TEACHING AND RESEARCHING FRENCH NASAL VOWELS: THE PROS AND CONS OF ONLINE TRAINING MODALITIES FOR IMPROVING PERCEPTION AND PRODUCTION

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Nasal vowels present a unique challenge to adult first language (L1) English speakers learning French as a second language (L2) due to the lack of phonemic distinction in their L1 as well as acoustic and articulatory factors that dampen the salient phonetic differences. Perceiving the distinctions among French nasal vowels can thus represent a struggle for both L2 French learners and their teachers. Adding to this challenging situation, language teachers report a lack of time and expertise as reasons for neglecting pronunciation instruction. In this paper I report on the use of online training modalities to confront two interrelated challenges: experimental training about nasal vowel distinctions and effective pronunciation instruction in and out of the classroom. I describe an experimental study using high variability phonetic training (HVPT) embedded in online lessons to improve learners' ability to distinguish among French nasal vowels. Turning to the pedagogical perspective, I then discuss the capacity of these asynchronous online platforms to provide effective pronunciation instruction in the L2 French classroom context. Taken together, this discussion forms a critical analysis of online modalities in research and explores their pedagogical applications as a strategy to mitigate potential downsides.

INTRODUCTION

Pronunciation, more than other second language (L2) skills, has faced the need for a bridge between research and teaching (Barriuso & Hayes-Harb, 2018; Levis, 2016). Despite considerable evidence that pronunciation instruction improves learners' oral production (Derwing & Munro, 2005; Saito, 2012; Saito & Plonsky, 2019; Sakai & Moorman, 2018), attention to pronunciation in the L2 classroom remains minimal (Derwing & Munro, 2005; Olson, 2014). There are several possible explanations for this lack of instructional focus, from the relatively understudied position of pronunciation research within the field of second language acquisition (SLA) to insufficient teacher preparation to language learner and teacher anxiety (Baran-Łucarz, 2011; Szyszka, 2011). Notwithstanding these possibilities, it is incumbent upon researchers to highlight the importance of pronunciation to overall L2 proficiency and to provide evidence-based tools to facilitate its instruction.

The current paucity of pronunciation instruction differentially affects learner outcomes based on the target language since each language is constrained by a unique set of segmental and suprasegmental features that can impede communication. Importantly, if we are to work within an instructional context that foregrounds comprehensibility and intelligibility (Levis, 2005; Munro & Derwing, 1995; Saito & Plonsky, 2019), the most salient features of the target language in question must be determined in order to develop an effective instructional paradigm. In the case of L2 French taught to first language (L1) American English learners, one of these

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salient features is nasal vowels (Inceoglu, 2016; Marquez Martinez, 2016). The acoustic and articulatory properties that render these segments difficult for learners to distinguish present a pronunciation challenge that must be met if learners' speech is to be comprehensible to L1 listeners.

Two difficulties, then, are presented here: finding a way to effectively teach students to perceive French nasal vowels and finding the time to do so. This is an area where lessons learned in the research context can be mined in order to improve pedagogy. To reflect on the ways in which research and teaching can be brought together, I discuss the online platforms that were used as a delivery system for training and testing materials in the current empirical study. I then explore how those modalities may be used in the classroom to facilitate pronunciation instruction. Through a critical analysis of these two distinct contexts, we will see in what ways and to what extent tasks and modalities can be manipulated to suit each situation.

Classroom Struggles with Pronunciation

While any number of factors may influence the choice (intentional or otherwise) to leave pronunciation instruction to the side, three main causes are discussed here: time, training, and anxiety. Anecdotally, we know that pronunciation is frequently neglected due to the age-old problem of not having enough time to include it. In a survey of thirty instructors from four universities, Olson (2014) calculated that they spent around eight minutes per week, or 2.6 minutes per class, on pronunciation. But why is this the case? Given that "research indicates that phonetic instruction serves to improve L2 pronunciation, even at the lower levels of language instruction" (p. 49), it would seem reasonable that pronunciation instruction should be explicitly addressed in lesson planning.

