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Effects of PASS Theory on Aged Chinese EFL Learners' Reading Comprehension Ability*

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This study investigates the English learning conditions of aged Chinese EFL learners including their reading comprehension ability through a cognitive approach-PASS theory. A quantitative-dominated research method is adopted in the study. After a 15-week semester, a significant distinction in both posttest (reading comprehension score, $t = 3.39$, $p = .000$) and retention test (reading comprehension scores, $t = 4.62$, $p = .000$) indicates that the cognitive teaching approach through PASS model outperforms the traditional teaching approach. As another independent variable, the quantity of Chinese characters used in English learning only sees a significant difference for the population according to reading comprehension scores in the posttest results (posttest, $F = 4.56$, $p = .038$ & retention test, $F = 1.04$, $p =. 312$). Besides, during the retention test, the Chinese characters quantity factor showed significant effect only on the experiment group's English reading comprehension results. Through this study, an effective cognitive pedagogy for EFL aged learners has been claimed to public. Admittedly, there is still limitation. The investigation of corresponding details of the dynamic changes of the aged EFL learners' cognitive process is insufficient. This limitation can be lifted up in future studies and transformed into further academic extension as well.

[reading comprehension ability/aged Chinese EFL learners/PASS theory/cognitive effect]

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I. INTRODUCTION

Based on the situation of insufficient research on cognitive English teaching for aged EFL learners in China, whether there's a possibility that aged EFL learners' English proficiency could be improved through an innovative English teaching mode can be proven. The theory that forms the basis of this article is PASS, which stands for Planning, Attention, Simultaneous, and Successive processes (Das, Naglieri, & Kirby, 1994). Research on children has demonstrated that cognitive intervention of them based on PASS theory could improve word recognition and reading comprehension (Papadopoulos, Das, Parrila, & Kirby, 2003; Wang & Li, 2013; Xiong & Zhao, 2020). This study hopes this type of intervention will be successful for EFL aged learners' English reading comprehension ability, too. Besides, extensive research has proven that SLL (Second Language Learning) could postpone cognitive decline. This seems to be plausible, and the two kinds of research go in a reverse direction. Although in Europe, there are quite a few relevant studies on cognitive decline and corresponding treatments for resistance to language, a specific treatment approach kindled by the cognitive model PASS is rare, given that it is concrete, comprehensive, and dynamic. In China, the application of this model is even weaker. Along with the conditions above, the purposes of this study are given below.

(a) To demonstrate the distinction between the English cognitive approach (by adopting PASS model) & traditional approach for EFL aged learners, i.e., whether the cognitive English approach outperforms the traditional one in aged learners' English proficiency.

(b) Whether the retention of aged EFL learners' English proficiency by cognitive English approach (PASS treatment) and learning will outperform the ones by traditional teaching approach.

There's a famous saying among hospitals in China: *Predictions are always more critical than therapies.* In light of the purpose of this study, to improve aged EFL learners' mental ability to enjoy their lives unfettered by delaying the cognitive decline is what was being attempted, too.

As a summary of this study, a reverse experimental method from the previously proven studies has been put forward to investigate whether the English reading comprehension ability of aged EFL learners in Chengdu University for the Elderly could be significantly improved through cognitive English teaching approach. Meanwhile, if the Chinese characters quantity also perform a significant effect on their English reading comprehension is an aim for investigation.

Based on cognitive development and relevant linguistic research, this study investigated reading comprehension ability of aged EFL learners by the cognitive English approach (by adopting PASS-treatment) at Chengdu University for the Elderly (China). The study attempts to investigate the following problems:

1. Is PASS theory useful to enhance the English reading comprehension abilities of the aged EFL learners?
2. What function does the native language (such as Chinese characters quantity) proficiency of those aged EFL learners perform in their English reading comprehension abilities through PASS treatment?
3. Is there a joint effect of the Chinese characters quantity of aged learners and cognitive teaching approach by adopting PASS theory on the English proficiency of the aged EFL learners?

II. LITERATURE REVIEW

1. Theoretical Background

Following the development span over several decades, cognitive linguistics has been approaching complex integration of cognitive science, psychology, logic, and linguistics etc. Similarly, as a broad discipline, gerontolinguistics belongs to a big academic domain, which consists of gerontology, linguistics, physiology, psychology, and other related scientific subjects. This literature review chapter mainly states cognitive linguistics, L2 learning, and ageing issues. In addition, related prominent research and findings between western countries and China will be in statement for a concise classification.

