Crimson Publishers
Wings to the Research

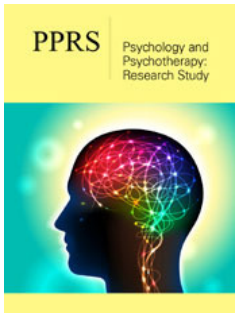
Research Article

Syllable Stress Sensitivity of Chinese University Students and the Correlation with English Reading Ability

Xu Qinfang* and Fang Yue

School of Languages, Nanjing Normal University of Special Education, Jiangsu Nanjing, China

ISSN: 2639-0612



***Corresponding author:** Xu Qinfang, School of Languages, Nanjing Normal University of Special Education, Jiangsu Nanjing, China

Submission: September 26, 2022

Published: October 12, 2022

Volume 6 - Issue 1

How to cite this article: Xu Qinfang, Fang Yue. Syllable Stress Sensitivity of Chinese University Students and the Correlation with English Reading Ability. Psychol Psychother Res Stud. 6(1). PPRS. 000626. 2022. DOI: 10.31031/PPRS.2022.06.000626

Abstract

Background: Most studies have proved that phonological awareness is closely related to reading ability. However, the correlation between syllable stress sensitivity and English reading ability remains to be further investigated, especially for English learners in Chinese colleges and universities.

Methods: This study was designed to examine the correlation between syllable stress sensitivity-one of the main prosodic features-reading and auditory perception in a sample of 68 Chinese university students. The students were divided into three groups according to their English proficiency and were assessed for their syllable stress, phonological measures and psychoacoustic tasks along with their reading and spelling ability.

Results: Correlation analyses revealed that stress sensitivity was significantly associated with English reading ability. The duration and intensity of sound were significantly correlated with the perception of stress. However, the correlation between rise time measures and English word stress sensitivity were not significant as expected. There was a significant difference in stress perception among the three groups.

Conclusion: The findings suggest that stress sensitivity can be used as an important indicator of second language learning ability and great emphasis should be placed on fostering their stress awareness to enhance their syllable awareness, sharpen their ability to recognize the phonemes in (unstressed syllables, and finally facilitate the development of their English reading and spelling ability.

Keywords: Auditory perception; Reading ability; Stress sensitivity

Introduction

The traditional emphasis of English phonetic teaching in China has always been segmental acquisition, with highlight in the pronunciation of vowels and consonants, while the knowledge of super segmentation in the aspects of speech naturalness, coherence and comprehension is relatively insufficient [1,2]. Furthermore, there exists a rhythmical and typological difference between Chinese and English in their prosodic properties: Chinese is a syllable-timed tone language, while English is a stress-timed language [3]. Consequently, many Chinese students are faced with a problem of frequently experiencing difficulties with the rhythm of English language. It seems that difficulty in speech rhythm will directly restrict the normal development of their reading ability and cause more difficulties in English learning [4]. Therefore, it is necessary to study the correlation between rhythmical sensitivity and reading ability of Chinese English learners in the university.

Prosodic aspect of language is one of the first linguistic features acquired by children learning their first language at an early stage [5]. As a stress-timed language, prosody is especially effective in segmenting English sounds. In English two-syllable words, the first syllable with a full vowel is usually stressed, while the second syllable is generally reduced [6]. Native English speakers identify words in a flow by means of stressed syllables. Nevertheless, most of studies that have investigated the relationship between phonological awareness and reading development restricted to segmental phonology [7,8]. However, supra segmental phonology, such as stress, timing, and intonation, has received less attention. In recent years,

the role of prosodic awareness in the development of children's reading achievement attracted the attention of many scholars. Prosodic awareness is considered to be an important factor affecting the development of children's phonological awareness and reading ability [8]. These prosodic features help the listeners to process language flow at the phrase, word and syllable level, and helps the listeners to process the salient information to promote understanding Whaley K et al. [9].

As prosodic awareness plays an important role in oral comprehension, many researchers have begun to examine the relationship between prosodic awareness and reading achievement on the development of individual phonological awareness and reading ability [10-13]. Stress is one of the main prosodic features in reading acquisition, which can be divided into metrical stress and lexical stress [14]. Wood C [15] Found that the awareness of lexical stress could effectively explain the variation of reading, spelling, rhyme awareness, alpha-phonetics knowledge and phonics spelling. More significantly, word stress awareness was still effective in explaining spelling variations after controlling for age and vocabulary [15]. Hulme's research found that word stress awareness can not only effectively predict the accuracy of reading, but also help children to establish the phonetic representation of words and develop the form-sound correspondence awareness [16]. However, although stress awareness, especially word stress awareness, has been confirmed by many researchers in the development of reading accuracy, these studies were mainly conducted among young native learners. The correlation between syllable stress sensitivity and English reading ability of Chinese college students, especially English as a second language, remains to be further investigated.