Derwing and Munro (2005) attribute the limited focus on pronunciation instruction to its disadvantaged position in SLA research, when they say that "The lack of attention to pronunciation teaching in otherwise authoritative texts has resulted in limited knowledge about how to integrate appropriate pronunciation instruction into second language classrooms" (p. 383). They argue that despite evidence that pronunciation instruction improves oral production, pronunciation's "marginalized status" means that "many ESL teachers have no formal preparation to teach pronunciation" (p. 389). This leads to a situation where instructors must rely on intuition or otherwise ignore pronunciation altogether.

Another potential explanation for the lack of pronunciation instruction is that both learners and teachers experience anxiety around L2 pronunciation. In two studies on L2 English acquisition by L1 Polish teacher trainees and high school students respectively, Szyszka (2011) and Baran-Łucarz (2011) used the Foreign Language Classroom Anxiety Scale (Horwitz et al, 1986) to examine the relationship between language anxiety and self-perceived pronunciation level. These studies provide further insight into both learners' and teachers' experience of pronunciation instruction. In both studies a significant correlation was found between anxiety and self-perceived pronunciation competence, with teacher trainees demonstrating a strong negative correlation ($r = -.54$, $p < .05$), most notably on several suprasegmental aspects of pronunciation (Szyszka, 2011, p. 292). High school learners, in a similar finding, displayed a negative correlation of moderate strength ($r = -.49$) between language anxiety and perceived foreign

language pronunciation (Baran-Łucarz, 2011, p. 504). Considering the amount of language educators who do not speak the language they teach as their L1, it is important to take into account their own L2 pronunciation anxiety as well as that of their students.

Given the constraints of lack of training and pronunciation anxiety, one of the challenges of pronunciation research is to determine how to make the best of the limited contact time available to teachers in a way that minimizes stress to the teacher and the learner. Online modalities represent a way to alleviate anxiety by allowing learners to work on difficult pronunciation topics autonomously and without the inherent time constraints imposed by classroom activities. By giving learners the opportunity to practice perceiving and producing L2 segments at home, these modalities free up valuable class time for the application of the information in asynchronous lessons. Such autonomous practice has been shown to lead to similar improvements when compared to teacher-led pronunciation practice (Martin, 2020a). They have the added potential to address teacher preparedness by providing supplemental pronunciation lessons that do not need to be explained in class.

Focus on French Nasal Vowels

Nasal vowel contrasts have been considerably less studied than consonants and oral vowels. Studies of L2 French, for example, have largely focused on front rounded oral vowels (e.g. /y/ and /œ/) (Brosseau-Lapré et al., 2013; Levy & Law, 2010; Simon et al., 2010). In one study of French nasal vowel contrasts, Inceoglu (2016) found that both audiovisual and audio-only training improved perception of the target contrasts and that the audiovisual condition had a greater impact on production.

In nasal vowel articulation, the velum is lowered to allow air to pass through the nasal cavity as well as the oral cavity. Whereas some nasalization occurs in English oral vowels adjacent to nasal consonants, this difference is allophonic. In French, on the other hand, nasality represents a phonemic contrast, and the adjacent nasal consonant is not articulated. The phonemic status of French nasal vowels makes them important to comprehensibility and intelligibility due to their importance for distinguishing various word pairs. Nasal vowels are contrastive not only in relation to other nasal vowels (e.g. *bon* vs *bain* vs *banc*), but in relation to oral vowels as well (e.g. *bon* vs *beau*).