1) Cognitive Linguistics in Second Language Learning

"Cognitive linguistics" first appeared in 1971, which referred to "the real item used to study the language in brains" (Lamb, 1998, p.381). It was primarily established under the theoretical background of cognitive science, by which the cognitive linguistics could develop mutually and spontaneously. As a branch of linguistics, cognitive linguistics stands against a theoretical background of cognitive science and philosophy, and was born on the bottom of opposition to transformational grammar, and then became molding from the end of 1980s to the 1990s.

At the end of the 20th century, there were emergent views on critiques of cognitive SLA. Two representative cognitivists of the first critiques on cognitive SLA were Firth and Wagner (1997). They claimed there was an imbalance in SLA research replaced by the cognitive-oriented theories and methodologies and argued that it was necessary to reconceptualize SLA to be more balanced through multi-dimension of L2 acquisition.

The items above concern interaction (information transfer) among negotiation and transition during the period from native speaker to non-native-speaker. As a specific disease

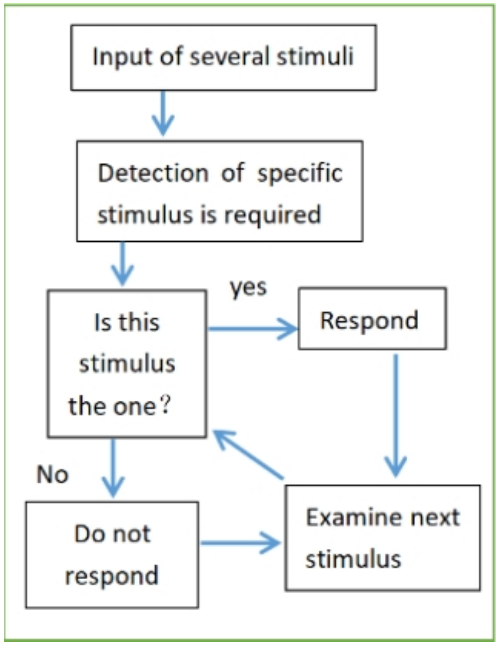
which symptoms as cognitive decline, if older adults wish to search for a practical approach to postpone cognitive decline, L2 learning is plausible.

2) PASS Theory and Related Studies

According to cognitive theories and the subordinate, Das worked with Kirby and Jarman, issuing *Simultaneous and Successive Cognitive Processes* (1979). After that, he cooperated with Naglieri and Kirby for *Assessment of Cognitive Processes: The PASS theory for Intelligence* (1994). An overview of the model of cognitive functioning called Planning, Attention, Simultaneous, and Successive (PASS) processing.

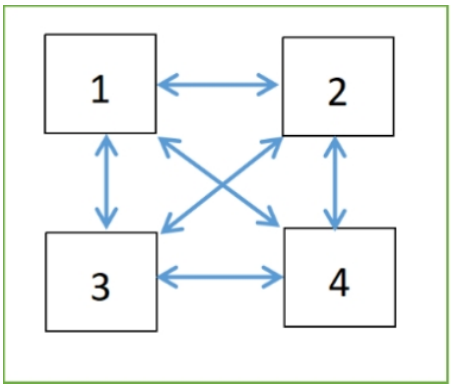
The first functional unit is at the base of human's mental processes because it maintains a proper state of arousal or cortical tone that allows for the focus of attention (see Figure 1).

FIGURE 1
Attention Processes Path Diagram



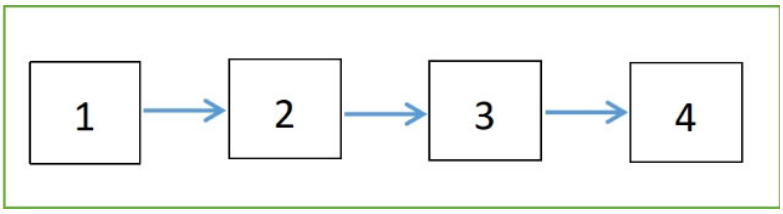
Simultaneous processing involves the integration of stimuli into groups, or the recognition that a number of stimuli share a common characteristic. The essence of simultaneous processing is that the elements of the stimuli are interrelated (see Figure 2).

