Aural Chinese Words Learning for Native English Speakers: A Test of the Spacing Effect and the Picture Superiority Effect

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Introduction

Language as a tool of communication, for native speakers, most of their total communication time is spent on listening. Listening is the foundation of language acquisition. While, for second language (L2) learners, especially for most of adult learners, since they have fewer opportunities to be exposed to an immense quantity of contextualized target L2 aural input environment than native speakers, consequently, they typically have sub-optimal aural vocabulary knowledge which means they have difficulty recognizing meanings of words when these words are presented in their aural form. Research has shown that aural vocabulary knowledge is an important predictor of L2 learners' listening comprehension success. However, compared to literature that investigate strategies to increase L2 learners' written vocabulary knowledge, far less research has focused on helping L2 learners remember aural vocabulary knowledge effectively. Therefore, the current study aims to explore the appropriate practice context and practice time schedule for native English speakers to learn aural Chinese vocabulary effectively. Participants are assigned to one of the three practice contexts: context only includes illustration of an aural Chinese word, context only includes English translation of an aural Chinese word, or context includes both illustration and English translation of an aural Chinese word. Besides, aural Chinese words are presented in three different spaced fashions: narrow, medium, and wide. The results of this experiment will produce evidence on which practice context and which practice schedule are more effective for native English speakers to memorize aural Chinese vocabulary.

Background

Research shows that more than 45% of native speakers' total communication time is spent on listening (Feyten, 1991). While listening is regarded as the most difficult language skill to learn, compared to the other three basic skills: speaking, reading, and writing (Hasan, 2000). To improve L2 learners' listening skill, some evidence suggests that L2 learners have to accumulate enough aural vocabulary knowledge (Milton, Wade, & Hopkins, 2010; Matthews, 2018; Masrai, 2019). Besides, learning Chinese as a second language has grown in popularity in the United States. The enrollment for Chinese as a foreign language was about 47.5% and this percentage has been steadily increasing (Looney & Lusin, 2018). Based on the growing pedagogical demands, in the current study, we focus on investigating one or some effective practice situations for native English speakers to memorize aural Chinese vocabulary. We refers to two commonly used psychological theories to improve learners' declarative knowledge learning efficiency: the spacing effect and the picture superiority effect. The experiment will be conducted in the MoFaCTS (Mobile Fact and Concept Training) system, an online flashcard learning platform (Pavlik et al., 2016).

Relevant Theories

The Spacing Effect

The spacing effect, a cognitive phenomenon, indicates that people are better able to retain or recall information that is repeated in a distributed fashion relative to information that is repeated in a massed fashion (Hintzman, 1974) and it is firstly researched by Ebbinghaus (1885/1964). The effectiveness of the distributed practice in vocabulary or verbal learning has been attracting the attention of researchers (Bahrick et al., 1993; Cepeda et al., 2006). Robust benefits of distributed practice exists in verbal learning tasks: spaced practice schedules led to markedly better final retention performance, compared with massed practice schedules, besides, wider spacing produced more benefits than shorter spacing. However, some studies also indicate that the presentation mode of stimuli interact with the spacing effect (Waugh, 1970), when stimuli are presented aurally, the spacing effect is moderated by other variables, such as the speed of presentation (Melton, 1970).

The Picture Superiority Effect

The picture superiority effect is proposed based on Paivio's dual-coding theory (Paivio, 1986) which assumes that cognition occurs in two independent but connected codes: a verbal code for language and a nonverbal code for mental imagery. Picture stimuli have an advantage over word stimuli because they are dually encoded. This effect has been used widely in multimedia learning research. Mayer (1997) suggests that when information is transmitted through both verbal (speech) and nonverbal (visual) channels, it is represented more fully, leading to greater recall. Evidence shows that pictures can facilitate learning foreign language vocabulary (Carpenter & Olson, 2012; Bisson et al., 2015). However, both these previous studies did not investigate the independent influence of the illustration on foreign language vocabulary learning.

