THE EFFECT OF PERCEPTUAL TRAINING INCLUDING REQUIRED LEXICAL ACCESS AND MEANINGFUL LINGUISTIC CONTEXT ON SECOND LANGUAGE PHONOLOGY

by

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ABSTRACT

Most second language (L2) learners acquire L2 perceptual phonology with a nonnative-like outcome, which creates “accented listening”, believed to lead to accented speech. Studies have demonstrated that L2 perception and production can be changed through perceptual training. However, these studies have been performed in laboratory settings with tasks unlike real-world communication in many ways. This raises the question of whether perceptual training in the laboratory can generalize to real-world communication.

Experiment 1 of the present study investigates the effect of laboratory-type tasks on L2 learners' perception and production. Lexical access and required interpretation of linguistic context are characteristics not typical of laboratory tasks, but are characteristic of real-world communication. Experiment 1 investigated the question whether effects of these additional task demands are found for Japanese-speaking learners of English on tests of English /r/-/l/ perception and production. Perceptual results are mostly consistent with the predicted trend that Japanese speakers' performance accuracy would decrease as task demands increased. Production results from Experiment 1 did not demonstrate any differences in performance between groups. Thus the predictions for Experiment 1 were partially supported.

Experiment 2 explored whether the above-mentioned task effects can also be found after perceptual training of the less-demanding laboratory type used in previous studies. If learners do not perform as well after training on more-demanding tasks as they

do on a less-demanding task, it brings into question whether the previously used training is effective for helping L2 learners improve in ways transferable to real-world communication. Experiment 3 of the present study attempted to mitigate the predicted task effects after training by applying a new kind of training that includes additional demands. It was predicted that learners would perform better on perceptual and productive tasks with lexical access and linguistic context demands after this more demanding training than they do after the traditional training. In contrast to predicted results, perception tests in Experiments 2 and 3 showed that subjects performed more accurately after the less-demanding training than after the more-demanding training. Production results also did not yield the predicted training effects. Explanation of results and discussion of future directions are offered.

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CHAPTER 1

INTRODUCTION

For most adult learners, the acquisition of a second language (L2) is a difficult process that rarely results in native-like proficiency. In the domain of phonology, this difficulty is commonly observed as foreign-accented speech. A large literature has examined the phenomenon of foreign accented speech and has identified several factors that contribute to accentedness, including difficulty distinguishing novel second language contrasts. Much of this research has focused on the acquisition of novel contrasts in the new language; this also the focus of the present study.

When L2 learners produce novel contrasts in nonnative-like ways, their speech can be perceived as accented. When learners perceive novel contrasts in nonnative-like ways, we might say that they exhibit accented listening. The present study aims to contribute to the literature on accented perception and production with the goal of better understanding how second language learners acquire novel phonemic contrasts. A better understanding of how learners acquire novel contrasts can contribute to the creation of useful pedagogical applications to make this aspect of the process of second language acquisition (SLA) more efficient and more successful for learners.

The present dissertation adopts a laboratory-based approach to the study of second language phonological acquisition. Approaching questions in SLA in the laboratory has some important advantages. In particular, laboratory research allows us to

study factors in a controlled manner so we can more accurately pinpoint the possible causes of effects we observe (cf. Xu, 2010). However, second language learners in the "real world" acquire language under very different conditions from the conditions in the laboratory (Jarvi, 2008). If laboratory tasks are sufficiently different from the conditions learners experience in their normal environment, the results of laboratory studies may be limited in their ability to inform our understanding of how language learners perform in nonlaboratory conditions. The present study represents an attempt to bridge the gap between laboratory research and "real world" settings. This study aims to use the laboratory setting to study second language acquisition in order to take advantage of benefits of laboratory studies, such as controlling factors, while at the same time attempting to incorporate "real world" elements into the research. The goal of this approach is to be able to generalize the results of this study to the real world to a greater extent than previous laboratory research.

With this goal in mind, the present study investigates the acquisition of novel L2 contrasts through laboratory tasks that differ in the degree to which they capture characteristics of "real world" language use. This approach allows us to investigate the generalizability of previously used laboratory methods and to develop pedagogical materials and procedures that aim to help learners acquire the phonology of a new language.