Moreover, English lexical stress mainly involves the perception of fundamental frequency, duration and intensity. Lack of a good command of any of these correlates may interfere with the perception and production of English syllable stress [17]. However, to date few research have investigated the possible relationship between basic auditory processing skills and the perception of syllable stress for Chinese university students. Therefore, the work of promoting research on syllable stress sensitivity seems to be inevitable and should be implemented immediately [18,19].

Thus, this study attempted to fill the gap with the purpose of evaluating the relationship between English syllable stress sensitivity and reading and spelling ability in Chinese university students. Here we make the hypothesis that the perception of syllable stress is related to perception of acoustic features in Chinese students. Furthermore, this study is hoped to provide effective stress learning strategies for Chinese students and teachers in promoting their reading ability. Therefore, it might pave the way for the reform of English teaching in China. This study was carried out to answer the following questions:

A. Is there a correlation between syllable stress sensitivity and reading ability in Chinese university students?

B. Is there a correlation between basic auditory processing and syllable sensitivity stress in Chinese university students?

Methods

Participants

Sixty-eight university students (6 males, 62 female) who were native Chinese speakers learning English as a second language took part in the study. Their age ranged from 18 years to 27 years (M =20.19, SD =2.12). The participants were within the normal range of nonverbal IQ without diagnosed disorders. They were divided into three groups according to their English proficiency. English proficiency was measured by College English Test Band 4 (CET 4) and College English Test Band 6 (CET 6). Those who passed CET 6 were in the high-level group 3, those who passed CET 4 were in the medium level group 2, and those who failed both CET 4 and CET 6 tests were assigned to the low-level group 1. Table 1 illustrates the participants' age, years of English learning and English proficiency.

Table 1: Information about Participants.

Variable	Min	Max	Mean	SD
Age (Year)	18	27	20.19	1.94
SOA	5	15	10.22	2.12
English proficiency (CET4)	243	623	401.34	135.45

SOA= years of English learning

Tasks

English reading and spelling tasks:

A. Reading tasks

Two types of reading tasks were selected to assess participants' word reading skill. In the first task, the participants should read aloud as many words as possible from a list of 100 high-frequency words in one minute. The word list contained both simple words and complex words (one up to five syllables). The score for this task was the number of words correctly read in one minute. The maximum score was 100. This task has been used in the previous research [20].

In order to avoid the word frequency effect, the second task used non-word (word attack) to examine reading skills. It chose 31 nonwords in VC, CVC, and CVCC structures (e.g., af, pem, vist) from [19]. The participant read the nonwords aloud one by one. The scoring was based on the number of nonwords pronounced correctly, and the maximum score was 31. This task was also used in the research [20].

B. Spelling task

In the test, the participants should write down the words they heard, and the words they chose were all the words they had learned. They got one point for each word they spelled correctly. The maximum score was 50.

C. English reading comprehension task

We chose the reading comprehension task from CET 4 & 6. Participants were given two short passages to read silently. After reading, they need to finish five multiple-choice questions about the passage. The questions tested reading skills such as word meaning, sentence comprehension, passage comprehension and reasoning skills. Participants were given 1 point for each correct choice. The maximum score was 10.

Psychoacoustic tasks: We used the psychoacoustic tasks created by Dorothy Bishop of Oxford University assessing auditory thresholds for sound rise time, duration, frequency, and intensity [21]. The tasks were presented in an AXB format or 2IFC format by dinosaurs' program, in which each dinosaur made a sound. The participants' task was to decide which dinosaur's sound was different from the other two sounds. They also received feedback for each sound. The auditory tasks were presented using an adaptive staircase procedure with a combined 2-up 1-down and 3-up 1-down procedure. All the tasks included practice trials. The mean of the last four reversals was calculated as the threshold score. The psychoacoustic tasks were also used in the previous research [22].

