Role of Semantic Radical Knowledge as Mediator in Relation to Vocabulary Size and Depth Acquisition among CFL Learners in Pakistan

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ABSTRACT
Chinese language across proficiency levels calls for research not only for the development of curriculum and pedagogy but also to predict a better learning and performanceof adult Chinese foreign language (CFL) learners in Pakistan, as research on CFL and its pedagogical development is limited in Pakistan and needs initiation. In the context of CFL learning, the mediating role of semantic radical knowledge in association between vocabulary size (character-word recognition) and vocabulary depth is purposed to be investigated with Chinese foreign language (CFL) learners in Pakistan. It's aimed to explore the relationship between vocabulary size and depth with the mediating impact of semanticunderstanding at different proficiency levels. This study is of great importance to the CFL field why, because it will provide better developmental associations of CFL learning across proficiency levels and the effective pedagogical implications to the field of Chinese foreign language teaching in Pakistan.
Key words: semantic radical knowledge, vocabulary size (character recognition, and word recognition), vocabulary depth.

I.   INTRODUCTION
        International prominence of China has made Chinese language remarkably popular in the past 20 years and learning Chinese as a foreign language (CFL) has grown rapidly (Williams, 2010; 2013). Chinese in nature has a logographic writing systemthat makes hurdles to learning Chinese as a foreign language(Wang & Leland, 2011) on a contrast to alphabetical languages. Chinese language consisted of radicals in two dimensional squares. Radicals are known as the sub-character components or the building blocks of Chinese language, as they produced the minimal orthographic unit or characters (Tsai, 2014; Shen &Ke, 2007). Radicals carried all of critical constituents of words, in terms of semantic, orthographic, and phonetic information of characters. In Chinese language, more than 80% of characters are the compound characters thatare made up of radicals(Shu & Anderson, 1999), thereforethe radical understandingof a learner can be considered as a significant interpreter of character recognition. And the knowledge of radicals cannot be limited only to the character recognition but it is also valuable for the word acquisition, as in Chinese language nearly all words are made up of single or double character words,where comparatively than single character words, recognition ofdouble character words is greater. Radicals are of two types; Phonetic radials that process the phonology or the sound production of characters, whereas the other type is semantic radicals that provide the meaning of the characters to the readers or learners (Hoosain, 1991; McBride, 2016).Two important features of radicals (semantic and phonetic) are taken asthe typical positions within characters and the encoding process of character information. These important properties of radicals are called the positional and the functional radical knowledge that also effects the

processing of character recognition in learners (Liu et al., 2022).

The current study is focusing on the semantic radical knowledge, which conveys semantic information of characters and words. At the morphological awareness, the semantic radical has its significance of awarenessas these are the smallest units combine together to make words meaningful (Shu & Anderson, 1999), as for recognition, the transparent semantic radicals rooted into the words would be very helpful (Shen, 2010).Character structures knowledge is suggested to be beneficial and a quick build up knowledge to teach CFL learners (Shen &Ke, 2007; Ke, 1998). Generally it is assumed that as different character structures form words, so the meanings of the words are related to that characters' structure, whereas this association would not be taken as so simple and direct. Consequently, to have language proficiency, CFL learners are required to have valuable information of word structure, as just to know the meaning of word is not more than enough to have language proficiency. To sum up, the accuracy and speed to access the meaning of printed words by the decoding process is word recognition (Wolf &Katzi-Cohen, 2001) that is very important for language learning. Traditionally, it has been associated with reading only, but recent advances stated that word recognition may also mark the important aspects of vocabulary acquisition in a foreign language (Han, 2015).

In the acquisition of a language, the learners are also needed to develop the most important competency, i.e., vocabulary knowledge, it can be explained as vocabulary size and depth. Read (2004) assessed that increase in the vocabulary size of a learner, results in the accommodation of newly acquired words within a set-up of the familiar words and also some reforms of the existing network. Whereas the depth of vocabulary is not limited to the learners' ability to discriminate words semantically but considered as the learners' knowledge about different ways of combination among words. Or it is also described as to entailed specific aspects of knowledge in depth or to find out the exact constituents of the dimension of knowledge (Milton, 2009; Read, 2000). Different meanings of vocabulary depth has been distinguished, including compiled knowledge of words ranging from semantic features and pragmatic characteristics to the networking knowledge of the words (Schmitt, 2014; Read, 2000).In learning Chinese vocabulary, the complexity is reflected by Chinese characters as Ke (1998) recommended that partial information of characters leads to recognition, but accurate

production requires total mastery of the character. Gonzalez-Fernandez and Schmitt (2020) suggested that the global vocabulary construct is based on the significant contributions of all components of words, and vocabulary development is said to bebased on the great contribution of knowledge of words by grade level.