Research Methods And Work

The current study is an three-factors mixed designed experiment. The spacing condition is a within-subject independent variable (IV) and three levels are designed (narrow, medium, and wider). The practice context is between-subject IV consists of the only picture illustration context (OP), the only English translation context (OE), and the both English translation and illustration context (PE). To investigate the spacing effect more throughly, the retention interval also been included in current study as an between-subject IV and three retention intervals are included: 2-minute, 1-day, and 7-day. The experiment includes two sessions: the practice session and the post-test session. Two sessions are separated by retention interval.

Firstly, participants are randomly assigned to one of the three practice contexts by the MoFaCTS system. During the practice session, participants will learn 27 aural Chinese nouns. Each word will be repeated 7 times but different words will be presented in different spaced fashions depends on which spacing level it is assigned to by the system. The narrow spaced words will be presented 7 times consecutively, the medium spaced words will be presented every 10 other words on average, and the wide spaced words will be presented every 30 other words on average. There are a total of 189 multiple-choice practice trials in the practice session. Practice trials in the OP context consist of the aural Chinese noun and 4 alternative illustrations; Trials in the OE context consist of the aural Chinese noun and 4 alternative English translation words; Trials in the PE context consist of 4 choices includes both illustrations and English

translation words. Participants have 5 second to answer the question, if their choice is correct, the feedback is "Correct." and lasts for 1 second. If their choice is incorrect, the feedback is the correct answer and the corresponding aural Chinese noun will be played one more time. Participants have 5 seconds to learn from the feedback and they are encouraged to do so in the instruction. At the end of the practice, participants have to answer 10 demographic question and 14 learning experience survey questions. The practice session lasted approximately 40 minutes.

After finishing the practice session, participants will be randomized into one of the three retention interval conditions and will be locked out of the system for the retention interval, then automatically emailed to return after the interval. The post-test trials consist of 81 multiple-choice questions. Each participant will encounter 27 trials they have practiced that are used to measure their learning performance, 54 trials with different practice contexts for them that are used to measure their near-transfer performance. 27 cloze tests are include to measure participants' far-transfer performance. The post-test session approximately 20 minutes.

Real World Applications

The design and results of this study will have several pedagogical applications. First, the target learning stimuli of this study is aural Chinese words and such auditory vocabulary knowledge learning usually are the secondary concern in most foreign vocabulary learning literature. However, to some extent, the improvement of listening skill for L2 learners should be put on a higher priority than the improvement of reading skill in their daily life. Evidence shows that listening skill is strongly correlated with the overall language proficiency of L2 learners (Bozorgian, 2012). Thus, the results of current study can shed a light on which is a better practice context or which is a more appropriate practice schedule for L2 learners to memorize aural foreign vocabulary.

Second, the practice contexts designed in this study include only picture illustration context which usually are ignored in previous foreign vocabulary learning research that investigate the benefits of picture for retention improvement. One problem caused by such previous research design is that the independent benefit of the picture illustration can not be compared to the first language translation learning context directly. Thus, those research cannot provide evidence for us to prove picture illustrations per se are enough for L2 learners to remember foreign vocabulary.

Future Directions

Donovan and Radosevich (1999) found that even though increasingly distributed practice resulted in larger effect size for foreign language learning but an inverse-U function exists. This indicated that once a threshold was exceeded, wider spacing produced smaller effect sizes. In other words, for L2 learners to obtain higher vocabulary retention performance, the spacing interval between two practice trials, not the wider the better. Thus, the most practical next step of this research is to build an adaptive learning model. With the help of accurate computational learner models, optimal spaced schedule can be generated based on learners' practice histories, then their learning efficiency can be maximized correspondingly (e.g., Pavlik & Anderson, 2008; Khajah et al., 2014; Lindsey et al., 2014; Mettler & Kellman, 2016).

Summary

This study will contribute to the literature of investigating how to help L2 learners' memorize aural foreign vocabulary knowledge effectively. The results will provide alternatives for researchers interested in designing foreign vocabulary learning strategies. The data collected in this study can be used to test the generality of existing computational models of vocabulary memory and also can be used to build new adaptive learning models.

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