FIGURE 2
Simultaneous Processing Path Diagram



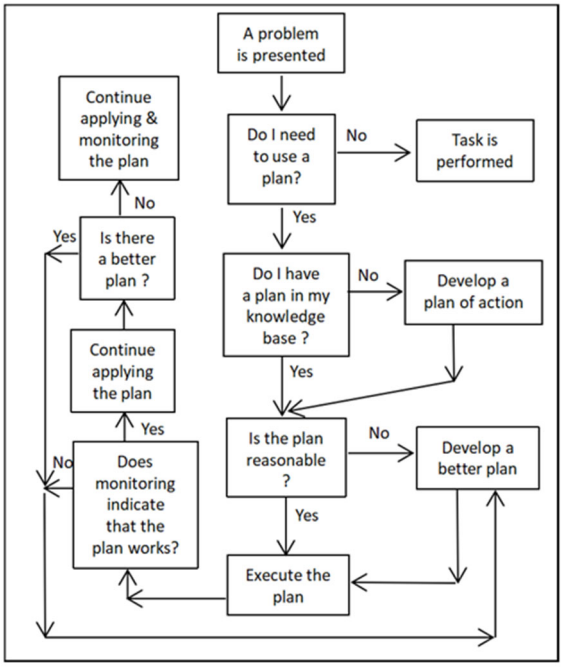
Successive processing involves the integration of stimuli into a particular series where the elements form a chain-like progression. The critical aspect of successive processing is that elements must be ordered without survey ability. In successive processing, the elements are only linearly related (see Figure 3).

FIGURE 3
Successive Processing Path Diagram



Planning processes provide the individual with the facility to determine and utilize an efficient way to solve a problem through applying attention, simultaneous, and successive processes in conjunction with the base of knowledge (see Figure 4). This functional unit is also responsible for activities such as impulse control, regulation of voluntary actions, and linguistic functions such as spontaneous speech (Luria ,1980).

FIGURE 4
Planning Processes Path Diagram



Meanwhile, the relationship between age and language learning has been the hot issue, interests in both Second Language Acquisition (SLA), and the EFL research, which all intrigued many scholars. Still, most of the studies focused on the learning process of children and adolescents till now. Studies of second language learning and EFL in aged learners are still more minor, so the interdisciplinary research across cognitive geronto-linguistics and EFL are plausibly emergent and significant. The main English cognitive teaching strategy used in this study to distinct control group and experimental group is PASS theory, in which the term “strategies” is used deliberately. It refers to actions that readers select and control to achieve desired goals or objectives (Paris, Lipson, & Wixson, 1983). And just as its name implies, PASS theory, this cognitive model could also be designed as a teaching strategy, which might be suitable to the study for the aged EFL learners.

2. Previous Studies

1) Review on Cognitive Ageing and Second Language Learning in the Aged Groups

It is a heated discussion of the impact of cognitive and psychological factors on the age of learners in current days. Granena and Long (2012) found language aptitude mitigates the

adverse effects from ageing on the acquisition of lexical knowledge. As an element of cognitive linguistics, motivation factor also plays an important role in language learning, and attracts many linguistic scholars to concern themselves with this point in second language learning. The correlation between age and motivation has been an issue for over one decade.

Both comparative research on parole usage between monolingual and bilingual aged people (Bialystok, Craik, Klein, & Viswanathan, 2004; Bialystok, Craik, & Luk, 2008) as well as the tracking research which focused on an identical aged group in diachrony (Kavé, Eyal, Shorek, & Cohen, 2008). It also includes the increasing volume of gray and white matter, for cognitive ageing postponement. This effect has been positively demonstrated by Perquin et al. in *Luxembourg Research* (Perquin et al., 2013), which is a "natural laboratory of multilingualism".

As a cohesion to what was mentioned before, diachronic studies on bilingual aged groups attracted global highlights. A cognitive project in India carried out by the Centre for Cognitive Ageing and Cognitive Epidemiology (CCACE) from University of Edinburgh, found the brain health and IQ of the aged people could be effectively improved by speaking foreign languages. This center conducted a research on 853 trials who aged 11 in 1947 at first, and then another retest was projected in the same trials group in 2008, 61 years later. An exciting report claimed that the bilingual trials' abilities in various aspects were much higher than researchers' anticipation, especially regarding IQ and reading levels (Gu & Huang, 2020).

In China, the scientific interest in integration of gerontology and linguistics which could be regarded as an interdisciplinary science across neurolinguistics, psycholinguistics, and sociolinguistics have been developing slowly over the past 20 years. Fang (2019) concluded a few crossing dimensions of research on coping with degradation of language for aged adults in *Ageing Society is Calling for the Appearance of Gerontolinguistics*. In Gu and Huang's (2020) *Gerontolinguistics and Multimodal Studies*, a detailed process and research conditions of development in gerontolinguistics, as well as the relative advancing area in China have been in the description, which expounds on a multi-dimension of gerontolinguistics, linguistic features of senior citizens. However, the intimate linguistic data base is still imperfect and insufficient.

