BY SUBTEST

Measures \ Subjects		All N = 408	English proficiency		
			Upper-level N = 85	Inter-mediate N = 220	Lower-level N = 103
Oddity	Syllable	9.54 (0.08)	9.41 (0.17)	9.60 (0.10)	9.51 (0.15)
	Onset-rhyme	9.10 (0.08)	9.26 (0.17)	9.17 (0.10)	8.81 (0.15)
	Phoneme	7.24 (0.08)	7.22 (0.17)	7.31 (0.10)	7.13 (0.15)
Segmentation	Syllable	7.09 (0.08)	7.36 (0.17)	7.07 (0.10)	6.91 (0.15)
	Onset-rhyme	8.37 (0.08)	8.63 (0.17)	8.50 (0.10)	7.89 (0.15)
	Phoneme	6.67 (0.08)	6.66 (0.17)	6.78 (0.10)	6.45 (0.15)
Blending	Syllable	4.06 (0.08)	4.28 (0.17)	4.34 (0.10)	3.30 (0.15)
	Onset-rhyme	2.98 (0.08)	3.66 (0.17)	3.01 (0.10)	2.36 (0.15)
	Phoneme	2.90 (0.08)	3.55 (0.17)	2.98 (0.10)	2.21 (0.15)
Deletion	Syllable	5.63 (0.08)	6.60 (0.17)	5.70 (0.10)	4.72 (0.15)
	Onset-rhyme	3.83 (0.08)	4.28 (0.17)	4.03 (0.10)	3.07 (0.15)
	Phoneme	4.30 (0.08)	4.78 (0.17)	4.33 (0.10)	3.85 (0.15)

English proficiency had a significant effect on overall PA (F = 26.7628; p < .0001). The upper-level group's score (M = 6.29) was higher than the intermediate group (M = 6.09), but the difference was not significant (p = 0.1187). The intermediate group scored significantly better than the lower-level group (M = 5.50) (p < .0001). Analyzed from task, the effect of English proficiency attained significance for all tasks but oddity (F = 2.3157; p = 0.0991). Although no significant difference was found between the upper-level and intermediate groups (p = 0.9130) for segmentation, the

difference was significant between any two groups for blending and deletion (all *p*s < .05). Analyzed from the level of PA, English proficiency exerted a highly significant effect on all three phonological units (all *p*s < .0001). A significant difference showed not between the upper-level and intermediate groups, but between the intermediate and lower-level groups for all three levels (all *p*s < .005). Analyzed from the 12 subtests, English proficiency significantly affected eight ones: onset-rhyme oddity; onset-rhyme segmentation; syllable, onset-rhyme, and phoneme blendings; and syllable, onset-rhyme, and phoneme deletions (all *p*s < .001).

The results shed light on a potent facilitative role of English proficiency in English PA performances. This factor had a strong effect on overall PA, all tasks but oddity, as well as all levels of PA. This study has demonstrated that English proficiency improves L2 learners' PA in English. Higher proficiency entails larger vocabulary size. With more words added to learners' repertoire, as Gorman (2012, p. 110) proposes, "their phonological systems become more sensitive to the sound differences between words". In turn, this process may further foster skills of manipulating phonological segments, thus promoting PA development.

For all language groups, their scores on syllable awareness were the highest while those on phoneme awareness the lowest. This finding replicated previous research with either native or nonnative speakers of English (e.g., Liberman et al., 1974; Pan & Gai, 2013; Treiman & Baron, 1981; Treiman & Zukowski, 1991), in that syllable awareness developing earliest poses less difficulty than onset-rhyme awareness which in turn is easier than phoneme awareness developing the last. The reason is that to decode a larger unit like syllables requires lower level awareness of intraword structures than such a smaller unit as phonemes.

However, high English proficiency did not guarantee a causal relationship between English proficiency and PA in English. The results revealed that the higher-level and intermediate groups did not differ significantly from each other in overall PA, the segmentation task, and all levels of PA even if the main effects were significant for these measures. These non-significant differences could be due to the assignment of subjects to three language groups rather than to higher- and lower-level groups, which may have reduced cross-group differences.

In addition, English proficiency failed to significantly affect the oddity task which obtained the highest score among four tasks. Its effects reached significance for one oddity subtest and one segmentation subtest, but all three blending subtests and all three deletion subtests. Considering that blending and deletion subtests obtained much lower scores than oddity and segmentation subtests, the findings demonstrate that the facilitative role of English proficiency is constrained by the type of processing skills. PA seems to "develop along a continuum of skills, including tasks that represent a range of difficulty" (Sodoro, Allinder, & Rankin-Erickson, 2002, p. 226). More difficult PA tasks require deeper awareness than easier ones (Treiman & Zukowski, 1991). Oddity only requires distinguishing sounds and thus surface-level awareness of the phonological structure of English whereas segmentation, blending, and deletion require more sophisticated skills of manipulating subsyllabic units and thus deeper awareness. The gap in difficulty may explain the non-significant effect of English proficiency on the oddity task, but its significant effects on all three subtests of blending and deletion. What these findings, taken together, suggest is that while English proficiency exerts a definitive impact on overall PA in English, its impact on a specific level of PA is modified by the operative demands of a task.

V. Conclusion

This study assessed Chinese college students' English PA based on their English proficiency by diversifying tasks with varying difficulty and homogenizing tasks for the same level of PA. The results demonstrated how PA performances varied with English proficiency: Generally, the English level was an important facilitator for overall PA; specifically, its effects on the PA performances in terms of task were conditioned by the difficulty of processing skills required by a specific task, those in terms of level of PA by the phonological unit's size of a specific level of PA, and those in terms of subtest by the interplay between the difficulty of processing skills and size of phonological units.

Theoretically, the findings suggest the necessity for researchers to consider the possible effects of task, level of PA, and English proficiency to undertake a valid comprehensive assessment of Chinese English learners' PA in English. Pedagogically, the findings can guide English teachers on designing PA training which takes into account the interaction between complexity of task and level of PA to improve their students' PA in English. Future studies should explore more varieties of task (say, substitution, transposition, isolation, etc.) and consider other factors (such as L1 experience) to gain a further understanding of Chinese learners' English PA skills.

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