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THE PHONOLOGY OF THE ABSOLUTE INITIAL STATE OF L3 ACQUISTION

By

KYLE PARRISH

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ABSTRACT OF THE DISSERTATION

The phonology of the absolute initial state of L3 acquisition

by

KYLE PARRISH

Dissertation Director:

Joseph Casillas

This is where the body of your abstract goes. The abstract should summarize your work. The abstract for a dissertation or document may be longer than one page; word count is more important than page length in this section.

ACKNOWLEDGEMENTS

Thank you to my committee, most of all to my advisor, Professor Joseph Casillas, and to Professor Magdalena Wrembel.

DEDICATION

*I dedicate this dissertation to my loving wife, Marinna, and to my 3 fur children,
Olive, Kevin, and Phyllis. I could not have done it without you.*

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library(ggplot2)
library(tidyverse)
```

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## -- Attaching packages ----- tidyverse 1.3.1 --

## v tibble  3.1.1      v dplyr   1.0.5
## v tidyr   1.1.3      v stringr 1.4.0
## v readr   1.4.0      v forcats 0.5.1
## v purrr   0.3.4

## -- Conflicts ----- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
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Chapter 1: Literature Review

1.1 Introduction

The difficulty of learning a new language adulthood has a well documented history. This is especially true in the case of phonological acquisition. For example, many studies over the course of the past five decades have demonstrated that adult second language (L2) learners often produce and perceive the sounds of the target language in a non-native manner (cite some flege stuff).

This difficulty arises, in part, because bilinguals often navigate complex communicative situations in which they produce and perceive speech from both of their languages in real time.

Recent studies suggest that bilinguals learn to modify their perceptual categorization routines in accordance with the phonetic realizations of the language they believe they are hearing (cite recent language set studies). Much less is known about the acquisition of a third language (L3A), particularly with regard to L3 production, perception, and phonological learning.

The present investigation explores the perceptual categorization routines of adult bilinguals during the initial stages of L3 acquisition.

Gap in the literature: Much of L3 phonological acquisition is not well known and is still under studied - lack of available resources and participants have lead to low sample sizes

The present dissertation aims to address the issue of low sample sizes and varied statistical analyses by, firstly, recruiting bilinguals who do not yet know a third language, and, secondly, by using more fitting statistical analyses made more appropriate by a larger sample size. It is likely that the relatively homogenous populations of bilinguals are in greater supply than trilingual populations, particularly when suggested methodological practices are to be used, such as the use of mirror-image groups. With

the increase in sample size, more precise observations and conclusions may be drawn about the very starting point of L3 phonological acquisition which are far less likely to be explained by statistical limitations such as sampling error.

1.2 Models of L2 phonological acquisition

Many accounts for L2 phonological acquisition exist. In general, these models all have in common that language-specific L1 categories drive L2 speech development. In the section that follows, a brief overview of each model, along with its evidence, will be covered.

1.2.1 The Speech Learning Model

The SLM posits..

SLM studies...

L3 SLM

1.2.2 The Perceptual Assimilation Model

The PAM predicts...

Evidence for PAM...

The PAM in L3...

1.2.3 The L2LP

The L2LP is similar to the PAM and predicts...

Evidence for the L2LP comes from...

The L2LP in L3...

1.3 Models of third language acquisition

Research in third language acquisition has attempted to model the interplay between L1 and L2 language systems in the acquisition of a third. Among questions asked by third language models is whether the L1 or L2, or a combination of both languages, serves as the basis in L3 acquisition. This question is complicated in the context of multilingualism due to the widespread diversity in bilingual populations that include wide variation in ultimate attainment in adult L2 learners, and, in the case of phonological acquisition, wide variation in the production patterns of L2 segments. The predictions and theoretical underpinnings of models of L3 acquisition are covered in the following section, as well as the empirical evidence for each model.

1.3.1 The Cumulative Enhancement Model

The Cumulative Enhancement Model (CEM) suggests that each language known by a bilingual may be used to enhance the process of L3 acquisition. In this view, both features of the L1 and features of the L2 are in principle available to the L3 learner from the beginning of the acquisition process.

Evidence for this model was found. . . .

An issue with this model is non-facilitation, as argued by Rothman.

1.3.2 The L2 Status Factor Model

In contrast to the CEM, the L2 Status Factor Model (L2SF) predicts that the L2 will influence the L3 by default, due to the proposed cognitive similarity between the L2 and the L3. These proposed cognitive similarities stem from the Declarative-Procedural model, which posits that late learned languages are largely subserved by the declarative memory system, whereas early learned languages are subserved by procedural memory.