2) Review of Studies on Aged EFL Learners' English Reading Comprehension

It is found that the ageing working memory also significantly influences the comprehension abilities of language as well as reading comprehension abilities (Gu & Huang, 2020). According to some authoritative demonstrations and shared experiences in daily life, reading comprehension ability and retention of memory are regarded as two variables in cognitive English teaching for aged EFL learners in this study. And then,

Federmeier and Kutas (2005) found that “older adults with lower reading spans showed greater delays. Age-related changes were driven primarily by decreases in the aged adults’ ability of making use of rich, available information from strongly constraining contexts to guide semantic processing.

In recent years, some research on the reading characteristics of aged adults in China focused on specific aspects of regression. Through some experiments, it is reported that the reading mode and processing strategies in Chinese are different between the aged adults and youngster. The perceptual span of aged adults in reading Chinese is ageing, which is likely to relate to their decreasing volume of working memories (Wang, Shi, Wu, & Bai, 2010). Passages in Chinese can be more intelligible to the aged through more prominent patterns of characters, wider leading lines and inserting “place” into words in terms of part of speech (Bai, Guo, Wang, Gao, & Yang, 2015). All this shows the healthy aged people degenerate only in sensation, memories, and inference with ageing, which is based on physiology and because of degeneration of reading ability.

3. Hypothesis

The predictions and hypothetical background from the research questions derive from the prominent cognitive model - PASS theory and some dramatically influential neurocognitive theories on L2 acquisition. There being some intriguing phenomenon, a single occupational factor (e.g. aged people who are accountants or English teachers before their retirements) also may suffer from sharp cognitive impairment of language. Perhaps some aged EFL adults are annoyed by the fluency of speech and the others are suffering from deficiencies in parole coherence Maybe both mathematical logic and linguistic cognition are necessary, but the integration of the two would be even more effective. Thus, the hypotheses of the study are between control group & experimental group:

1) The aged EFL learners’ English reading comprehension ability will not be significantly affected by cognitive teaching approach by PASS model.
2) Aged EFL learners’ Chinese characters quantity will not show significant effect on aged EFL learners’ English reading comprehension abilities.

III. METHODOLOGY

1. Participants

The aged learners involved in this research are EFL learners from Chengdu University for

the Elderly. All of them, aged from 50-70, are in good health conditions (especially without deficiencies in listening, speaking and vision, corrected visual conditions permitted, and no known history of psychiatric disorder, neural injuries or learning disabilities). Both male and female aged learners have been distributed in the comparative groups randomly, i.e., the experiment group ($n1$ = 24, 17 female, 7 male) and the control group ($n2$ = 32, 21 female, 11 male). Of the aged EFL learners who completed the study of the whole semester, their English competence and behavioral changes were analyzed through cognitive interactions, posttest, retention test. The data collection for all the participants involved almost 17 weeks of participation and observation on both behaviors and data of test. The related participants information is collected from survey, which is shown in Table 1.

TABLE 1
Participants Information ($n1$ = 24; $n2$ = 32)

Items	Experiment Group ($n1$)				Control Group ($n2$)			
Age (%)	50-55	56-60	61-65	66-70	50-55	56-60	61-65	66-70
	12.5	41.7	25	20.8	15.6	37.5	31.3	15.6
Gender	*F*		*M*		*F*		*M*	
	70.8		29.2		65.6		34.4	
Occupation (%)	Cultural servants	Private owners	Scientific, medical	Soldiers Others	Cultural servants	Private owners	Scientific, medical	Soldiers Others
	staff, etc				staff, etc			
	16.7	8.3	12.5	8.3	45.8	28.1	9.4	25	6.3	31.2
Educational(%) background	High school		College and above		High school		College and above	
	16.7		83.3		21.9		78.1	
	1-3ys	4-6ys	7-10ys	10ys+	1-3ys	4-6ys	7-10ys	10ys+
	41.7	20.8	33.3	4.2	37.5	31.25	25	6.25

To be consistent with what is mentioned above, it is also helpful to indicate that the participants of this study are in similar English levels. In addition, all the participants' mother tongue is Chinese and most of them are motivated by enriching their amateur life after retirement or going abroad for reunion with family members. According to the survey, all the participants have had some exposure to English as their second language, but none of them has claimed to be fluent or ever proficient, in only one foreign language other than English. Besides, some are willing to go abroad for travelling or reading English literature in their occupational domains. Moreover, some aged EFL learners tend to interfere their cognitive ageing, intentionally. According to the personal information of enrolment, they had completed at least 3 years of study at a secondary school.