In summary, many studies have evaluated overall vocabulary knowledge of CFL learners in terms of vocabulary size but specifically there has been a minimal focus on to the study of vocabulary depth. In second language learning studies, the relationship between vocabulary size and depth has been explored (Schmitt, 2014), in relation with second language proficiency and reading comprehension (Zhang, 2012). Current study attempts to disentangle the association between vocabulary size (character and word recognition) and depth across proficiency levels by examining the potential mediating effect of semantic radical knowledge.

II.   LITERATURE REVIEW

Learning of Chinese as a foreign language (CFL) has gained popularity globally,as with the growth of China's economic power there is an increasing need to communicate with Chinese people (Scrimgeour, 2014).

Semantic Radical Knowledge

Chinese language is logographic in nature and is composed of radicals. Its' orthography includes the written forms of characters including stroke, shape and component. Jackson, Everson, and Ke, (2003) suggested thatradical awareness comes under orthographic knowledge, but some researchers also categorized it as a form of morphological knowledge (Li, et al., 2002). Shen and Ke, (2007) defined the term ofradical knowledge as to the radicals' role understandingin character formation. The radical knowledge in word reading has shown strong and positive association with other factors (orthography, phonology and morphology) in a study on Hong Kong students of grade 2(Tong & McBride-Chang, 2010).Among radicals some are phonographic in nature known as phonetic radicals and serve as a pronunciation guide; whereas some are logographic radicals known as semantic radicals that suggest the meaning of the character (Shen, 2010; Ho, Ng, & Ng, 2003). Comparative to the phonetic radicals in Chinese writing system, the semantic radicals are more reliable and visually distinctive (Shen &Ke, 2007; Ho, Ng, & Ng, 2003). Learning of the semantic radical can help the learners to learn other semantically derived characters. In a Chinese

character, a semantic radicals' cueing function is significantly important as these have typically large family size with great transparency and high frequency (Shu et al., 2003). So for Chinese learners to learn characters, it is easier to know the abstract orthography-semantics rules. Where semantic radicals knowledge is to have the awareness of positional regularities andmeaning-cueing functionof the radicals (Su & Kim, 2014), the languages with alphabetic writing systems marks both awareness of morphology and orthographyas the good predictors of language literacy development (Kim, 2010; Cunningham, Perry, &Stanovich, 2001).

In Chinese decoding tasks, it is founds that semantic radical plays a basic and crucial role in character recognition than the phonetic element,Everson (2002) described orthographic awareness in CFL learning by founding that the initial level learnerscan use semantic radicals for guessing unknown characters' meanings. Butin the case of adult CFL learners, it is reportedeasier to teach the significant role of semantic radicals in character meaning learning (Jackson, Everson, &Ke, 2003).So in learning novel semantic transparent characters, the CFL adult learners can effectively apply semantic radical knowledge and perform significantly better on the recognition and production of the characters (Lu, et al., 2015; Williams, 2013; Shen, 2010; Wang, Liu, &Perfetti, 2004; Wang, Perfetti, & Liu, 2003). However, recognition of semantic information of characters can also beused as a learning strategy (Williams, 2010). Overall, for CFL learners in their intention to continue learning Chinese to improve their proficiency, semantic radicals are highly facilitative (Sun et al., 2021).

Character Recognition

Chinese logographic writing system marks great visual complexity to characters recognition, mainly for foreign learners whose first language is alphabetic, as the complexed orthographic structures make it challenging to master thousands of Chinese language characters (Shen, 2005). In the Chinese writing system, the basic unit is a character, that is parallel to the status of a word (a unit that has a clear visualized boundary) in English (Li & McBride-Chang, 2014). Characters are the smallest free standing written units, playing important role in conveying meaning, instruction and training of Chinese language (Wang & Harris, 2016).An important branch of pattern recognition is called Chinese character recognition (CCR) (Dai, Liu, & Xiao, 2007). Existing literature (Shen, 2010) suggested that character learning is

facilitated by radical knowledge. As Chinese compound characters are composed by radicals, that provide semantic or phonetic information (Chen et al., 2013; Shen &Ke, 2007). Thus for native speakers, either in the recognition of characters or development in reading, the radicals are counted as the major orthographic processing components (Ho et al., 2003; Feldman &Siok, 1999), and are also important for nonnative Chinese language learners in character learning and word reading (Zhang et al., 2016; Tong & Yip, 2015; Shen &Ke, 2007; Wang et al., 2004; Taft, Zhu, & Peng, 1999). Shen (2010) noted that beginning-level CFL learners (93%) considered that while learning meaning, pronunciation, and the graphic structures in characters, the radical knowledge is helpful and CFL adult beginners in learning novel semantic transparent characters can apply semantic radical knowledge; furthermore, on the recognition and production of the characters, the subjects with good semantic knowledge performed significantly better. In addition, among first and second year English-speaking adult CFL participants, the semantic radical knowledge and Chinese character learning has been reported as moderately correlated (Shen &Ke, 2007). These findings in CFL character learning established the role of semantic radical awareness in character recognition.