a. Amplitude envelope onset (Rise Time) task

A rise time discrimination task was presented in AXB format by dinosaur program. Two standard tones had a 15ms linear rise time envelope, 735ms steady state, and a 50ms linear fall time. The third tone changed the linear onset rise time logarithmically with the longest rise time being 300ms. All of the sounds were presented by dinosaur program. Each dinosaur would make a sound and that the task was to decide which dinosaur's sound was different from the other two. The feedback was given after every trial on the accuracy of performance. This task was also used in the previous research [23].

b. Frequency task

This task was also introduced in AXB format. The standard sound was a pure tone with a frequency of 500Hz with a duration of 200ms. The maximum pitch difference between the stimuli presented in this task was 60Hz. Participants were introduced to three cartoon elephants. It was explained that each elephant would make a sound and that the task was to decide which elephant's sound was higher [22].

c. Intensity task

The intensity discrimination task was delivered in a 2IFC format. The standard tone was the same pure tone as frequency task. The intensity of the second tone ranged from 54 to 74dB SPL. Participants were introduced to two cartoon mice. It was explained that each would make a sound, and the task was to decide which sound was softer [22].

d. Duration discrimination task

Participants were presented with two sequences of sound. In each sequence five 160ms sine tones were presented with 50ms rise time, 50ms fall time and inter-stimuli intervals of 100ms. In one sequence the tones were all of constant duration (160ms; 'AAAAA') while in the other sequence, alternate tones had a longer duration ('ABABA'). A continuum of 40 stimuli increased in 1.8ms steps from the standard 160ms tone. Participants were told that each dinosaur would make a series of sounds and their task was to decide which dinosaur made longer sounds [21].

Phonological tasks:

A. Phonological memory

Participants were asked to listen to nonsense syllable, such as glistow, brasterer, pennerrrifle and repeat them within three seconds. There were 18 items at 5 levels with two to six syllables. The test was discontinued if three continuous items were not repeated correctly.

B. Spoonerisms

We draw the task from the Phonological Assessment Battery [24]. Participants were presented 10 pairs of words orally in E-prime program. Participants were asked to swap the onset phonemes of the pair of words (e.g. for ''jacket-desk" subject responded ''dacket-jesk"). Their response were recorded in the program and judged by the researcher. One correct response was given one score.

C. Oddity task

The participants listened to ten sets of three words and had to select the non-rhymed word (e.g., ripe, might, night). Their responses were recorded in E-prime program. Three different orders of trial presentation were used, counterbalanced across participants, and practice trials were always given. One correct response was given one score.

D. Rapid letter naming

We conducted the rapid letter naming task [25]. Participants were asked to name the letters on a sheet of paper with a 10 × 5 array of lowercase English letters (a, d, o, s, and p) in random order as quickly and accurately as possible. The letters were named twice, and the average naming time in seconds for the two trials was taken as the score of this task. So, the longer time they took, the worse they performed.

Syllable stress task:

a. Word stress identification

In this task, participants simply heard a word pair where two words were presented one after the other orally in E-prime. They are

required to make same or different judgments about the position of syllable stress in the pair (such as Difficulty–difficulty [different] or Difficulty–Difficulty [same], Difficulty-Voluntary [same] diFFIculty-VOLunatry [different]). There was a 500ms interval between the words in a pair, and a 2 second interval between trials to give a response. The maximum score was 80. The similar task was used in the previous research as well [22].

b. Word stress discrimination

During this task, participants were asked to determine which syllable the stress of the word fell on word stress discrimination. For example, decision, literature. One score was given for one correct mark. The maximum score was 15. In order to standardize the scores, all the scores were computed the rate of accuracy. All the tasks are detailed in Table 2

Table 2: Details about the Tasks.

Task	Test Name	Item	Example
English reading and spelling	Word reading	100	skim ,faulty, crayon
	Word attack	50	aund, chove, kolice
	Word spelling	50	cast, dismiss, pacific
	Reading fluency	300	
	Reading comprehension	10	
Phonological measures	Oddity rhyme	25	rain, main, May
	Spoonerism	30	dog-cup, cog-dup
	Phonological memory	18	
	Rapid letter naming		a, d, o, s, p
Syllable stress	Word stress identification	15	magazine
	word stress discrimination	80	Difficulty-DiFFIculty. Difficulty-VOLunatry
Psychoacoustic tasks	Amplitude Envelop Onset		
	Duration		
	Intensity		
	High-frequency		
	Low-frequency		

Data collection

Participants were given reading and spelling tests, phonological processing tasks, syllable stress tasks and psychoacoustic tasks. The participants were assessed individually in a quiet lab. The order of the tasks within each session was randomized for each participant. The test lasted about 60 minutes for each participant. All the data were set up by EXCEL and processed by SPSS 22.0.