Evidence for the L2 Status factor has been reported. . .

Counterevidence to this model has also been found in empirical studies that would serve as the basis for subsequent models.

1.3.3 The Typological Primacy Model

The Typological Primacy Model, like the L2SF, predicts that a single language will influence the L3, but differs in that this language may be either the L1 or the L2. The choice of language is thought to be driven by individually perceived psycho-typology. In this view, the choice of language is also not thought to be conscious, but rather driven by input in L3 learning.

There has been some support in the literature for the TPM, but this evidence often simultaneously supports other models. For instance, in a recent systematic review of 92 studies in L3 acquisition, @puig-mayenco_systematic_2020 concluded that, in support of the TPM, that either the L1 or L2 influenced L3 performance in 59 out of 92 studies. On the other hand, 29 of the studies out of 92 found that the L2 influenced the L3. However, these findings were not mutually exclusive; the authors coded 25 total studies as being explained both by L2 status and typology, meaning that the results of these studies reported that the L2 transferred to the L3, but could not rule out the possibility that psycho-typological transfer could also explain the results, since the studies did not use mirror image groups (i.e. L3 groups with the same languages, but the opposite order of acquisition).

Counter-evidence and issues with this model include lack of cross-linguistic support, and lack of specificity when it comes to the term “initial stages.” For example, evidence for the TPM has been found primarily in studies which contain Romance languages and a non-Romance language. To the author’s knowledge, no study has yet shown support for the TPM’s predictions outside of language combinations which contain two romance languages and a non-romance language which also employ the criteria suggested by Rothman (CITE) of mirror-image groups. The studies coded in the systematic review by Puig-Mayenco et al. as providing evidence for L2 Status and Typological proximity cannot be said to conclusively provide evidence for the TPM

for the same reasons that they do not provide conclusive evidence for the L2SF, since L2 status and typological primacy could explain the results. In short, the TPM does not currently have support from a study which uses mirror-image groups and does not involve 2 romance languages.

A second potential shortcoming of the TPM is the vagueness associated with the term “initial stages” of L3 acquisition. Rothman (2015) describes this time as some 20-25 hours of instruction, before which time access to either language is possible. This vague criterion makes it quite difficult to derive the predictions of the TPM in the case of learners who first encounter an L3.

1.3.4 The Linguistic Proximity Model and the Scalpel Model

These models propose that both language systems may influence the L3, but also that they may not.

Unlike the TPM and the L2SF, the Linguistic Proximity Model

(westergaard_crosslinguistic_2017?) suggests that transfer occurs on a property-by-property basis, rather than holistically. The LPM suggests that there is a “full transfer possibility,” meaning that any individual structure may transfer at any time, but that it also may not. Scholars have argued that this vague prediction creates a problem in modeling L3 transfer acquisition (bardel_l1_2020?; wrembel_multilingual_2020?), since it is unclear when transfer of a particular structure occurs and when it does not. Likewise researchers have argued that, unlike the TPM and the L2SF, the LPM is not easily falsifiable (bardel_l1_2020?). Given the lack of predictive power of the LPM, it may only receive post-hoc support.

Evidence for these models.. Westergaard et al. (2017), Mitronova & Westergaard (2018)

Issues come from lack of predictive power of the models.

1.3.5 Wrembel's model on L3 phonology

1.4 Previous literature in L3 phonology

The models discussed to this point, with the exception of Wrembel's model, have focused largely on morpho-syntax. The findings in L3 phonology have largely yielded mixed results and do not quite have a comprehensive model. Despite the lack of a model, some patterns emerge from the body of research. The following sections cover the empirical studies that have been done in L3 production studies across L3 proficiency levels, and the fewer studies done in L3 perception.

1.4.1 L3 Production Studies

*In a case study foundational to L3 phonology, ([hammarberg_articulatory_1993?](#)) and ([hammarberg_processes_2005?](#)) examined the productions of a single informant, who spoke L1 British English, L2 German, and L3 Swedish. SW, a near-native German speaker as rated by German natives, was recorded reading a story in Swedish at two different time points, first one month after moving to Sweden, and second after one year having lived there. Those Swedish recordings at both time points were then judged by native speakers of Swedish with regard to the accent of the speaker in the story, unaware that they were hearing the same informant at two different times. Interestingly, the Swedish speakers rated the first telling of the story as heavily German accented (influence from the L2), whereas in recording 2, they rated the accent as coming from an English speaker.

