WHEN VARIABILITY MATTERS IN SECOND LANGUAGE WORD LEARNING: TALKER VARIABILITY AND TASK TYPE EFFECTS

by

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ABSTRACT

This study addressed the role of talker variability in the perception of nonnative contrastive phonemes by adult second language (L2) learners who had no prior knowledge with the target language. Specifically, the study explored how training with varying talkers could affect native English speakers’ acquisition of the Arabic pharyngeal-glottal contrast, which is not distinctive in their native language. The present study also examined the effects of task type on learners’ word recognition ability.

To accomplish this, the present study included two main experiments: Experiment 1 (nonlexical task) and Experiment 2 (lexical task). Sixty adult native speakers of English (with no Arabic experience) participated in the two experiments, 30 subjects in each experiment who were randomly assigned to either a single- or multiple-talker word learning groups. Subjects in the two experiments were presented with nine nonword minimal pairs where six pairs contrasted the Arabic /h/ and /h/ phonemes and three pairs included familiar sound contrasts (i.e., /s/ and /ʃ/). The nine nonword pairs were assigned to pictures indicating their meanings and subjects learned the nine nonword pairs in the training phase and were then tested on them later in the testing phase.

Findings of Experiment 1 demonstrated a significant effect of training type ($p < .001$), a significant effect for item type ($p < .001$), and a significant interaction of training type and item type ($p < .001$) for subjects in the multiple-talker environment. That is, their performance was more accurate (91.5%) than the single-talker group
(67%). The same significant findings were found in Experiment 2 where again, subjects in the multiple-talker training group performed more accurately on test items better than their counterparts in the single-talker training group (single-talker group = 65%; multiple-talker group = 87%).

Overall, the results of this experiment provided evidence that multiple-talker training did have a significant effect on the subjects’ recognition of the target contrast in a nonlexical discrimination task with above 88% average accuracy. Findings also provided evidence supporting learners’ ability to establish lexical representations for the newly learned words that included the target Arabic contrasting phonemes with above 83% average accuracy for only the multiple-talker training group. Even though subjects’ scores differed on the two discrimination tasks, this difference was found to be statistically insignificant. That is, subjects’ ability to discriminate the novel contrasts was the same on the lexical task as on the nonlexical task regardless of the two tasks’ distinct demands.

Findings of the two experiments imply that variability in talkers can contribute to acquiring nonnative contrasting phonemes. Results are considered in relation to their implications for understanding the learning process of L2 novel phoneme contrasts and their lexical processing.
In loving memory of my dearest Mum and to my gracious Dad
with deep appreciation and love. Thank you for all that you taught me about the world
and all you did for me throughout my whole life. To you two, I not only owe success
but also my life.
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CHAPTER 1

INTRODUCTION

Speech produced by second language (L2) learners who acquire their second language after childhood is commonly characterized by a foreign accent (Asher & Garcia, 1969; Flege, MacKay, & Meador, 1999; Leather & James, 1991; MacKay, Flege, & Imai, 2006; MacKay, Meador, & Flege, 2001; Mayo, Florentine, & Buus, 1997; Munro, Flege, & MacKay, 1996). Due to its significance as an acknowledged characteristic of L2 learner speech, the issue of foreign accents draws the attention of several scholars in the field of L2 phonology who have become interested in exploring the reasons behind the persistence of the foreign accent in L2 speech. In this regard, previous second language acquisition (SLA) research findings have shown numerous factors that contribute to the accentedness of L2 speech such as age of arrival in a new host country (Baker & Trofimovich, 2006), amount of exposure to the target language (Bradlow & Bent, 2008; Celce-Murcia, Brinton, & Goodwin 1996; Kenworthy, 1987), learners’ cultural attitudes (Moyer, 2007), musical ability (Sleve & Miyake, 2006; Wong, Skoe, Russo, Dees, & Kraus, 2007), and length of residence (Flege & Liu, 2001).
1.1 Overview