Results and Findings

Descriptive statistical results

The means and standard deviations for performance on English reading and spelling are shown in Table 3. As we can see, the mean value of the word spelling accuracy percentage was 0.98 and the standard deviation was 0.04, indicating that the spelling accuracy of the subjects was very high and the difference between the scores was not significant. The means and standard deviations for performance on the auditory processing task, phonological measures and stress tasks are shown in Table 4. The results indicate that the accuracy of word stress identification was higher than word stress discrimination, which was 54 percent in average. The accuracy of phonological awareness was about 80 percent in the two tasks.

Table 3: Participant's Performance in English Reading and Spelling Tasks (n=68).

Variable	Min	Max	Mean	SD
Word reading ACC % correct	0.65	0.99	0.87	0.09
Word reading RT ms	963	4507	2476.31	729.56
Word attack ACC % correct	0.62	0.98	0.81	0.1
Word attack RT ms	1569	5722	2970.96	947.75
Word spelling ACC % correct	0.8	0.99	0.96	0.04
Reading fluency words per sec	0.73	3.05	1.65	0.43
Reading comprehension ACC % correct	0.1	1	0.55	0.19

ACC%= accuracy percentage

RT= reaction time

Table 4: Participant's Performance in Stress, Phonological and Auditory Processing Tasks.

Variable	Min	Max	Mean	SD
word stress identification % correct	0.55	1.00	0.73	0.09
word stress discrimination % correct	0.10	1.00	0.54	0.23
Oddity rhyme % correct	0.64	0.96	0.79	0.09
Oddity rhyme RT ms	469.00	1741.00	1018.29	309.29
Spoonerism % correct	0.57	0.93	0.80	0.08
Spoonerism RT ms	906.00	13897	5993.72	2092.75
Phonological memory % correct	0.33	0.94	0.78	0.10
Rapid letter naming in seconds	11.00	18.57	15.11	1.88
Rise time in ms	23.68	275.38	115.45	70.88
Duration in ms	14.76	119.33	49.53	24.26
Intensity in dB	1.98	13.09	5.27	2.68
Low-frequency in Hz	0.57	3.91	1.82	0.97
High-frequency in Hz	4.79	19.89	15.46	4.19

Correlations between stress sensitivity and word reading and spelling ability

The main purpose of this study was to explore the relationship between syllable stress sensitivity and reading ability in Chinese university students. To do this, correlations between stress sensitivity and English reading and spelling were computed. As can be seen in Table 5, the correlations between English word stress sensitivity and reading and spelling were significant. Word stress discrimination was significantly correlated with word spelling($r = .52$, $p < .001$), word reading ($r = .45$, $p < .001$), reading fluency ($r = .44$, $p < .001$), word attack ($r = .52$, $p < .001$). Moreover, phonological awareness (oddity rhyme) was significantly correlated with word spelling ($r = .43$, $p < .001$) and word reading ($r = 0.47$, $p < .001$). Phonological memory was significantly and highly correlated with word attack ($r = .34$, $p < .05$). Rapid letter naming in seconds was significantly correlated with reading fluency ($r = .53$, $p < .001$) and word spelling ($r = .32$, $p < .05$) (Table 5).

Table 5: Correlations between word reading, spelling and stress, phonological processing skills.

Variables	WRA	WR RT	WA A	WA RT	Fluency	Spelling	RC
word stress identification % correct	.39**	-.25	.40*	-.23	.39**	.47***	.34*
word stress discrimination % correct	.45***	-.27*	.52***	-0.07	.44***	.52***	0.26
Oddity rhyme% correct	.36**	-.34*	.50***	-.21	.33*	.43***	0.09
Spoonerism% correct	.47***	-.35*	.52***	-.32*	.35*	.38**	0.03
Phonological memory% correct	0.24	-.007	.34*	-.04	0.13	0.26	-.15
Rapid letter naming in seconds	-0.16	.30*	-.21	0.08	-.53***	-.32*	0.04

WRA=Word reading ACC % correct

WRRT=Word reading RT ms

RC= Reading comprehension

WART=Word attack RT ms

WAA=Word attack ACC % correct

*p<0.05, **p<0.01, ***p<0.001

Correlations between acoustic features and stress sensitivity

The role of basic auditory processing in Chinese college students is also an interest in this study. Correlations between word stress and acoustic features are shown in Table 6. The results suggest that duration, intensity were significantly and highly correlated with English word stress sensitivity and phonological awareness. However, rise time measures were not associated with English word stress sensitivity as expected. English reading and spelling were not as closely associated with auditory perception but was significantly correlated with word stress sensitivity and phonological awareness.