This initial effect has been referred to as a 'foreign language effect' ([meisel_transfer_1983?](#)) or, more recently, as L2 status ([bardel_role_2007?;](#) [hammarberg_processes_2005?](#)). The findings of ([hammarberg_processes_2005?](#)) suggest that this foreign language effect, or, in other words, the desire to sound less like a speaker of one's L1, may diminish as proficiency increases and be replaced by L1 effects. Other studies have also found primarily L2 influence in L3 productions in global accent ratings

(wrembel_l2-accented_2010?), VOT productions (llama_influence_2010?; tremblay_l2_2007?), vowel production (kamiyama_acquisition_2007?) vowel reduction and speech rhythm (gut_cross-linguistic_2010?).

Other findings in L3 production, however, have yielded mixed results. Several studies have found that acoustic properties of the participants' productions fall between L1 and L3 values, suggesting that both the L1 and the L2 have some influence on L3 productions, rather than solely one language. For instance, (wrembel_vot_2014?) measured VOT and aspiration in all languages of participants with two different language combinations: (1) L1 Polish, L2 English, and L3 French; (2) L1 Polish, L2 English, and L3 German. The results showed that each language had a specific stop-value, and that the L3 VOT productions were intermediate, falling between the L1 and L2 values. Similarly, (wrembel_cross-linguistic_2011?) examined thirty-two learners of L3 French with L1 Polish and L2 English who were recorded reading lists of words in carrier phrases. As in previous studies (wrembel_vot_2014?), combined transfer from the L1 and the L2 in VOT productions was found.

Findings of combined L1 and L2 influence in VOT productions were also reported by (wunder_phonological_2010?) in L3 Spanish speakers, and by (blank_transferencia_2009?) in L3 English speakers who spoke L1 Brazilian Portuguese and L2 French. Other studies have found an L1 influence on production despite L3 proficiency (wrembel_foreign_2012?), or in advanced L3 learners (llama_revisiting_2018?)*.

Kamiyama (2007), Wunder (2010), Tremblay (2007), Llama et al. (2010), Blank and Zimmer (2009), Gut (2010), Llama & Cardoso (2018), Wrembel (2010, 2011, 2012, 2014)

1.4.2 L3 Perception studies

Balas (2019), Liu

*Perception studies in L3 acquisition have been much more scarce than those on

production, and primarily in young participants. One of few L3 perception studies in adults is (**liu_effects_2019?**), which examined the perceptual boundary of a VOT continuum in trilinguals. The participants were L3 Spanish speakers who spoke L2 English and L1 Chinese. Though the authors focused their analysis on regressive transfer and comparisons to all speakers, the reported boundaries in the study ($n = 10$, 28ms for Chinese, 24.6ms for English and 23ms for Spanish) suggest that the participants were using their English boundaries for L3 Spanish categorization.

Other studies in L3 perception, which have examined young trilinguals, have found a wide range of results. For instance, (**wrembel_cross-linguistic_2020?**) found that cross-linguistic influence is structure dependent and varies among individuals, while (**balas_perception_2019?**) found CLI to be modulated by a complex combination of factors such as markedness of the segment under examination, proficiency in the L2 and the L3, and L1 typology. Finally, another study on L3 perception in young learners (Polish L1, English L2, German, L3) revealed that the L2 predominantly influences L3 perception in both rhotic sounds and devoicing of word final stops (**wrembel_cross-linguistic_2020?**). These variable findings of the source of influence in L3 perception and production, including single language influence, combined languages influence, or structure-dependent influence, point to a lack of homogeneity in multilinguals.*

1.5 Methods and anylsis in previous work

Organization paragraph

1.5.1 Sample sizes

Sample sizes have been quite small. Describe the sample sizes of the body of research.

Small samples are associated with higher sampling error. Discuss the issues with modeling based on small sample sizes

1.5.2 Choices of analyses

Lack of main effects in ANOVA

How I combine better analyses with higher sample sizes to better the very beginning of L3A.

1.6 Cross-linguistic language features

Organization paragraph.

1.6.1 Vocalic systems

The Spanish vowel space is the smallest of the present study and consists of 5 distinct vowel categorizations and 3? diphthongs.

The vowel inventories of all three languages, relative to one another.

1.6.2 Use of Voice-Onset Time

The description of cross-linguistic uses of VOT.

Voicing in these segments can be measured acoustically using voice-onset time (VOT). VOT refers to the time interval between the release of a stop consonant and the onset of vocal fold vibration (lisker_cross-language_1964?). For example, in Spanish, the difference between [p] and [b] is manifested as a difference in VOT. Where [b] is voiced (a negative VOT), [p] is voiceless (a positive VOT). Languages which contain this distinction, in which the realizations of /p/ and /b/ are phonetically voiceless and phonetically voiced, respectively, are referred to as “true-voicing languages” (lisker_cross-language_1964?). Relevant to the present study, Spanish, French, and Hungarian fall under this category. English, on the other hand, contrasts stop consonants with only positive VOT via a long versus short lag distinction. That is to say, both /p/ and /b/ are phonetically voiceless, but /p/ is realized as a long lag

*stop and is aspirated, and /b/ is a short-lag stop that is not aspirated (**lisker_cross-language__1964?**).*