Nasal vowels in French represent a case where segments are crucial to comprehensibility and intelligibility. As explained by Inceoglu (2016), the differences among French nasal vowels are visually salient (p. 1179) due to the spectrum of rounding that is present. The three commonly cited French nasal vowels (and those I address in this study) are considered hyper-rounded (ɔ̃), rounded (ɑ̃), and unrounded (ɛ̃) (Inceoglu, 2016). Further, Marquez Martinez (2016) posits that because of the relationship between vowel nasalization and nasal consonants in English, "when English speaking learners of French hear a French nasal vowel, they might associate such a feature to a consonant and not to the vowel" (p. 4). More than an issue of reducing foreign accent, then, the correct perception and pronunciation of nasal vowels facilitate communication.

Research Questions

The purpose of the present study is twofold: to contribute to the empirical literature regarding the efficacy of perceptual training to improve L2 French nasal vowel distinctions, and to explore the practical potential of online modalities in both empirical training/testing and classroom applications. To that end, two research questions arise:

1) Does online training in French nasal vowels lead to a greater improvement in perception compared to a control group?
2) What are the advantages and drawbacks of online modalities in the training and testing phase, and how can these be mitigated in the classroom context?

METHODS

To answer the first of these research questions, an empirical study was designed to test perception and production in two groups of participants. The experimental group completed HVPT on French nasal vowels while the control group completed reading comprehension tasks adapted to their level of instruction. Both groups completed a pretest, posttest, and delayed posttest in perception as well as production. In this paper I present the perception results.

Participants

Recruitment was undertaken in all courses of the basic language sequence (the first four semesters of instruction), where students were given a general overview of the goals of the study and were offered extra credit for completing all testing and training. This resulted in an initial pool of twenty-six participants who were then randomly assigned to either the experimental or control group. After a considerable level of attrition over the course of the semester, six participants had successfully completed all training and testing, and four additional participants had completed the pretest and posttest (but not the delayed posttest), leaving ten potential participants for data analysis (see Table 1).

Table 1
Participants Chosen for Analysis

	Participant	Group	Pretest	Posttest	Delayed
101	P101-10	Control	63.33	66.67	60.00
	P101-22	Control	66.67	96.67	
102	P102-1	Control	73.33	83.33	90.00
201	P201-4	Control	63.33	80.00	73.33
	P201-6	Control	70.00	80.00	70.00
	P201-1	Experimental	76.67	86.67	86.67
	P201-5	Experimental	90.00	93.33	
	P201-7	Experimental	60.00	63.33	66.67
	P201-9	Experimental	73.33	86.67	
202	P202-5	Control	83.33	80.00	

Unfortunately, all participants from the first, second, and fourth semesters of instruction who completed the study had been randomly assigned to the control group. For this reason, and in the interest of having a consistent comparison across conditions (experimental vs control), I focus here on four participants, all from the third semester of instruction, who completed all three tests.

Materials and Procedure

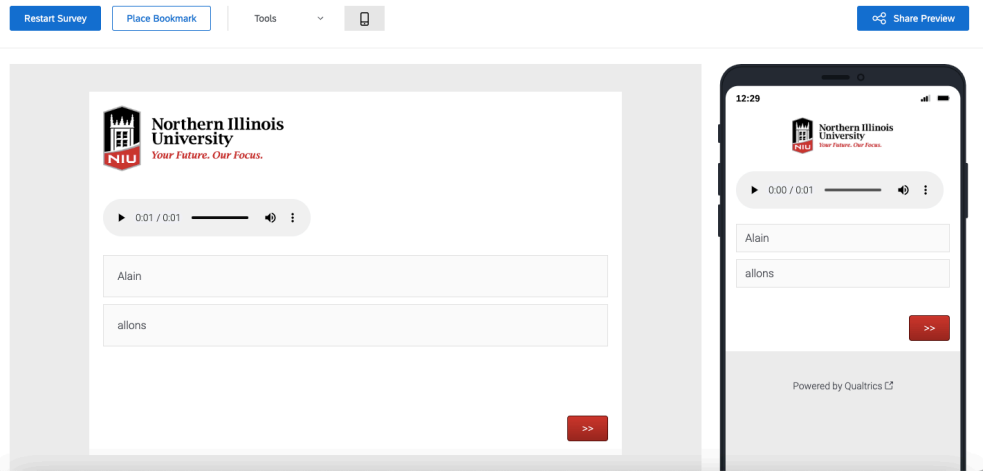
Following recruitment, participants were sent a welcome email and directed to complete the demographic questionnaire and the pretests of perception and production. They then completed ten weeks of asynchronous online training, followed by the perception and production posttests and (three-week) delayed posttests. All reminders and links to the testing and training materials were sent via email. The online survey platform Qualtrics was used for the demographic questionnaire, perception tests, and training for both groups.