Group differences in stress sensitivity

We conducted 3*2 ANOVA to explore potential group differences, taking English proficiency as the between-subjects variable and the percentages of accuracy in word stress identification task and

word stress discrimination task as the dependent variables. Anova analysis results in Table 6 showed that there were significant differences in stress perception among the three groups (Fs >5.04, ps <.001.) The highest-level group was significantly better than the low and middle level group in word stress identification and discrimination (Table 7).

Table 6: Correlations between Word stress, Phonological Processing and Auditory Processing.

Variable	Word Stress Identification	Word Stress Discrimination	Oddity Rhyme	Spoonerism	Rapid Letter Naming
Rise time in ms	0.19	0.01	-0.13	-0.16	0.19
Duration in ms	-.41**	-0.21	-.35*	-0.13	0.19
Intensity in dB	-.57***	-.33*	-.19*	-0.16	0.03
Low-frequency in Hz in Hz	-0.19	-0.18	-0.23	0.09	0.1
High-frequency in Hz	-0.17	-0.1	-0.09	0.08	.28*

*p<0.05, **p<0.01, ***p<0.001

Table 7: Group Differences in Stress Sensitivity.

Variable	Low Level Group 1 n=24		Middle Level Group 2 n=28		High Level Group 3 n=16		Group Differences	
	M	SD	M	SD	M	SD	F	
word stress identification	55.42	5.421	56.89	6.893	63.8	8.394	7.59***	1=2<3
word stress discrimination	7.48	2.584	7.82	3.454	10.6	3.582	5.03***	1=2<3

Discussion

Phonological awareness, stress sensitivity and reading ability among Chinese college students

This study aimed to explore the connection between phonological awareness, syllable stress sensitivity and reading ability in Chinese college students. The findings reported the correlations were significant between phonological awareness and word reading, and between stress sensitivity and word readings. There are also significant differences in stress perception among the three groups which were divided according to their English proficiency. These two results can serve as evidence that stress perception can be used as an important indicator of second language learning ability in Chinese college students [24].

In addition, the results of this study also support the significant role of phonological awareness in English word reading, which is consistent with other studies about Chinese English learners [25]. All these studies, including this one, draw our attention to the fact that the development of second language phonological ability is a key link that cannot be ignored by Chinese second language learners, that is, the majority of Chinese English learners. Phonological awareness affects not only the improvement of listening and speaking ability, but also other aspects of language ability such as reading comprehension and spelling. This study opens a new way to participate in population research, focusing on Chinese college students with English as a second language, which is rarely of interest to researchers in this field. The established view supports there is a significant correlation between phonological awareness and reading ability, which also applies to adult groups other than children (Table 7).

Basic auditory processing and stress sensitivity in Chinese college students

The relationship between acoustic features and syllable stress was another research question. The duration and intensity of sound were significantly correlated with the perception of stress. The study of Goswami U et al. [21] established rise time discrimination as a universal cross-language sensory deficit in developmental dyslexia. Rise time is also connected with the perception of stressed and unstressed syllables for developmental dyslexia [26]. However, rise time measures were not associated with English word stress sensitivity as expected in this study. The reason for this difference may be related to the participants of the study. Among the students with English dyslexia, there is a sound perception defect, while the students with normal reading ability do not have such defect [22]. In addition, due to the influence of Chinese learning style, Chinese rhythm depends on intensity and sound length, and there are differences in the perceptual mode of second language learning [23].

Implications for stress learning strategies in promoting reading ability

The poor English stress sensitivity in college students can be attributed to their inadequate phonetic learning in primary and secondary schools. Therefore, we should also pay attention to the transmission of stress teaching methods in their early age [27]. Word stress, as an important part of English learning in primary and secondary schools, is the basis of oral communication. In order to memorize and spell words easily, teachers should improve students' phonological awareness, help students understand and master the position of word stress, and summarize the rules in

the process of teaching [28]. In addition, when teaching words, teachers can use some auditory techniques to make a strong sound when accentuating syllables while using weak strokes to express non accentuating syllables.