2. Instruments

1) Test Papers of PETS-1 (Public English Test, Band-1)

The full name of pretest, posttest and retention test papers (PETS-1) is Public English Test System (Level-1), which is an official test entitled by the educational department of the Chinese government. The test paper consists of 5 parts, listening, knowledge application, cloze, reading comprehension and writing. There are two primary reasons why PETS-1 can be the pretest paper for aged EFL learners. One is the test level, which is suitable to aged EFL learners in this study as the English level of Grade 8 in China (the second year of middle school). The other is the test pattern closely similar to the step-by-step cognitive assessment procedure according to the PASS model. However, since the realistic situation of aged learners' English level in Chengdu University for the Elderly, writing and cloze have been omitted from the pretest. As a requisite ability for aged EFL learners' English learning and the specific learning level according to the teaching contents, listening is a testing focal point.

As for posttest, one of the test papers in the new scheme for PETS-1 has been selected for the same candidates. Although the quantity of Listening part has slightly changed, the total score and focal points in the test paper relevant to this study have not changed at all.

2) Online Vocabulary Testing Tool

An online testing tool is for Chinese characters quantity (see Figure 5), and the website is as follows, https://www.arealme.com/how-many-chinese-characters-do-i-know/cn/ which follows the standardization of *The General Standard Chinese Characters Scale* (State Language Committee, 2013; see Figure 6). The interface of the Chinese characters is as follows, by which the working theory could be explicitly understood, from Chinese Pinyin, to phrases, which are existent and/or non-existent. After almost 70-80 items of test, the quantity of Chinese characters will be in evaluation and show up.

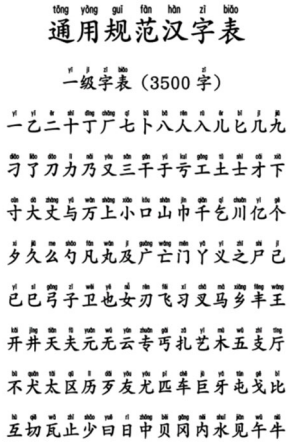
FIGURE 5
Interface of Chinese Characters Quantity Online Test



According to *The General Standard Chinese Characters Scale*, there are three levels of the characters quantity for Chinese people to acquire. The total quantity is 8,105, and the number of the first level is 3,500, another 3,000 for the second level. And the last 1,605 characters are most difficult to acquire for non-Chinese majors. However, the dividing line of the Chinese characters quantity for the two-way ANOVA (big/ small) in chapter 4.2.2 is the median of the total quantity, 4,052. This dividing line depends upon the *Chinese Curriculum Standards for Compulsory Education* (Ministry of Education of the People's Republic of China, 2022), in which the Chinese characters quantity for graduates of middle and high schools in China is 3,500. In terms of the educational conditions of the aged EFL learners in this study, most of them have graduated from colleges and above, due to which the median of the total characters quantity in the scale has been set as the diving line in the two-way ANOVA to examine if Chinese characters quantity is another independent variable to significantly affect the aged learners' English reading comprehension abilities.

FIGURE 6
The General Standard Chinese Characters Scale (2013)





3. Research Design

a) A two-factor mixed experimental design (native characters quantity× cognitive English treatment) has been adopted in this study. A cognitive English teaching in the PASS way has been involved in comprehensive aspects of the English learning class. Cognitive treatment to corresponding levels of the PASS model respectively is in a half-exposure pattern for aged EFL learners. Before enrolment, all the aged EFL learners have been selected in terms of a specific foundation.

b) English reading comprehension ability is a dependent variables focused on in this study. As for the English course schedule, teaching activities in both experiment group and control group are two 45-minute classes each time. The first 45-minute would be totally the same whether in pedagogic contents or instruction pattern. However, the latter 45-minute would be distinct, in which the aged EFL learners in the experiment group are exposed to the cognitive instructions (treatments) and activities according to the specific syllabus in the PASS model. Meanwhile, the aged learners in the control group are still by traditional English teaching methods. At the beginning of classes, pretests on English proficiency (PETS-1) and characters amount of their native language have been in performance. After 15-week evolutionary teaching and learning according to the specific syllabus, posttest & retention test will be conducted on whether distinction exists between the two English teaching methods. Retention test is performed after another 2 weeks of posttest, for reconfirmation to the retention of the aged EFL learners' reading comprehension scores.