Jackson, Everson, and Ke (2003) reported that after one year of Chinese learning,radical knowledge of semantic developed in adult CFL learners, making them enable of producing the meanings of unknown characters, as generally, the semantic radical is to provide semantic information of Chinese character (Zhang, Li, Dong, & Xu, 2016). Therefore, the semantic element of radical is useful in recognition of characters (Xu, Chang, &Perfetti, 2014). As previously in Chinese children the developmental patterns of semantic knowledge has been reported with significance (Ho, Ng, & Ng, 2003), and the CFL learners of different proficiency levels also have a well-developed route of semantic knowledge for character and word recognition (Williams, 2013; Wang, Liu, &Perfetti, 2004). In line with preliminary findings in CFL learning that reported positive influence of semantic radical knowledge in character recognition (Su & Kim, 2014; Taft & Chung, 1999) the current study intend to explore the mediating role of it in CFL learners' vocabulary size and depth.

Word Recognition

Chinese characters are not equivalent to words, as in modern Chinese language, two or

more characters together create most of the words with different structures. The visual recognition of different word structures in the text is orthographic information but word recognition is not just limited to it, pronunciation and meaning are also required (Grabe, 2009).Semantic radical processing gained more attention in word reading, as studies on CFL learners has shown positive association between semantic radical knowledge and Chinese word reading (Su & Kim, 2014; Nation &Snowling, 2004). Orthographic information or decoding of phonological codes is also found helpful in retrieval of semantic information (Jackson & Coltheart, 2002; Coltheart et al., 1993). Normally, familiar or high frequency words are processed by the direct lexical route, and unfamiliar or less frequent words (or pseudo words) are operated by optional route (Castles, 2006). So drawing of semantics from the graphic forms is a word recognition process, that is very important and reading is at best inefficient without good word recognition skill (Snowling&Hulme, 2005).Morphological relationships among words effects the means to embodied words in memory and also to make the skilled readers to recognize not only the difficult words but also their meanings (Nagy et al., 2006; Anshen&Aronoff, 1988). During the last century, theories about word recognition began to develop (Snowling&Hulme, 2005), including that words' orthographic input can make possible the direct access to the meaning (Smith, 1973), direct approach to the meaning by orthographic input or indirectly by phonology (Coltheart et al., 2001), and also access jointly by phonologically mediated and direct routes (Harm & Seidenberg, 2004; Seidenberg & McClelland, 1989).

Context aids readers in reading process when they have delays in word recognition (Grabe, 2009). While in character identification, the semantic radicals hold a privileged status (Williams, 2010). Various researches (Liu, 1983; Itoo, 1979: cited in Wang, 1998) suggested that dictionary use can be facilitated by early teachings of radicals, but the additional weight to the point would be that targeted instruction in radical use would ultimately help learners to establish a stronger semantic path to recognition by facilitating the lexical classification and access. Atintermediate-advanced level, for CFL students teaching of radical strategy is suggested instinctive, comprehensible, and useful.It would make students both to have an eye on character patterns and details and also important semantic clues to character composition (Williams, 2010). Researches have reported a moderate relationship between word recognition and comprehension, while word recognition has considered as a significant and unique predictor of comprehension among CFL learners (Su, 2010), particularly the positional and functional knowledge of radicals (Ho et al., 2003; Shen &Ke, 2007), furthermore, in the range of relation with Chinese word recognition, the productive and receptive semantic radicals' knowledge are also important (Su & Kim, 2014).

Vocabulary Acquisition

Extant researches have concluded the nature of vocabulary knowledge (Nagy & Scott, 2000; Henriksen, 1999; Richards, 1976), focusing on the patterns of vocabulary knowledge acquisition and also its appropriate assessment (Milton, 2009; Read, 2000), highlighted the best vocabulary instructions (Schmitt, 2008), and the close associations between language development and knowledge skills (Milton, 2014; Grabe, 2009; Nation, 2001). Vocabulary knowledge has been labelled as multi-dimensional with different aspects of knowledge about words (Nation, 1990; 2001; Nagy & Scott, 2000; Henriksen, 1999). To know a word means knowing a words' meaning, knowing its form and use; receptive knowledge to recognize a word and its meanings, productive knowledge to produce a word to process communicative functions, related to written or oral modality and active or passive (Nation, 1990, 2001; Laufer&Paribakht, 1998).