Stress sensitivity should not be a naturally developed ability, but one that may require deliberate teaching and practice to develop [29]. Providing effective stress learning strategies for Chinese college students can promote their reading and spelling ability. In terms of teaching, creating an effective input environment can stimulate students' self-evaluation and correction consciousness in phonetic learning. Therefore, improving teachers' stress knowledge should be given priority. In addition, to clarify the differences between English and Chinese stress is a prerequisite to enhance college students' awareness of English stress. However, indoctrination of purely theoretical phonological knowledge will make students feel bored and boring. In oral classes, teachers may wish to contrast the teaching of English and Chinese stress in the form of pictures, visualize the highly abstract phonological knowledge, and externalize the implicit knowledge, so as to facilitate students' understanding [30-37].

Interesting teaching through English songs is also an important way to cultivate stress sensitive. On the other hand, students are the main body of learning, great emphasis should be placed on fostering their prosodic sensitivity, with a special focus on employing their stress awareness to enhance their syllable awareness, sharpen their ability to recognize the phonemes in (un)stressed syllables, and finally facilitate the development of their English reading ability.

Conclusion

There are some limitations in the present research. The participants' English proficiency was measured by the scores in CET 4. If possible, the future study may use more specific tests to measure their reading skills. Second, the future study should examine the difference in stress perception between native English speakers and Chinese English learners. Overall, the present results add evidence that there were significant correlations between English word stress sensitivity and English word reading and spelling while its relationship to rise time requires further exploration. Second language learners with Chinese as their mother tongue may have different ways of rhythm perception from those with English as their native language, which need to be further studied.

Acknowledgement

This research was supported by Humanities & Social Science Program of Ministry of Education in China (No. 18YJA90018).

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

References

1. Chen Y, Wang XM (2015) The study of the stress characteristics of Chinese students in English. Foreign Language and Foreign Language Teaching 3: 13-18.
2. Spade N, Tomita Y (2010) Interactions between type of instruction and type of language feature: A meta-analysis. Language Learning 60(2): 263-308.
3. Hasegawa-Johnson, M Cole J (2005) Finding into national boundaries using acoustic cues choi related to the voice source. Journal of the Acoustical Society of America 118(4): 2579-2587.
4. S A L , Ciocca V, Ma L, Fenn K (2008) Perceptual learning of cantonese lexical tones by tone and non-tone languagse speakers. Journal of Phonetics 36(2): 268-294.
5. Avanti A (2009) Rhythm, timing and the timing of rhythm. Phonetica 66(1-2): 46-63.
6. JL, Longman C J (2004) The nature of phonological sensitivity: Converging evidence from four studies of preschool and early-grade school children. Journal of Educational Psychology 96(1): 43-55.
7. Caravels M, Larva A, Deiform S, Seidlová Markova G, Hume C (2013) Different patterns, but equivalent predictors, of growth in reading in consistent and inconsistent orthographies. Psychological Science 24(8): 1398-1407.
8. Goodman I,Licensor A, Wade-Woolley L (2010) Sensitivity to linguistic stress, phonological awareness and early reading ability in preschoolers. Journal of Research in Reading 33(2): 113-127.
9. Whaley K, Hansen J (2006) The role of prosodic sensitivity in children's reading development. Journal of Research in Reading 29(3): 288-303.
10. Clint EM, Wade-Woolley L, Heggie L (2009) Prosodic sensitivity and morphological awareness in children's reading. Journal of Experimental Child Psychology 104(2): 197-213.
11. Cutler A, D Norris (1988) The role of strong syllables in segmentation for lexical access. Journal of Experimental Psychology: Human Perception and Performance 14 (1): 113-121.
12. Dowhower SL (1991) Fluency in oral reading speaking of prosody: fluency's unattended bedfellow. Theory Into Practice 30(3): 165-175.
13. Holliman A J, Critten S, Lawrence T, Harrison E, Wood C, et al. (2014) Modeling the relationship between prosodic sensitivity and early literacy. Reading Research Quarterly 49(4): 469-482.
14. Pitt MA, Samuel AG (1990) The use of rhythm in attending to speech. Journal of Experimental Psychology: Human Perception and Performance 16(3): 564-573.
15. Wood C (2006) Metrical stress sensitivity in young children and its relationship to phonological awareness and reading. Journal of Research in Reading 29(3): 270-287.
16. Beckman ME (1986) Stress and non-stress accent. Dordrecht, Holland, Netherlands.
17. Thomson JM, Fryer B, Malt by J, Go swami U (2006) Auditory and motor rhythm awareness in adults with dyslexia. Journal of Research in Reading 29(3): 334-348.
18. Corrival K, Pasquinade E, Goswami U (2007) Basic auditory processing skills and specific language impairment: A new look at an old hypothesis. Journal of Speech, Language & Hearing Research 50(3): 647-666.
19. Snowling M, Stackhouse J, Rack J (1986) Phonological dyslexia and dysgraphia-a developmental analysis. Cognitive Neuropsychology 3(3): 309-339.
20. Yang Z, Wang C, Feng L, Li S, Tao S (2016) Unsuccessful letter-sound integration in English reading by native Chinese speakers: Evidence from an event related potentials study. Science Bulletin 61(24): 1855-1864.
21. Goswami U, Garson D, Astros L (2010) Amplitude envelope perception, phonology and prosodic sensitivity in children with developmental dyslexia. Reading and Writing 23(8): 995-1019.

