

Analysis of Errors Produced from the Articulatory Perspective, the Verbo-Tonal Method and the Perceptual Perspective in French phonetics

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Abstract: This case study analyzed the phonetic difficulties encountered by a French as a Foreign Language (FFL) learner at the intermediate level, with a particular focus on the articulatory and perceptual aspects of his production. This study also analyzed his errors by using the Verbo-Tonal Method. Through a detailed analysis of recorded speech samples, this study examined his pronunciation errors in both consonant and vowel production, using the framework of the Articulatory Perspective, the Verbo-Tonal Method and the Perceptual Perspective.

Keywords: Articulatory Perspective, Verbo-Tonal Method, Perceptual Perspective, French Phonetics.

1. Introduction

Pronunciation plays a key role in language acquisition process, and it is regarded as a key competence of oral production in CEFR. As a result, teaching pronunciation seems to be essential for language learning[1], and before proposing suitable pedagogical implications, it is necessary to discover and analyze the sources of errors of language learners.

Existing studies have investigated the role of the Articulatory Perspective, the Verbo-Tonal Method and the Perceptual Perspective in the acquisition process of phonetics. However, previous research rarely triangulated articulatory, verbo-tonal and perceptual analyses on the same learner dataset, which left this area under-explored.

The aim of this study is to observe and analyze the errors of the participant in the French phonetic system, by adopting three analytical frameworks: the Articulatory Perspective, the Verbo-Tonal Method, and the Perceptual Perspective,

Verbo-Tonal Method in Foreign Language Acquisition not only for phonetics but also for the emotional investment in the learners[6].

2.1.3. Perceptual Perspective

The importance of input and perception of language learners has been discovered by several studies. Flege (2011) has presented the impacts of phonetic input on the L2 phonological learning process[7]. Huensch (2016) has discussed the beneficial impacts of perceptual training on oral productions[8], while Sakai and Moorman (2018) have also revealed the impacts of perception training on the production of second language phonemes[9].

Furthermore, existing literature has shown that the perceptual difficulty could be influenced by varied factors. Polka (1991) and Winn and Stilp (2019) have mentioned the varied factors that could impact the perception of phonetics[10][11]. Best and Strange (1992) have also observed the effects of phonological and phonetic factors on the perception[12].

2. Literature review

2.1. Existing literature

2.1.1. Articulatory Perspective

Delattre has proposed a foundational classification of vowel aperture, outlining how different degrees of openness influence both articulation and syllable division[2].

Moreover, Maillart has presented a diagnostic framework that highlights the importance of the cognitive and linguistic process for the articulatory and phonological troubles[3]. Her approach, initially developed in language therapy contexts, proves valuable in understanding the persistence of pronunciation errors in language learners.

2.1.2. Verbo-Tonal Method

In parallel, the Verbo-Tonal Method (VTM) has emerged as an effective pedagogical tool for pronunciation correction. Billières has argued for its integration into phonetic didactics, viewing VTM as a means to develop prosodic perception and improve oral accuracy[4].

More recently, Lorenzi et al. (2021) have demonstrated the method's positive impact on pronunciation learning[5], while Ville (2021) has discussed the beneficial impacts of the

2.2. Research gap

Even though existing literature has discussed the role of the Articulatory Perspective, the Verbo-Tonal Method, and the Perceptual Perspective in phonetics learning, prior work rarely triangulated articulatory, verbo-tonal and perceptual analyses on the same learner dataset. Addressing these research gaps, the current study aims to analyze the phonetic errors in French by using the Articulatory Perspective, the Verbo-Tonal Method and the Perceptual Perspective together, thus helping to find out a suitable pedagogical strategy for FFL learners at the intermediate level in further studies.

3. Methodology

3.1. Participant

This case study involved a 20-25 year old Chinese participant who currently studies in language class at the Université Paris Cité. The participant provided informed consent in Chinese Mandarin before the research. For protecting privacy and security, this study will anonymize all the data, and the participant was allowed to withdraw at any point throughout the study. The study adhered to institutional

guidelines for human research.

The participant had an overall level between B1 and B2 in French, verified by the institutional placement exams. The participant has been learning French for one year in a language class. The participant's L1 is Mandarin Chinese, and he also started learning English as L2 more than ten years ago.