4. Research Procedures

Table 2 and Table 3 given below refer to the syllabi for both experiment group and control group. As mentioned in Figure 2 and Figure 3 above, the specific simultaneous and successive processing activities in experiment group involve a wealth of figure and verbal comprehension exercises.

TABLE 2
Syllabus for Experiment Group (by PASS Model)

Phases	Schedule
1st week	Pretests for English and native characters & PETS-1
2rd– 4th week	Knowledge in videos & attention treatment stage
5th– 7th week	Knowledge in videos &Successive processing treatment
8th– 10th week	Knowledge in videos &Simultaneous processing treatment
11th week	Successive & Simultaneous processing integration
12th– 14th week	Knowledge in videos &Planning strategies treatment stage

15th week	Posttest on reading comprehension
17th week	Retention test on reading comprehension

TABLE 3
Syllabus for Control Group

Phases	Schedule
1st week	Pretests for English and native characters & PETS-1
2rd - 4th week	Knowledge in videos & pronunciation practice, reading scripts, transcribing words and phrases
5th - 7th week	Knowledge in videos & reading scripts, role-play, transcribing words and phrases
8th - 10th week	Knowledge in videos & reading scripts, role-play, transcribing words, phrases and syntactic patterns repetition
11th week	Knowledge in videos & reinforcement on phases and syntactic patterns as well as making up sentences
12th - 14th week	Knowledge in videos & reading scripts, role-play, transcribing words, phrases and dictation
15th week	Posttest on reading comprehension
17th week	Retention test on reading comprehension

5. Data Collection and Analysis

From Table 4 to Table 5, an independent t-test was conducted to compare the total scores of pretest, and reading comprehension scores between the experiment group and control group. As shown in the tables, the t-value of total scores and English reading comprehension scores in pretest (PETS-1) between the experiment group and the control group are -.328 and 1.10, respectively. And all the *p* values of the test items are higher than .05, which indicated there was no significant distinction between the two groups. The selection of both groups for this study is reasonable for investigation.

TABLE 4
Means and Standard Deviations of Total Score of Pretests for Two Groups

Group	*N*	Total Score (Pretest)				*t*	*Sig.*
		M	*SD*	Min	Max		
Experiment group (*n*1)	24	61.46	15.20	38	85.5	-.328	.744
Control group (*n*2)	32	62.83	15.66	30	85		

* $p < .05$, ** $p < .01$, ***$p < .001$

TABLE 5
Means and Standard Deviations of Reading Comprehension Scores for Two Groups

Group	*N*	Reading Comprehension (Pretest)				*t*	Sig.
		M	*SD*	Min	Max		
Experiment group (*n*1)	24	17.08	5.47	6	30	1.10	.275
Control group (*n*2)	32	15.44	5.57	6	26		

* $p < .05$, ** $p < .01$, *** $p < .001$

In addition to the effect of the cognitive treatment approach, a two-way ANOVA was performed to investigate whether the Chinese characters quantity was also a variable that affects the English reading comprehension scores and retention. Meanwhile, whether the Chinese characters quantity and the cognitive treatment approach had significant interaction effects on the three items was under investigation in Chapter 4.1.

IV. RESULS AND DISCUSSIONS

1. Statistical Results and Analysis

In order to investigate whether the cognitive treatment approach according to the PASS model contributes to aged EFL learners' English reading comprehension ability, posttest for reading comprehension of the aged learners have been conducted both in control and cognitive approach groups.

1) The Effect of Cognitive Approach through PASS

As seen in Table 6, the experiment group outperformed the control group in reading comprehension. The mean of reading comprehension in the posttest was 24.08, whereas the mean of the one in control group was 19.69. The reading comprehension scores in posttest showed a statistically significant distinction between the two groups ($t = 3.39$, $p = .001$).

TABLE 6
Means and Standard Deviations of Reading Comprehension in Two Groups of the Posttest

Group	*N*	Posttest Reading Comprehension		*t*	*Sig.*
		M	*SD*		
Experiment group (*n*1)	24	24.08	4.11	3.39	.001*
Control group (*n*2)	32	19.69	5.26		

*$p < .05$, **$p < .01$, **$p < .001$

To see whether the cognitive teaching approach contributes to better retention, the reading

comprehension scores in the retention test were also compared between the two groups (Table 7). The retention score of the experiment group was 21.58, while that in the control group was 15.53(t = 4.62, p = .000). Again, the experiment group achieved significantly higher scores than the control group. However, both groups' scores on retention test for reading comprehension were lower than that in the posttest. This was also not unexpected. There was the distinction between the posttest and retention test because the classes have been suspended for two weeks, and the corresponding English activities in classes were also terminated. However, the increased t value in Table 7 compared with the one in Table 6 shows that cognitive approach and corresponding interactions were even more effective in the improvement of the aged EFL learners' English reading comprehension and the retention condition.