Novel L2 speech contrasts, which have no equivalents in learners’ native language, have been generally recognized as one of the main factors contributing to the complexity of L2 accented speech (Escudero, Hayes-Harb, & Mitterer, 2008; Flege & MacKay, 2004; Flege, Munro, & Mackay, 1995; Hayes-Harb, 2002; MacKay, Meador, & Flege, 2001). Considerable speech perception research reveals that adult L2 learners experience difficulty in learning novel L2 phoneme contrasts that differ from their first language (Best, McRoberts, & Sithole, 1988; Best & Strange, 1992; Goto, 1971; Hayes-Harb, 2007; MacKain, Best, & Strange, 1981; Werker, Gilbert, Humphrey, & Tees, 1981). For example, Japanese learners of English experience difficulty perceiving the English /r/-/l/ contrast, (e.g., right vs. light), which does not exist in their native language (Aoyama, Flege, Guion, Akahane-Yamada, & Yamada, 2004; Best, 1995; Boatman, 1990; Bradlow, Pisoni, Akahane-Yamada, & Tohkura, 1997; Bradlow & Pisoni, 1999; Goto, 1971; Hattori & Iverson, 2009; Logan, Lively, & Pisoni, 1991; Mochizuki, 1981; Strange, 1995; Takagi, 2002).

Likewise, native Dutch speakers display an inability to differentiate the English /æ/-/ɛ/ contrast, e.g., they have difficulty with the English words med and mad (Broersma, 2005; Cutler & Broersma, 2005). Similarly, native English speakers have difficulty discriminating contrasts, such as Hindi retroflex /ɖ/ versus dental stops /ɖ/ (Werker, Gilbert, Humphrey, & Tees, 1981; Werker & Tees, 1984). Prior research, on the other hand, found evidence that lab training may improve L2 learners’ perception of novel L2 contrasting phonemes (Bradlow, Pisoni, Yamada, & Tohkura, 1997).
Many studies have shown that adult L2 learners have difficulty establishing distinctive phonetic categories for unfamiliar speech phonemes that are similar to their native language equivalents but are perceived in a different phonetic way (Best, McRoberts, & Sithole, 1988; Flege, 1987). However, it is not yet well-understood why a foreign accent is so persistent in L2 learners’ speech. Thus, more studies that further explore this issue can help us build a better understanding of the persistence of accent in L2 speech.

1.2 Proposal and Organization of This Dissertation

The main objective of the current study is two-fold: (1) to examine whether talker variability plays a role in the acquisition of the Arabic pharyngeal-glottal phoneme contrast by native English speakers with no Arabic experience, and (2) to explore the possible effect of task type (i.e., nonlexical versus lexical) on learners’ acquisition of novel phoneme contrasts.

The present dissertation includes eight main chapters that are organized as follows. Chapter 2 is an overview of empirical studies of L2 speech perception and word recognition that presents prior research on unfamiliar phoneme contrasts, including those that examined the relative influence of talker variability on L2 phonological acquisition. Furthermore, this chapter introduces the gap in the literature followed by the research questions and hypotheses.

The study design is presented in Chapters 3 and 4, and results are reported in Chapter 5. First, Chapter 3 presents Experiment 1, which investigated whether talker variability may influence learners’ distinction of unfamiliar phoneme contrasts on a
nonlexical task. Chapter 4 displays Experiment 2 that used a lexical task to explore the role of variation in talker’s voice on L2 learners’ lexical processing of novel L2 contrasts. Chapter 5 introduces the main results of both Experiment 1 and Experiment 2. It also represents a comparison of findings of the two experiments.

Chapter 6 synthesizes the main findings from Chapter 3 and Chapter 4 and proposes theoretical pedagogical implications of the main findings. Chapter 7 provides a brief summary of this dissertation. Finally, Chapter 8 addresses the study’s limitations and proposes directions for future research.
CHAPTER 2