Perception Tests

Five native speakers, two women and three men all originally from France, recorded the tokens. In order to encompass many of the common lexical contrasts, the list included sixty sets of minimal pairs. All tokens were real words, and approximately half of them contained one of the target vowels /ɑ̃ ɔ̃ ɛ̃/. Once all audio files were uploaded to the Qualtrics platform, sixty blocks were created. Each block contained five audio files of the same token, one from each native speaker. The blocks were then internally randomized, so the speaker varied from token to token.

Participants were presented with a simple audio player and a choice between two written words, representing one of the minimal pairs (see Figure 1). They were instructed to listen to the audio file and choose the word they heard by clicking on it, and to advance quickly without spending too much time on any one token. No feedback was given at this time. Additionally, the timing feature was applied to each block to verify the amount of time spent on that item. During the testing sessions, each participant was presented with thirty-five blocks at random. The same testing procedure was repeated for the posttest following the ten-week training phase, and again three weeks later (delayed posttest).

Figure 1
Screen Shot of Perceptual Training Task Items



Intervention

During the ten weeks between the pretest and posttest, the experimental group participated in an augmented version of the testing procedure: they were presented with thirty blocks out of sixty and were asked to click on the word they heard. Right after, they were shown the correct answer and prompted to listen again to the "correct" audio file. They were also asked to look at and listen to the audio file of the "wrong" answer. In this way, they were encouraged to reflect on the differences among the various minimal pairs they heard as well as their own perceptual processes. In preparation for these lessons, the first two weeks of training also contained brief lessons (two to three PowerPoint slides) about French pronunciation to introduce them to the basic concepts.

During this same ten-week time frame, in order to allocate approximately equal time to additional French language instruction, the control group completed weekly reading comprehension tasks. These consisted of reading an approximately 200-word text (selected according to level) and answering eight to ten simple comprehension questions. The control group received no pronunciation-related instruction or content as part of the study, though they may have received pronunciation instruction in their regular classes.

RESULTS

Given the small sample size, a statistical comparison of the two groups was not possible, leading the focus to descriptive statistics instead. Despite significant attrition resulting in groups of two participants each, an interesting difference emerged. While the control group improved their perception to a greater extent than the experimental group from the pretest to the posttest, they lost this advantage in the three weeks between the posttest and the delayed posttest (see Table 2). The experimental group, on the other hand, continued to improve during the same period.

Table 2
Perception test averages by condition

Group	Pretest avg	Posttest avg	Delayed avg
Experimental	68.33	75.00	76.67
Control	66.67	80.00	71.67

Table 3
Perception test gain scores by condition

Group	**Gain pre-post**	**Gain post-del**	**Total gain**
Experimental	6.67	1.67	8.33
Control	13.33	-8.33	5.00

In other words, despite the larger gain score of the control group from pretest to posttest, the experimental group achieved a larger total gain score throughout the study period thanks to their continued improvement after training (Table 3). The control group, on the other hand, seemed to lose most of their gains once the training phase was over.