TABLE 7
Means and Standard Deviations of Reading Comprehension in Two Groups of the Retention Test

Group	*N*	Retention of Reading Comprehension		*t*	*Sig.*
		M	*SD*		
Experiment group (*n*1)	24	21.58	3.59	4.62	.000*
Control group (*n*2)	32	15.53	5.62		

*p < .05, **p < .01, **p < .001

2) The Effects of Chinese Characters Quantity

For the sake of the investigation of the factor of Chinese characters quantity on aged EFL learners' English reading comprehension and retention, aged learners in both groups were also divided into big (Chinese characters quantity is above 4,052) and small (which is below 4,052). The respective mean scores of the four groups on the posttest and retention test of reading comprehension are shown in Table 8. Still, both experiment group and control group, which were with bigger Chinese characters quantity achieved higher mean scores of reading comprehension than the ones being with smaller Chinese characters quantity.

TABLE 8
Means and Standard Deviations of Reading Comprehension (Posttest & Retention Test)

Group (*N*)	Posttest of RC		Retention of RC	
	Mean	*SD*	*M*	*SD*
Experiment-big (*n* = 15)	26.00	3.12	22.93	3.10
Experiment-small (*n* = 9)	20.89	3.62	19.33	3.32
Control-big (*n* = 14)	19.86	5.89	15.00	6.56
Control-small (*n* = 18)	19.56	4.88	15.94	4.93

A two-way ANOVA was conducted with scores of English reading comprehension as a dependent variable and with Chinese characters quantity (big/small) and cognitive treatment as independent variables to examine if the differences across the four groups' scores were significantly affected by their Chinese characters quantity as well as the cognitive treatment activities.

As for reading comprehension measured by the score of the posttest, as illustrated in Table 9, it was found that cognitive treatment (by adopting PASS model) had a significant effect on reading comprehension, F (1, 52) = 8.69, p = .005 and Chinese characters quantity also had significant effect on reading comprehension, F (1,52) = 4.56, p = .038. This result indicated that both cognitive treatment and Chinese characters quantity had significant effect on aged EFL learners' English reading comprehension ability in the posttest.

TABLE 9
Analysis of Variance of Posttest Reading Comprehension across Cognitive Treatment and Chinese Characters Quantity

	df	*F*	*p*
Cognitive Treatment	1	8.69**	.005
Chinese characters Quantity	1	4.56*	.038*

*p < .05, **p < .01, ***p < .001

Table 10 showed that the cognitive treatment was the most essential factor as a significant effect on retention measured by reading comprehension retention test, F (1, 52) = 18.40, p = .000. Chinese characters quantity was found not to have an significant effect on aged learners' retention, F (1, 52) = 1.04, p = .312. This effect has changed and decreased from the value in the posttest. This result also indicated that cognitive treatment significantly contributed to reading comprehension and to the aged learners' corresponding retention.

TABLE 10
Analysis of Variance of Retention of Reading Comprehension across Cognitive Treatment and Chinese Characters Quantity

	df	*F*	*p*
Cognitive Treatment	1	18.40***	.000**
Chinese characters Quantity	1	1.04	.312

*p < .05, **p < .01, ***p < .001

In the reading comprehension posttest, the factor of Chinese characters quantity still affected significantly. Then, until the retention test of two weeks later, the Chinese characters quantity did not affect significantly anymore.

2. Discussions

1) Significant and Positive Effects of Cognitive Teaching Approach

As put forward in Chapter 2.3, and data analysis in Table 9 and Table 10, which could paraphrase the conditions of aged EFL learners' English reading comprehension abilities in two groups are significantly different from each other after cognitive teaching approach by PASS model. This could answer the hypothesis 1).

In terms of the comparison of learning conditions between the two groups, the English reading comprehension scores after the 15 weeks study could be feasibly explained. This result indicated that the cognitive treatments adopted PASS model was more effective than the traditional pedagogy in aged EFL learners. According to this result, the English teachers in University for the Elderly could employ a cognitive-dominated approach adopting PASS in class.