LITERATURE REVIEW

2.1 Background

A large number of empirical studies have addressed the phenomenon of accented speech through focusing on the learning of nonnative phoneme contrasts, which involves learning distinctive features that distinguish them. These studies have tended to investigate this issue in two ways: cross-language research exploring L2 learners’ acquisition of a second language at different stages (Curtin, Goad, & Pater, 1998; Cutler, Weber, & Otake, 2006; Escudero, Hayes-Harb, & Mitterer, 2008; Flege, Bohn, & Jang, 1997; Hayes-Harb & Masuda, 2008; Ota, Hartsuiker, & Haywood, 2009; Pállier, Bosch, & Sebastián-Gallés, 1997; Pater, 2003; Pater, 2004; Strange, Polka, & Aguilar, 1989; Weber & Cutler, 2004), and training studies in which L2 learners have been trained in laboratory settings to learn unfamiliar speech contrasts over the course of an experiment session (Bradlow, Pisoni, Yamada, & Tohkura, 1997; Logan, Lively, & Pisoni, 1991; Lively, Logan, & Pisoni, 1993; Lively, Pisoni, Yamada, Tohkura, & Yamada, 1994). In this regard, previous research has indicated that training can enhance L2 learners’ discrimination of unfamiliar contrasting phonemes that do not have counterparts in their native language.
The following discussion focuses on reviewing prior research to introduce findings of both cross-language and training studies that have been reported in the literature highlighting significant issues with respect to the learning of nonnative contrasting phonetic categories.

2.2 Acquisition of Second Language Lexical Phoneme Contrasts

In an attempt to examine whether adult L2 learners demonstrate an ability to categorize and create lexical representations for the newly learned tokens that included nonnative contrasts, mixed results have been reported in the literature. Some studies have reported the difficulties of phonemic categorization and lexical processing of unfamiliar contrasting phonemes by adult L2 learners (Boatman, 1990; Curtin, Goad, & Pater, 1998; Ota, Hartsuiker, & Haywood, 2009; Pater, 2003; Pater, 2004; Strange, Polka, & Aguilar, 1989) and other studies found that adult L2 learners might not be able to categorize the novel nonnative contrasting phonemes, but they could lexically retain them in their long-term memory (Cutler, Weber, & Otake, 2006; Escudero, Hayes-Harb, & Mitterer, 2008; Weber & Cutler, 2004). The following presents a discussion of these two main findings.

Numerous studies have tested the inability of L2 learners to distinctively categorize L2 contrasting phonemes. For example, Pállier, Bosch, and Sebastián-Gallés (1997) examined whether listeners, who were brought up in a setting where two or more languages were spoken, were able to master the sound systems of these languages and easily move from the native language to the second language or whether they only use one language system to process the other. To explore this question, Pállier, Bosch, and
Sebastián-Gallés chose the Catalan /e/ and /ε/ contrast and assessed its perception by 40 participants from Catalonia who were proficient speakers of both the Spanish and Catalan languages. Half of the participants were Spanish-dominant bilinguals, and the other half included Catalan-dominant bilinguals. Three main tasks were used: a classification task, an AX discrimination task, and a typicality judgment task in which subjects heard a word and were asked to pay attention to the initial vowel in the word. Then, subjects listened to a group of vowels that were introduced independently, and they were instructed to rate the degree to which each single vowel matched the initial vowel in the words presented before on a scale from 0 (very bad) to 5 (very good).

Findings showed that both the Catalan and the Spanish groups perceived the target contrast differently. While Catalan-dominant participants perceived the two phonemes as two separate phonemes, Spanish-dominant bilinguals perceived them as the same phoneme. This displayed that Spanish-dominant speakers who were exposed to the Catalan language at an early age were not able to differentiate Catalan words containing /e/ from minimally different words containing /ε/ that did not have an equivalent in Spanish. Instead, they used the Spanish /e/ to categorize both members of the distinctive Catalan phonemes. The study concluded that early exposure to a second language was not enough to gain the phonological competence of native Catalan speakers. Although Spanish-dominant speakers in the Pállier, Bosch, and Sebastián-Gallés (1997) study were exposed to the Catalan language at 6 years of age, they did not reach the same phonological competence as Catalan-dominant speakers.

Following up on Pállier et al. (1997), with a very similar population, Pállier, Colomé, and Sebastián-Gallés (2001) conducted another study aimed at exploring
lexical processing in the group of Spanish dominant bilinguals who were fluent in Catalan. In this study, Pállier and colleagues recruited 64 undergraduate psychology students from the University of Barcelona. Participants heard words contrasting Catalan /o/ and /ɔ/ and were instructed to indicate as quickly as possible whether each word was a real word or not.