22. Leong V, A Hämäläinen, Fruzsina Soltész, Goswami U (2011) Rise time perception and detection of syllable stress in adults with developmental dyslexia. Journal of Memory & Language 64(1): 59-73.

23. Richardson U, Thomson J, Scott S K, Goswami U (2004) Suprasegmental auditory processing skills and phonological representation in dyslexic children. Dyslexia 10(3): 215-233.

24. Van Donselaar W, Koster M, Cutler A (2005) Exploring the role of lexical stress in lexical recognition. The Quarterly Journal of Experimental Psychology 58(2): 251-273.

25. Zhou Y, McBride-Chang C, Law ABY, Li T, Cheung ACY, et al. (2014) Development of reading-related skills in Chinese and English among Hong Kong Chinese children with and without dyslexia. Journal of Experimental Child Psychology 122(3): 75-91.

26. Ziegler J C, Goswami U (2005) Reading acquisition, developmental dyslexia, and skilled reading across languages: A psycholinguistic grain size theory. Psychological Bulletin 131(1): 3-29.

27. Chen C, Fan C, Lin H (1996) A new perspective on teaching English pronunciation: Rhythm. Articulation, 16.

28. Qin X Y (2007) Study on English stress, rhythm and intonation concerning their features of message transmission in connected speech. Humanities & Social Science Jamal 25(1).

29. Phillips B M,Clancy-Manchester J, Longman CJ (2008) Successful phonological awareness instruction with preschool children: Lessons from the classroom. Topics in Early Childhood Special Education 28(1): 3-17.

30. Corrival K, Goswami U (2009) Rhythmic motor entrainment in children with speech and language impairment: Tapping to the beat. Cortex 45(1): 119-130.

31. Cutting L E, Scarborough HS (2006) Prediction of reading comprehension: Relative contributions of word recognition, language proficiency, and other cognitive skills can depend on how comprehension is measured. Scientific Studies of Reading 10(3): 277-299.

32. Goswami U, Wang HLS, Cruz A, Fosker T, Mead N, et al. (2011). Language-universal sensory deficits in developmental dyslexia: English, Spanish, and Chinese. Journal of Cognitive Neuroscience 23(2): 325-337.

33. Hume C, K Goetz, D Gooch (2007). Paired-associated learning, phoneme awareness, and learning to read. Journal of Experimental Child Psychology 96 (2): 150-168.

34. Lorenz C, Dumont A, Fulgurate C (2000) Use of temporal envelope cues by children with developmental dyslexia. Journal of Speech, Language and Hearing Research 43(6): 1367-1379.

35. Metal JL (1997) Spoken word recognition in reading disabled children. Journal of Educational Psychology 89(1): 159-169.

36. Machinate W, Machinate R, Maria K, Dreyer L (2002) Gate-machinate reading tests, Illinois, USA.

37. Valuation FR, Scanlon DM (1987) Phonological coding, phonological awareness, and reading ability: Evidence from a longitudinal and experimental study. Merrill-Palmer Quarterly 33(3): 321-363.