

Take-home assignment 3

Acoustic variation between English nasalized vowels and French nasal vowels.

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LING 282W

ABSTRACT: The audito

1.1. Background

Growing up surrounded by and speaking both English and French, the author of this study began to perceive of French nasal vowels as having more nasality to them, in contrast to English nasalized vowels. In fact, they often mistook English's nasalized vowels for their oral counterpart because of a faint auditory difference¹, whereas in French it is more distinguishable. Subsequently, they began to wonder if there was an explanation; perhaps certain vowel features that might influence nasality perception of vowels. The purpose, however, of this paper is to examine the acoustic variation between the English nasalized [] and [] vowels and the French nasal vowels [] and []. Since formant values are an indicator of vowel quality and nasalization is the result of an open velum (Kausar 2), one might predict a lowering and backing of the tongue alongside the lowering of the velum, thus resulting in a higher F1 value and a lower F2 value. Now, if French nasal vowels are perceived to have more nasality than English nasalized vowels, then the velum would need to be further lowered to allow a greater opened nasal cavity. Therefore, the tongue's position should be even lower and further back, reflected by a higher F1 and a lower F2 value.

2. METHODOLOGY

2.1. Participants

This study includes two participants, one a native English speaker and one a native French speaker. The first participant is a Canadian born female in her 60s. She grew up in British-Columbia where she spoke and learned English in school. She acquired French as an L2 in high school and continued to study it throughout university. The second participant is a French male in his 60s. He is a native French speaker and grew up in France where he spoke and learned French in school. He learned Spanish as an L2 for roughly 3 years while in school. As an adult, he was self-taught English and in 1975 he moved to Canada and settled in British-Columbia where he currently resides. He continues to use French in his daily life.

2.2. Data

In French, there are only 4 nasal vowels whereas in English, any vowel can become nasalized if succeeded by a nasal consonant. For that reason, this study will only focus on 2

¹ English in this study refers to the standard North American accent, and excludes accents such as Southern, Mid-Western, Newfoundlandian, etc.

vowels that are common in both languages, the [] and []. To begin, a list of English and French words containing said vowel sounds was curated. Regarding the English words, in order to cause vowel nasalization, a nasal consonant followed the vowel. The English and

[] and [] words show more consistent results. Regarding the [] vowel words, their F2 values fall within the 1000 Hz range whilst the F2 values of the [] vowel words are higher on the 1000 Hz scale averaging closer to 2000 Hz.

In Table 1b, it presents the formant values of the French nasal vowels [] and []. According to this table, the words with the [] vowel maintain more consistent F1 values than its English counterpart. This consistency, however, is not as apparent when observing the F1 values of the [] words, for which there is a greater difference between F1 values. For the F2 values for both [] and [] words, one can observe greater consistency among the results. For each group of words, the difference between their F2 values is less significant.

Table 1a. Formant values of the English nasalized vowels [] and [].

Vowel			

Table 1b. Formant values of the French nasal vowels [] and [].

Vowel	Word ²	Formant value	
[]	gant	546.70	1517.91
	campagne	622.53	1396.16
	décembre	571.87	1678.05
[]	plein	453.03	1634.84
	imperméable	282.44	1790.12
	faim	486.75	1637.83

3.2. Findings for the French nasal vowel []

To facilitate the comparison of the two English and French vowels, an average of both F1 and F2 values was determined. Table 2a lists the formant average for the [] vowel, whilst Table 2b lists the average for the [] vowel for both languages. According to Table 2a, for the English nasalized vowel [], the F1 and F2 values averaged at approximately 580.37 Hz and 1530.71 Hz, respectively. As for the French nasal vowel, its F1 and F2 values averaged at around 580.36 Hz and 1530.70 Hz, respectively. Just as the results indicate, the French [] has lower formant values than the English [], however this difference is extremely

Table 2a. Average formant values for [].

English		French	
580.37	1530.71	580.36	1530.70

Table 2b. Average formant values for [].

English		French	
634.00	1927.77	407.41	1687.60

4. DISCUSSION

4.1. Summary of findings

The results of this study perhaps give rise to more questions than answers and might even alter one's preconceived assumption regarding the nasalization of vowels. In this study, nasalization was defined as the result of an open velum, allowing air to flow through the nasal cavity instead of through the mouth (Kausar 2). Following this definition, an initial prediction was conceived that if French nasal vowels are perceived as more nasal than English nasalized vowels, the French vowels would require higher formant values than the English vowels. According to these results, this is not the case. In reality, the formant values of the French nasal vowels are inferior to those of the English nasalized vowels. The lower formant values for the French nasal vowels [] and [] indicate that the position of the tongue during the pronunciation of these vowels is not as low and not as far back in the mouth as it is when pronouncing their English counterparts. Consequently, based on these results, it is, in fact, the English nasalized vowels that appear to have a higher nasality than French nasal vowels, thus invalidating the earlier prediction.

accidentally include either preceding or succeeding sounds within the desired strip which will affect the results. This is difficult to avoid, since the desire is to obtain natural-like speech and not a fragmented pronunciation of words. These are a few of the main limitations observed during this study which would consequently affect the outcome of the results.

4.3. *Furthering the research*

In the background section of this paper, it outlined the idea that certain vowels can sometimes be perceived as having more nasality to them than others. Although that was not the topic of this particular paper, one might ponder whether vowel nasality is influenced by acoustic features. Much research has been conducted regarding this question and according to a study by Carignan et al., they concluded that nasality is not simply influenced by the opening of the velum and changes in tongue position, but rather a more complex phenomenon (679-680). Subsequently, further studies have conducted experiments to determine what other acoustic features causes nasality, including James F. Curtis's study "The Acoustics of Nasalized Speech" as well as Nancy F. Chen's paper "Vowel Nasalization in American English: Acoustic Variability due to Phonetic Context". Both of these studies focus on the different features of acoustic variation and of its relation to vowel nasality and perception. There was even a study by Will Styler in which the acoustic features of vowel nasality in English and French vowels are compared. In this study, he concluded that the acoustics of vowel nasality do differ between the English and French vowels (2481). Although the data from this study does not validate its initial prediction, the data does, however, support Styler's conclusion.

5. CONCLUSION

According to the results of this study, there is acoustic variation between English's nasalized [ɪ] and [ʊ] vowels and French's nasal vowels [ɛ̃] and [ɔ̃]. This outcome, however, also revealed that it's, in fact, the English [ɪ] and [ʊ] vowels that tend to have higher nasality than their French counterparts. This finding was surprising due to the fact that French nasal vowels are perceived to be higher in nasality than English nasalized vowels. It does, however, support the idea that vowel nasality is not a simple linguistic feature, but rather a complex system composed of different parts working together to cause nasalization.

6. REFERENCES