CHAPTER 2

LITERATURE REVIEW

One aspect of second language phonology that is difficult for L2 learners is acquiring the segmental contrasts of the target language; that is, distinguishing between contrastive sounds in the target language. Most researchers who focus on the acquisition of L2 segmental contrasts begin at the assumption that the initial state for L2 phonological acquisition has the same characteristics as the L1 system. A number of models have arisen that attempt to predict and explain the difficulty in learning segmental contrasts for L2 learners. For example, the Speech Learning Model (Flege 1995), the Perceptual Assimilation Model (PAM) (Best, McRoberts, & Sithole, 1988), and the Featural Model of L2 Perception (Brown, 1998; Larson-Hall, 2004) are all models that have been developed to attempt to explain and predict how L2 phonology develops in relation to L1 phonology.

The present dissertation does not represent an attempt to establish the predictive power of one model over another, but rather builds on concepts that models of L2 phonology have in common. In each of the models cited above, perception is considered to be the driving force behind L2 phonological acquisition. That is, nontarget-like perception ("accented listening") establishes an L2 phonology that is nontarget-like[1]. This accented phonological system then generates nontarget-like productions, accented

[1] Recent research such as that by Escudero, Hayes-Harb and Mitterer (2008) has identified that knowledge of orthography may also play a role in the development of the L2 phonological system.

speech. The present dissertation focuses on the concept that perception drives production and aims to improve techniques for teaching L2 phonology through perceptual training.

Studies attempting to understand the phenomenon of accented listening are typically conducted in laboratory settings. Among the major findings of the large literature on the perception of novel L2 contrasts are the findings that learners can become more accurate in L2 phonology over time and that varying task demands in laboratory studies can have systematic effects on learners' performance with respect to novel contrasts. The following discussion focuses on these two findings.

2.1 Development of the Ability to Perceive and Produce Novel L2 Phonemic Contrasts

As mentioned above, various studies have demonstrated that it is possible for learners to become more accurate in their perception and/or production of novel L2 contrasts over time. Some of the factors that have been demonstrated to influence this process are age of arrival (AOA), length of residence (LOR), acquisition setting, cultural attitudes (Moyer, 2007), and musical ability (Slevc & Miyake, 2006).

2.1.1 Age of Arrival and Length of Residence

Many studies have investigated the effect of AOA and/or LOR on second language phonology. Since these two variables are related (Stevens, 2006) they are discussed together in this section. These studies support the idea that learners with earlier AOA in an English-speaking country achieve better phonological performance. For instance, Mayo, Florentine, and Buus (1997) found that early bilinguals showed better perception in noise than late bilinguals. MacKay, Meador, and Flege (2001) showed that

Italian speakers with an earlier AOA in Canada performed better on a test of word-initial consonant perception than later arrivals. Similarly, Flege and MacKay (2004) found that Italian speakers with early AOA (2-13 years) in Canada performed better on tests of English vowel discrimination than later arrivals (15-26 years). MacKay, Flege, and Imai (2006) found that speech of Italian speakers with early AOA in Canada was perceived as less-accented by native speakers of English than speech of later-arriving counterparts.

A logical conclusion to draw from these studies is that those who arrive earlier in the L2 phonological environment are more likely to be successful language learners. But it could also be that those who arrive earlier are not performing more accurately because of their early AOA but rather because those who arrive early tend to have longer LOR, and therefore more exposure, to the L2 phonological system. That is, perhaps it is length of exposure that determines the effects seen in AOA studies. Baker and Trofimovich's (2006) results show that for some Korean learners of English, AOA had an effect on performance on tests of English vowel perception and production, with earlier arrivals (around age 9) performing better than late arrivals (age 21 or higher). However, in the late-arrival group, those who had about 10 years of residence in the United States performed significantly better on tests of production than L2 speakers with shorter LOR. Trofimovich and Baker (2007) also found that Korean children with longer LOR in the United States had more native-like suprasegmental production than children with shorter LOR.