Chapter 2: VOT production at first exposure to an L3

2.1 Overview

The present study investigates the production of words in a language by bilinguals that they do not yet know. In so doing, the present dissertation aims to investigate the very initial stage of acquisition by providing an overview of the initial relative influence of both L1 and L2.

2.1.1 Research Questions

RQ1: Will Spanish-English bilinguals produce L3 words with Spanish or English like VOT?

RQ2: Will Spanish-English bilinguals produce vowels with F1 and F2 values more like English or Spanish?

2.2 Methods

2.2.1 Participants

4 total groups of participants will take part in the experiment. There will be 2 bilingual groups with opposite orders of acquisition, Spanish L1-English L2, and English L1-Spanish L2, and monolingual English and monolingual Spanish participants. The bilingual groups will contain 75 participants per group, where the monolingual groups will contain 50 participants per group, for a total of 400 participants. These sample sizes were justified by a power analysis, in which a power level of .8 was desired (CITATION).

2.2.2 Tasks

Organization paragraph: An elicited production task & A shadowing task in the L3.

2.2.2.1 Bilingual Language Profile

To measure language use and language dominance, the Bilingual Language Profile (BLP) will be used.

2.2.2.2 LexTALE

The LexTALE will be used to measure English and Spanish proficiency. The LexTALE is a lexical decision task, in which participants see either words or pseudowords on a screen one at a time. Participants are supposed to then decide whether the word presented is a real word in the language or a pseudoword. The task is intended to be a measure of vocabulary size and thus a proxy of proficiency. ADD SENTENCE JUSTIFYING THE LINK BETWEEN VOCAB AND PROF. Either the English and Spanish versions of the task will be used in the study, depending upon the L2 of participant.

2.2.2.3 Elicited Production Tasks

In the elicited production task, the participants read words which appeared on the screen one at a time and submitted their recording of the read words by clicking on a record button to begin the recording, a stop button to end the recording, and an upload button upon completion of the recording. Participants were able to listen to their recording after completing a trial and were able to re-record in the event of an error.

2.2.2.4 Shadowing Task

For the shadowing task, participants were given a French word on screen and were able to play a recording of that word up to three times. The participant would then record themselves repeating the word that was uttered one at a time in a procedure identical to the elicited production task. The experiment was programmed and given in the online platform Labvanced. In order to control for language mode, the language specific word lists were presented in separate sessions, and the order of the languages (Spanish

first or English first) was counter-balanced across participants. All participants ended the experiment with the L3 shadowing task.

2.2.3 Analysis plan

The results will be analyzed using a Bayesian Multilevel Regression where the outcome will be VOT and the fixed effect, categorical predictor will be language, and the fixed effect continuous predictor variables LexTALE scores, and a dominance metric.

2.3 Simulated Results

Chapter 3: Vowel Production at first exposure to an L3

3.1 Research Questions

3.2 Methods

3.2.1 Tasks

3.2.2 Participants

3.3 Simulated Results

Chapter 4: Perception of L3 vowels

4.1 Research Questions

RQ1: Will Spanish-English bilinguals assimilate L3 sounds to L1 or L2 categories?

RQ2: Will Spanish-English bilinguals perceive differences on an acoustic continuum using L1 or L2 boundaries?

4.2 Methods

4.2.1 Participants

4 total groups of participants will take part in the experiment. There will be 2 bilingual groups with opposite orders of acquisition, Spanish L1-English L2, and English L1-Spanish L2, and monolingual English and monolingual Spanish participants. The bilingual groups will contain 75 participants per group, where the monolingual groups will contain 50 participants per group, for a total of 400 participants. These sample sizes were justified by a power analysis, in which a power level of .8 was desired (CITATION).

4.2.2 Tasks

4.2.2.1 AX Discrimination Task

The /i/ - /u/ continuum will be used, in which French /y/ is an intermediate. At this time, a second continuum is also being considered.

4.2.2.2 Category Identification Task

The purpose of this task is to identify whether French segments are assimilated to Spanish or English categories. Four conditions are proposed for vowels (1) The same vowel sound is found in both languages, such as /i/, which can be found in all 3 languages. (2) A sound which is found in English, but not in Spanish, such as /e/ in “bed,” or the short /I/. (3) Only Spanish, such as the rounded back-vowel /o/, and

finally, (4) a vowel which is not present in English or Spanish, but is in French, such as /y/.

The stimuli will be created by splicing natural utterances of the French vowels together, in closed syllables, with a consonant (e.g. gVg). The stimuli will be played 5 repetitions each, which will create 20 tokens per participant.

4.2.2.3 Analysis plan

The results will be analyzed using a Bayesian Logistic Regression where the outcome of language choice (English or Spanish) will be modeled as a function of presented vowel sound, LexTALE score, and a continuous language dominance metric.

4.3 Simulated Results

REFERENCES