

## 摘要

本研究旨在探究讲普通话和普通话-吴方言的英语学习者是如何产出和感知英语龈腭擦音的。同时,本研究也对所有汉语发音人英语龈腭擦音的产出策略做出音系学分析。本研究的吴语使用者,实际上是能够熟练使用普通话和绍兴吴方言的发音人,因此研究是将母语为普通话的单语发音人和母语为普通话-吴语双语发音人进行对比分析,了解他们在学习英语龈腭擦音时在感知和产出方面表现出的异同。

在产出实验中,研究者着重分析了普通话和普通话-吴语发音人英语龈腭擦音的频谱矩阵,测量了目标英语音段与二语产出音段的频谱数据,并将这一数据与发音人母语中龈腭擦音的声学数据进行对比。结果显示:普通话和普通话-吴语发音人对于英语龈腭擦音产出与母语中相对应音素没有显著差异。频谱数据线性判别分析也显示:普通话单语发音人用母语中的卷舌清音/ʃ/来替代英语龈腭清擦音/f/,并用卷舌浊音/ɹ/替代龈腭浊擦音/z/;而普通话-吴语发音人用母语中的龈腭音/ɛ/来替代/f/和/z/两个目标音。总体而言,这些产出策略并不完全符合二语习得模型(SLM)中关于语音相似性和二语语音习得效果的论述。接着,英语母语者对普通话和普通话-吴语发音人产出的龈腭擦音进行口音评价并通过量表对每个发音数据的口音轻重程度进行量化描述。结果显示:从英语母语者的视角来看,对于目标音口音轻重排列依次为使用 /ɹ/、/ʃ/、以及使用/ɛ/来进行替代的情形。而发音人语音与目标音的差异程度可以用音系特征违反的权重来衡量。这一结果表明二语目标音的习得效果既与两种语言语音的声学距离相关,也与两种语言语音的音系特征距离相关,而后者的相关性既需要考虑学习者的视角,也应该考察目标音本族语者的视角。

由于绍兴方言中的龈腭浊擦音/z/在声学空间中表现极不稳定,在感知实验中,本研究仅考察了英语龈腭清擦音是如何被普通话和普通话-吴语母语者所感知的。在区分实验中,两组学习者被要求区分带有目标音和替代音的CV结构,结果显示两组学习者感知模式完全一致:认为在后接元音/a/时,英语龈腭清擦音/f/更像普通话中的卷舌清音/ʃ/,而在后接元音/i/和/u/的时候,则更像普通话/吴语中的龈腭清擦音/ɛ/。普通话和普通话-吴语母语者在区分CV结构时并不存在差异,这与产出实验的结果不一致。而在辨认实验中,两组被试辨认含有目标音的假词,此时两组学习者的感知模式发生了变化:在三种元音环境下,普通话发音人都将目标音/f/辨认为卷舌清音/ʃ/,普通话-吴语母语者在多数情况下将/f/辨认为龈腭清擦音/ɛ/,辨认实验的结果与产出实验总体一致。感知和产出实验结果对比表明:二语语音的产出和感知模式只有在词汇层面才会存在对应。最后,研究者对普通话和普通话-吴语英语学习者的产出策略进行了音系分析,利用优

选论对两组人群英语龈腭清擦音的产出策略进行了解释,分析了制约条件在不同语言中排列顺序的差异。借由普通话和普通话-吴语母语者对英语龈腭清擦音的产出、感知和音系学分析,本研究最后对二语语音习得规律和其在教学方面的启示进行了阐述。

**关键词:** 龈腭擦音; 语音产出; 语音感知; 二语语音习得

## Abstract

This dissertation presents an experimental investigation of how Mandarin and Mandarin-Shaoxing Wu speakers produce and perceive the English post-alveolar fricatives, to establish the relation between production and perception in L2 English. The Shaoxing Wu speakers in the current research are Mandarin-Wu bilinguals who are proficient both at Mandarin and Shaoxing Wu, so a comparison was made between the monolinguals and bilinguals, to check differences between L2 perception and production.

In the production experiment, the researcher examined the spectral moments of the English post-alveolar fricatives produced by Mandarin and Mandarin-Wu speakers, and compared them with that produced by native English speakers and also the post-alveolar fricatives in the learners' L1s. ANOVA and LDA analyses both demonstrated that Mandarin speakers replaced the English voiceless post-alveolar fricative /ʃ/ with Mandarin voiceless retroflex /ʂ/, and the voiced post-alveolar /ʒ/ with the voiced one /ʐ/. On the other hand, Mandarin-Wu speakers used the voiceless alveolo-palatal /ç/ to substitute both the English voiceless /ʃ/ and voiced /ʒ/. The production patterns do not completely conform to the sound learning model (SLM) proposed by previous researchers. Next, native English speakers were invited to rate the accentedness of the L2 production by Mandarin and Mandarin-Wu speakers, and they rated Mandarin-accented /ʒ/ as most accented while the Mandarin/Wu-accented /ʃ/ was rated least accented. The pattern of accentedness can be linked to the degree of violation on the phonological features in L2. Therefore, I infer that the production of the L2 sound is a complex process, which relates not only to L1-L2 acoustic distance but also to the L1-L2 phonological distance, and the perception of the accentedness should be rated both from an L2 learner and a native speaker point of view.

Since the voiced alveolo-palatal fricative /ʒ/ is very unstable in its acoustic space and thus cannot function as an ideal substitution in the production experiment, in the perception task, only the voiceless English post-alveolar fricative /ʃ/ produced by Mandarin and Mandarin/Wu speakers were examined. In the discrimination task, Mandarin and Mandarin-Wu speakers were required to discriminate between English /ʃ/ and Mandarin /ʂ/ or Mandarin/Wu /ç/ in a CV structure. The results showed that both groups of participants perceived /ʃ/ to be closer to /ʂ/ when followed by the vowel of /a/ but closer to /ç/ when followed by /i/ and /u/. This perception pattern, similar between Mandarin and Mandarin-Wu speakers, does not align with their

respective L2 production patterns. However, in the identification task Mandarin speakers perceived the target English segment to be more like Mandarin retroflex /ʂ/ across all vowel contexts (/a/,/i/,/u/), while the Mandarin-Wu speakers perceived it to be more like Mandarin/Wu /ɕ/ in most vowel contexts (with the exception of the /a/ context, which is thought to be influenced by educational factors). Therefore, the perception in this task is correlated with the results of production when the target segment is embedded in the word form.

Finally, the researcher performed a phonological analysis on Mandarin and Mandarin/Wu speakers' production patterns of the English post-alveolar fricatives, and proposed relevant constraints on L2 sound production in Optimal Theory. The current study also sheds some light, in a pedagogical sense, on how to improve the learning of the L2 segments.

**Keywords:** Post-alveolar fricatives, speech production, speech perception, L2 sound learning