While these studies show that AOA has some impact on phonological ability, LOR also has a significant impact (cf. Moyer, 2007; Flege & Liu, 2001). Assuming that those with longer LOR have more exposure to the L2 phonological system, these studies

then support the idea that increased exposure to the L2 phonological system in laboratory settings (i.e. through phonological training) may also have an impact on phonological ability. Piske, et al. (2001) determined that age of learning (roughly equivalent to AOA) had a greater influence on judged degree of fore.g., accent in their study than LOR. However, their results did show effects of "continued L1 use", meaning that subjects who had high continuing levels of L1 use had stronger fore.g., accent ratings than subjects with low levels of L1 use. The authors interpreted their results to mean that LOR explained their pattern of results only inasmuch as it was partially correlated with age of learning. That is, age of learning had a more important impact on accentedness than LOR. The following section discusses studies of this type that attempt to influence L2 phonology using focused laboratory training.

2.1.2 Training Studies

The findings mentioned in the previous section that some learners perform more accurately than others supports the idea that learners can improve in their perceptual and productive abilities. The observation that learners can improve over time has motivated a wide variety of studies to develop training, a laboratory experience that would be a more efficient, encapsulated version of the input learners get in a second language learning English-speaking environment. Logan, Lively, and Pisoni (1991), Lively, Logan, and Pisoni (1993), Lively, Pisoni, Yamada, Tohkura, and Yamada (1994), and Bradlow, Pisoni, Akahane-Yamada, and Tohkura (1997) all found improvements in subjects' perceptual performance on the English/r/-/l/ contrast after training, and Bradlow, et al. (1997) found an additional benefit of training for production. Similar benefits for

perception were found by Wang, Spence, Jongman, and Sereno (1999) and for perception and production by Wang, Jongman, and Sereno (2003) when studying English speakers who were learning to use the tone system in Mandarin. The types of training employed in these studies are described in more detail in section 2.2.2 below.

In summary, it is possible for learners to improve in perception and production of a novel L2 contrast. The present study builds on training studies in particular to further develop training that will generalize to "real world" settings.

While some studies have investigated perception and production for the same L2 learners (e.g., Goto, 1971; cf. Bradlow, et al., 1997), relatively few studies have investigated directly the possibility that training speech perception can affect production for L2 learners. However, Rochet and Chen (1992), Bradlow, et al. (1997) and Wang, et al. (2003) contain information that sheds light on the perception-production relationship. Rochet and Chen (1992) found that native speakers of Mandarin Chinese demonstrated transfer of perceptual training on VOT durations in initial consonants in French when their posttraining productions moved in the direction of French VOT durations. Bradlow, et al. (1997) found evidence that their subjects as a group transferred perceptual learning to production. Similarly, Wang, Jongman, and Sereno., (2003) reported "significant" improvement in their subjects' overall accuracy in production after perceptual training.

The present study builds on the research in Bradlow, et al. (1997) and Wang, et al. (2003) by investigating the effect of perceptual training on production. In this study two kinds of training are compared in effectiveness of training both perception and production on different kinds of tasks. One type of training used is more typical laboratory training such as that used in the two studies just mentioned, and more authentic training.

2.2 Effects of Task Demands on Learners' Ability to Perceive and Produce Novel Contrasts

Logan and Pruitt (1995) remind researchers that the types of tasks that subjects are exposed to during training and at test may have an effect on perceptual and/or productive performance. The authors argue:

> …the primary goal of perceptual training studies may be to facilitate the long-term development of a novel phonemic category that is potentially usable among a variety of phonetic contexts, talkers, and other sources of variability…Thus, not only is the choice of tasks used for training critical, but so are the tasks used to evaluate the extent of generalization. (p.353)

That is, both training tasks and test tasks may have effects on results. This section reviews test tasks, training tasks, the relationship between training and test tasks, stimuli used in training and at test, and the effects of these factors on aspects of learner performance with respect to novel L2 contrasts.

2.2.1 Effects of Test Task

Research has demonstrated that the way in which perception is tested has an effect on results. For example, Werker and Tees (1984) found that the performance of English speakers on a test of discrimination of nonEnglish contrasts changed based on the interstimulus interval, the length of time between the presentation of the stimuli in an AX task. Similar results were found by Matthews and Brown (2004).