In both alphabetic languages (Ouellette, 2006) and Chinese (Song et al., 2015; Zhang,2013; McBride-Chang et al., 2008) vocabulary is closely correlated with word reading. Characters and words are important in conveying meaning (Hoosain, 1991) as Chinese syntax rules are simple (Kalgren, 1949), moreover, during lexical processing in Chinese the activations of phonological and semantic information are simultaneous (Perfetti& Zhang, 1995), the processing and storage of semantic information of a given character might be eased by rich vocabulary, making reading easier. In any language words are considered as the building blocks, so a language can be used comprehensively if one knows the more words. Different studies have found a close association between learners' various language skills, particularly reading comprehension and vocabulary size (Zhang, 2012; Qian, 1999, 2002), and for adequate comprehension of a printed text in learners of a second language the lexical coverage would need to be at least 98% (Hu & Nation, 2000). Various researchers argued that it is a very limited approach just to be focused on the size aspect of vocabulary

knowledge (Webb et al., 2013, Read, 2000, 2004; Wesche&Paribakht, 1996). Most of the words especially the words with high frequency have a great range of meaning uses, but vocabulary size alone cannot describe the aspect of quality of vocabulary knowledge in its true form.

For accurate Chinese vocabulary learning and production, the learners are required to have a comprehensive knowledge of characters, as the partial information is just lead to recognition (Ke, 1998). Different CFL studies have been conducted on orthographic depth of Chinese language that predicted the levels of different learning problems (Liberman et al., 1980), as Chinese characters complexity not only make the recognition and production process difficult but at the most hinders the acquisition of characters (Hayes, 1987; Ke, 1996). Some studies have recognized a strong correlation between reading and meaning identification of a word (Everson, 1998; Yang, 2000). While in terms of depth, vocabulary acquisition has a very limited research exposure, Jiang (2002) assessed the development of different types of associations among L2 learners of Chinese,Zhang and Koda (2018) studied Chinese second language learner's depth of vocabulary knowledge and its contribution to reading comprehension. Contribution of vocabulary depth to reading comprehension in comparison to vocabulary size has a limited research exposure (Jeon & Yamashita, 2014; Grabe, 2009). On the one hand, vocabulary size and depth are certainly two distinct aspects of vocabulary knowledge (Vermeer, 2001), and to second language reading comprehension these are found relatively important (Li & Kirby, 2015;Horiba, 2012; Qian, 2002).

III.   CONCLUSION:

Among different conceptual views about vocabulary knowledge dimensions, the most popular are the size or breadth of vocabulary knowledge and the depth of vocabulary knowledge, the former addresses the number of words one knows, and the latter gives the accuracy or production level of the known words (Read, 2000, 2004; Anderson &Freebody, 1981). In previous researches on vocabulary acquisition and assessment, the size dimension has majorly remained the focus of attention, as the words are considered as a language's building blocks that makes one to comprehend and use a language (Read 2000; Schmitt 2014). In literature, close associations between language vocabulary size and different skills have been reported (Ke, 2012; Zhang, 2012; Qian, 2002; Hu & Nation, 2000), but some researches argued by considering it a very

limited approach (Webb, 2013; Read, 2000, 2004). It is of more worth taking to know the patterns of organization of known words and words meaning relations in learners' lexical range than just to be limited to the vocabulary size.

Secondly, vocabulary size and vocabulary depth both are considered as two distinct aspect of vocabulary knowledge, that are important for different language skills (Vermeer, 2001; Li& Kirby, 2015), different researchers have found strong correlation between vocabulary size and knowledge, and labelled these as the best predictors of learners' language proficiency (Koizumi &In'nami, 2013; Kieffer&Lesaux, 2012) , the current study aims to access the association between these two major aspects among CFL learners. Similarly most literature has documented the associations of both character and word recognition with semantic radical knowledge (Lue, et al., 2015; Williams, 2010, 2013), and moderate association between semantic radical awareness and character knowledge, while vocabulary acquisition has been assessed by examining the association of semantic radical awareness and reading development among CFL learners (Su, 2010; Shen &Ke, 2007).Whereas the present study intends to investigate the mediating role of semantic radical knowledge while studying the associations of character, word recognition and vocabulary acquisition among CFL learners, as literature documented semantic radical knowledge to be more applicable for CFL learners while learning new vocabulary items (Dunlap, Perfetti, & Liu, 2011). And current research also aims to investigate the levels of vocabulary acquisition among CFL learners at different proficiency levels, as previous studies have been focused on higher levels of proficiency while dealing with the vocabulary acquisition in terms of depth as it has barely received any attention. It would be worthwhile to examine the vocabulary acquisition among learners of CFL at different proficiency levels while exploring the significance of association among character, word recognition with mediating effects of semantic radical knowledge.

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