DISCUSSION

Nasal Vowel Perception Training Results

Due to the small group sizes, no confident conclusions can be drawn from these data. They do, however, highlight an avenue for further research to confirm the results using robust statistical analyses, and to analyze the reasons for the experimental group's superior performance over time. It would be tempting to conclude from these data that any improvement from pretest to posttest was simply due to both groups continuing to receive input in the classroom, unrelated to the additional pronunciation (and reading) instruction that took place in the study. The results of the delayed posttest, however, provide a glimmer of hope that the extra perceptual training was influential in the continued success of the experimental group. Future iterations of this study will incorporate perceptual training as part of the coursework; offer additional incentives to enhance retention of the participant pool; and investigate how long the intervention should last for optimal results.

Pros and Cons of Online Modalities for Empirical Research

Online modalities like Qualtrics show promise in mitigating the constraints of the language classroom: lack of time, lack of teacher training, and the effect of anxiety on pronunciation teaching and learning. In order to explore those possibilities in pedagogical contexts, we must first look at the pros and cons of using the asynchronous online format in the empirical context. Three main benefits can be identified: quality and quantity of input, ease of delivery, and mitigation of anxiety.

The main benefit of asynchronous online pronunciation lessons is the ability to take advantage of high variability phonetic training by exposing participants to the amount and variety of tokens needed to create robust perceptual processing of the target segments. Research continues to support the effectiveness of HVPT (Carlet & Cebrian, 2022; Melnik & Peperkamp, 2021; Saito et al., 2022; Thomson, 2018), and technological advances have made it possible to easily record and manipulate audio files to be used in phonetic training.

Additionally, the Qualtrics platform is user friendly, easy for students to navigate, and provides a free resource for autonomous pronunciation practice. Sending materials via email with links and instructions makes the process simple for both researcher and participants. Closely related to the ease of delivery is the mitigation of pronunciation-related learner anxiety, since the ability to complete tasks in the comfort of a familiar location and without a researcher looking over one's shoulder surely reduces the potential stress of completing the tasks involved.

These benefits of online training do not come without corresponding challenges. Notably, the same lack of supervision that may put students at ease can introduce confounding variables into the study. Participants may be receiving outside help, spending too much time on each item, or not paying much attention at all. Additionally, without the structure and consistency of the laboratory environment, audio quality cannot be ensured and may vary from participant to participant or even from test to test, in a case where the same person completes one test from a given location and the next test from a different one. Though this is not ideal, it does more accurately reflect real-life language use and thus represents a more authentic learning experience. Finally, there is a strong potential "out of sight, out of mind" effect inherent in allowing participants to complete activities on their own.

While these downsides do not necessarily rule out conducting empirical research in an asynchronous online format, they do need to be taken into consideration during the study design phase. Fortunately, the personal attention and intentional design of the pedagogical context are such that many of these potential pitfalls can be mitigated.

Benefits of Online Modalities for Asynchronous L2 Learning

Online instruction and learning outcomes have been in the spotlight in the years since the pandemic, with encouraging results suggesting that not only can online pronunciation instruction be effective but that online students do just as well as those receiving face-to-face instruction (Martin, 2020b; Meritan, 2022; Violin-Wigent, 2014). Further, some of the aspects of online delivery that prove challenging for empirical research can be effectively used for asynchronous learning activities in the L2 classroom due to the scaffolding provided by the instructor and the ability to actively apply concepts presented in online format to subsequent in-person lessons. Additionally, by allowing teachers to expose their students to a diverse array of voices, articulations, and phonetic contexts, online modalities offer the benefits of high variability phonetic training without placing an added burden on the teacher to find time (and apply training) that they don't have.

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Appendix - Perception test stimuli: minimal pairs

ongle/angle
pour/pur
patient/passion
sous/su
dans/don
vent/vin
temps/teint
tout/tu
frein/front
quand/con
violent/violon
généreux/généraux
avant/avons
courant/courons
emporter/importer
parent/parrain
bain/bon
Inde/onde
veulent/vol
enfant/enfin
grand/grain
leur/lors
plan/plein
coeur/corps
faux/feu
sans/sain
chaton/châtain
pont/pain
mon/main
lion/lien
blanc/blond
talent/talon
étant/éteint
Alain/allons
fin/font