Information from the phonetic context around the stimulus also has an effect on results. Volaitis and Miller (1992) found that the rate of speech of the words surrounding the stimulus in sentence context affected perception of consonant voicing. Hayes-Harb, Smith, Bent and Bradlow (2008) found results that differed from previous studies on L2

perception dealing with the interlanguage speech intelligibility benefit; the authors suspect that one possible reason for this is that the Hayes-Harb, et al. (2008) study presented perceptual targets in isolation, while earlier work (e.g., Bent and Bradlow, 2003) had presented the targets in sentence context. Hayes-Harb, et al. (2008) suggest that the subjects may be using phonetic information from the context around the target to adjust their perception in a way that supports accurate recognition of the target. Similarly, in an early study of the effect of phonetic context, Ladefoged and Broadbent (1957) reported that their subjects changed their perceptions of certain vowels depending on the acoustic characteristics of vowels elsewhere in the phonetic context, showing that the nature of test stimuli can affect test results. The following sections discuss other task effects that are relevant to the present study in further detail.

2.2.1.1 Identification and Discrimination Tasks

The task used at test has been demonstrated to make a difference in the performance of nonnative speakers on a novel L2 contrast. The two kinds of tasks identified by Logan and Pruitt (1995) as relevant to training studies are discrimination and identification tasks. Discrimination tasks involve distinguishing between stimuli; these include AX, ABX, Category Change tasks (Logan and Pruitt, 1995), AXB, and XAB tasks. Identification tasks are defined as tasks where a stimulus is presented and the subject must associate the stimulus with some kind of label. It has been argued by Logan and Pruitt (1995) and by Logan, et al. (1991) that discrimination tasks such as the AX task capture intra-category differences between stimuli, while identification tasks encourage learners to attend to between-category differences. Therefore,

Logan, Lively, and Pisoni (1991), Lively, Logan, and Pisoni (1993), Lively, Pisoni, Yamada, Tohkura, and Yamada (1994), and Bradlow, Pisoni, Akahane-Yamada, and Tohkura (1997) used identification tasks at test. The present study also uses identification rather than discrimination tasks at test. Discussion of the nature of training tasks occurs below.

2.2.1.2 Authenticity of Test Tasks and Increased Task Demands

One possible concern about perceptual tests in the laboratory setting is that they might not be generalizable; that is, due to the differences between the laboratory task and authentic communication (such as natural conversation) the laboratory task may not test the abilities used in authentic communication, or performance on the laboratory task may not accurately predict performance in authentic communication. In previous research this concern has been addressed by adding noise to auditory stimuli, such as in Mayo, Florentine, and Buus (1997). The introduction of noise attempts to simulate real-world listening more closely because in the real-world, listening conditions are not always ideal; sometimes noise or other sound is present.

Xu (2010) argues that real-world speech and laboratory speech differ along a stylistic continuum; that is, laboratory speech is the style produced by speakers as a natural adjustment to laboratory conditions. As mentioned in the introduction, real-world language use differs in some important ways from the tasks often used in laboratory settings, in that in real-world communication settings, the L2 learner's cognitive resources are taxed in additional ways. For example, laboratory-style tasks often have learners read word lists or associate percepts with orthographic forms, which require only

the ability to decode orthographic forms. However, real-world communication almost invariably requires listeners to achieve lexical access (that is, listeners must access the meanings of the words they hear). In addition, many laboratory tasks allow learners to work with percepts and target words in isolation, while real-world communication demands on-line processing of phonetic information in the context of additional information such as phonological, syntactic, and semantic information. As discussed in Xu (2010), Bruce and Touati (1992) compared prosody of speech elicited in a laboratory setting to prosody of spontaneous speech and found negligible differences. However, this study addressed only acoustic similarities of production and did not address perception or training, both aspects of the present study. In addition, Bruce and Touati (1992) seems to be alone in examining similarities between laboratory speech and spontaneous speech. The question of similarity and generalizability between laboratory speech and speech created under more "real-world" demands is therefore still open. While lexical access and additional linguistic context are not the only two characteristics that distinguish laboratory tasks from real-world communication, these two aspects of communication provide a starting point to investigate the generalizability of laboratory tasks. More justification for choosing these two characteristics of communication is found in the sections that follow.

In a recent study, Jarvi (2008) attempted to incorporate lexical access and meaningful linguistic context into laboratory tests of second language listening. Jarvi manipulated test tasks in a different way from previous studies: by varying the degree to which the tasks reflected "real life" communication. Jarvi identified two aspects of real life communication that differ from traditional identification and discrimination tasks