2) The Influences of Chinese Characters Quantity

As for the second hypothesis in this study, the effect of Chinese characters quantity on aged learners' English reading comprehension ability is the focus.

As mentioned in preceding paragraphs, interlingual (language) transfer is an important issue in Second Language Acquisition. Some scholars believed that the reading competence is a process characterized by universals, which indicated that the native language reading competence might transfer to the second language reading (Goodman, 1976). But according to Cummins (1979) and Clarke (1980), the interlingual transfer from native reading competence to the reading of second language could only happen when the threshold (short circuit) level existed in bilingual users' second language levels. Although this hypothesis is still challenging and conflicted with some research (Ardasheva, Tretter, & Kinny, 2012), a further investigation from relationship between different native languages and second languages, as well as different research objectives merit high attention.

In terms of *Chinese Curriculum Standards for Compulsory Education* (2022) by Ministry of Education of the People's Republic of China, Chinese characters quantity is the fundamental base of Chinese reading competence, which presents positive correlation with a person's Chinese reading volume and native reading comprehension competence (Li, 2004; Tang, 2013). According to the results from Table 5, Table 6, Table 8 and Table 9, after a 15-week semester's English course, aged learners in experiment group progressed significantly in reading compensation scores (PETS-1), and both the Chinese characters quantity and cognitive treatments through PASS model significantly affected the English reading comprehension scores of aged EFL learners. It indicated that the reading comprehension

scores of the aged learners who were being with high Chinese characters quantity were higher than the ones being with low Chinese quantity. Thus, the Chinese characters quantity performed “interlingual transfer” to aged learners’ reading comprehension abilities in the experiment group.

While, in the retention test of reading comprehension, which conducted after 14 days of the posttest, the effect of Chinese characters quantity on the reading comprehension scores was not significant anymore. As illustrated in Table-8, Table-10, the retention condition of the reading comprehension scores in experiment group was significantly better than the ones in control group, despite the reading comprehension scores of the two groups in retention test have decreased. The Chinese characters quantity didn’t show significant effect on the overall aged EFL learners’ reading comprehension in retention test. In the control group, reading comprehension scores of the aged learners’ who were being with big Chinese characters quantity were even lower than the ones being with small Chinese characters quantity. This result also supported the threshold and short circuit hypothesis (Clarke, 1980; Cummins, 1979) in a lateral way. Due to this, the help of comprehensive reading competence quantity from native characters and native reading ability has been blocked. From this result, it could be an auxiliary support for the effectiveness of cognitive teaching approach by adopting PASS model.

V. CONCLUSION

The work on the study is designed to cover the gap between the research on the postponement of cognitive decline for aged bilingual EFL learners and the reverse verification of cognitive pedagogy (by adopting PASS theory). The aged EFL learners from Chengdu University for the Elderly have been divided into the experiment group and control group for this study according to cognitive English teaching and traditional teaching approach respectively. This could positively contribute to the English study of aged EFL learners - their English reading comprehension ability.

After 15 weeks of English learning (traditional classes for control group and cognitive classes for the experiment group) and having received the post-test, the results we got showed that the reading comprehension scores of experiment group outperformed those of control group, although both groups have progression in reading comprehension. Meanwhile, as another independent variable, the native language of (indexed following the quantity of the Chinese characters in the course) aged EFL learners also has been found to significantly and positively contribute to the English reading comprehension scores of both groups. After another two weeks of the posttest, the average scores of the retention test in English reading comprehension declined in both groups. The Chinese characters amount didn’t significantly

affect the aged EFL learners' reading comprehension.

Fundamentally, English class through a cognitive approach (PASS theory) demonstrated a much heavier effect than the one in traditional ways for aged Chinese EFL learners. In addition, the Chinese characters quantity indeed plays an active role in improving English reading comprehension for aged EFL learners, especially being combined with cognitive teaching approach by adopting PASS theory.

In the coming years, longitudinal research in 2 to 3 years such as investigation and observation of the average working memory span (short-term memory span) for the aged EFL learners should be taken. They could show the directions and extension of this domain in the coming years. Based on the data in this analysis, after treatment of the cognitive teaching approach through the PASS model, the method can be extended to the aged Chinese EFL learners at higher PETS levels, to see how their native language abilities (such as Chinese characters quantity, Chinese reading comprehension ability, etc.) benefit the English learning, besides the reading comprehension ability.

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Examples in: English
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Applicable Levels: Tertiary

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