Results indicated that Spanish-dominant bilinguals did display repetition priming for Catalan minimal pairs contrasting phonemes that exist in Catalan but not in Spanish. For instance, the Spanish-dominant bilinguals’ response to the Catalan word dóna (s/he gives) that included the phoneme /o/ was faster if it was preceded by the word dona (woman) that included the phoneme /ɔ/. This finding was explained as evidence that Spanish-dominant bilinguals processed Catalan minimal pairs as homophones of the same phoneme, not as two independent phonemes. The study concluded that Spanish-dominant bilinguals had problems learning the Catalan-specific contrasting phonemes.

Along the same line, Curtin, Goad, and Pater (1998) explored how both monolingual native English and French speakers perceived voicing and aspiration contrasts in Thai. Three groups of subjects participated: 9 monolingual native speakers of Canadian English, 8 monolingual native speakers of Canadian French, and 10 native Thai speakers. The researchers used 18 words contrasting in onset position. Each word was paired with a picture of a noun for presentation to the participants in two tasks: a picture selection task and an ABX nonlexical task in which three auditory stimuli were presented and the participants’ task was to choose which of the first two was matched by the final stimulus (X).
It was found that both English and French speakers performed better on contrasts in voicing than in aspiration. Even though native English speakers were able to discriminate the novel Thai voicing and aspiration contrasts on the ABX nonlexical, they were unable to distinguish them in the picture selection task that required sensitivity to the target contrasts.

In a follow-up study to Curtin, Goad, and Pater (1998), Pater (2003) examined the role of task effects on English speakers’ performance on both lexical and nonlexical discrimination tasks with respect to voicing and aspiration. Findings exhibited the opposite pattern to the one reported in the study of Curtain et al. (1998), where participants performed more accurately on contrasts of aspiration than voicing in the lexical task. This supported the claims made in earlier voice onset time (VOT) investigations. Furthermore, unlike findings from previous research that demonstrated the different demands of each task type to result in different outcomes, performance of subjects in Pater (2003) was consistent on the two tasks (76% correct on both tasks).

Another important finding of Pater’s study was the relationship found between the place of articulation, and both voicing and aspiration. While voicing was found to be better discriminated on alveolars, aspiration was better distinguished on the labials. Pater concluded that L2 learners, who could not reliably differentiate between novel distinctive phonemes, might perceive them similarly and might categorize them into a single phoneme. Thus, they could not lexically discriminate the difference between the target-language contrastive phones.

More recently, Ota, Hartsuiker, and Haywood (2009) investigated the role of the first language (L1) phonology in the lexical representations of unfamiliar speech
contrasts. To achieve this, Ota and colleagues gave a visual semantic-relatedness decision task to three groups of participants: 20 native English speakers, 20 native Japanese speakers, and 20 native Arabic speakers. In this task, participants were instructed to judge whether or not there was a semantic relationship between the words of each of the shown pair. For instance, native Japanese learners of English judged pairs, such as lock-hard and rock-key, to be more semantically related than other control items, such as sock-hard and sock-key. To illustrate, hearing the word lock activated the semantic network of rock and the opposite. Ota and his colleagues used two main contrasts: the English /l/-/r/ contrast and the Arabic /p/-/b/ contrast, besides filler stimuli.

Their findings proposed that both Japanese and Arabic speakers encountered difficulty in differentiating the nonnative contrast (/l/-/r/ and /p/-/b/), where native Arabic speakers made more mistakes than Japanese speakers. The finding also indicated that even in the absence of auditory perception, L1 phonology impacted the perception of L2 words and their lexical representations. Findings were compatible with those of previous research (e.g., Pallier, Bosch, & Sebastián-Gallés, 2001) that considered L2 learners’ ability to reliably categorize unfamiliar speech phonemes as a prerequisite for lexically processing nonnative phoneme contrasts.

The aforementioned studies have consistently claimed that L2 learners encounter difficulties in categorizing and/or establishing lexical representations for the nonnative distinct speech phonemes. Moreover, they assumed that learners’ phonetic perception could determine their lexical storage of the unfamiliar phoneme contrasts. In contrast to these findings, other studies have found cases in which adult L2 learners seem to be