3.2. Research Design

This case study adopted a qualitative method to collect and analyze the errors in the oral output of the participant by using the Articulatory Perspective, Verbo-Tonal Method and Perceptual Perspective.

To collect the oral input data, this study observed the performance of the participant and the interaction between the participant and his French teacher in language class. The sound input of the participant, collected throughout language class observation, was audio-recorded, and the transcriptions of audio pedagogical supports were scanned.

To collect the oral output data, this study audio-recorded a read-aloud task of a text in French, which was a handwriting sample of the participant. Before collecting the output data, this study examined the orthography of this text to minimize the bias caused by the orthographic errors. This study also designed a series of warm-up activities to minimize the bias caused by the deliberate avoidance of mistakes and the stress of the participant. The oral output of the participant was audio-recorded, transcribed and coded.

To analyze the data, this study used different tables to categorize different types of errors that occurred in the oral output of the participant, and analyzed his errors according to

the Articulatory Perspective, the Verbo-Tonal Method and the Perceptual Perspective.

3.3. Data Collection

This study collected oral input data by observing the performance of the participant and the interaction between the participant and his French teacher throughout language classes in university. This study organized two weeks of observation (30 hours) on February 2025 to justify the perceptual level of the participant of French phonetics.

This study collected oral output data on March 2025, by audio-recording a read-aloud task of a text in French (5 minutes), written by the participant. Before collecting the oral output data, this study also examined this text in French: the participant has written the text on a computer, as a result, he could use electronic tools to automatically correct his orthographic errors. This could ensure that the oral output would not be influenced by the orthographic errors in the writing text.

To ensure the validity and the security of data, this study engaged in brief communication with the participant to establish a trusting relationship and to reduce his stress.

During the data collection process, there were some biases such as the stress of the participant, the noise of the environmental background, and the deliberate avoidance of mistakes by the participant. In this study, we encouraged the participant by proposing a series of warm-up activities in below Table 1 to reduce his stress and to activate his muscles, and by suggesting to him to be audio-recorded in a more quiet environment.

Table 1. Warm-up activities

Articulatory Gymnastics	
Stage 1: Lower jaw	Step 1: Going down and up slowly Step 2: Going down in four times to correspond to the four degrees of aperture (opened, half-opened, half-closed, closed) Step 3: Going up in four times to correspond to the four degrees of aperture (opened, half-opened, half-closed, closed)
Stage 2: Tongue	Step 1: Opening the mouth widely, and then pulling the apex on the alveolars of the upper teeth then the lower teeth Step 2: Pulling the apex against the left cheek then the right cheek Step 3: Pulling the tongue forward abruptly, and gradually retracting it
Stage 3: Lips	Step 1: Imitating the lips movements like smiling in three times Step 2: Imitating the lips movements like kissing in three times

3.4. Data Analysis

The sound input of the participant, collected throughout language class observation, was audio-recorded, and the transcriptions of audio pedagogical supports were scanned.

The oral output of the participant was audio-recorded, transcribed and coded. Data was analyzed by a qualitative method: this study used tables to categorize different types of errors that occurred in the oral output of the participant, and analyzed his errors according to the Articulatory Perspective, the Verbo-Tonal Method and the Perceptual Perspective.

4. Analysis of Errors by the Articulatory Perspective

4.1. Vowels Errors

4.1.1. Aperture

Table 2. Vowel errors caused by the aperture

Too large	Pronunciation of [e] instead of [i] (half-closed / closed); Pronunciation of [ɛ] instead of [i] (half-opened / closed); Pronunciation of [a] instead of [e] (opened / half-closed); Pronunciation of [ɔ] instead of [o] (half opened / half closed); Pronunciation of [ã] instead of [ɔ̃] (opened / half-open); Pronunciation of [ə] instead of [e] (central / half-closed);
Too small	Pronunciation of [ə] instead of [œ] (central / half-opened); Pronunciation of [o] instead of [ɔ] (half-closed / half-opened); Pronunciation of [ɛ̃] instead of [ã] (half-opened / opened);

After categorization in Table 2, we could observe that in 66.67% of the errors (6 out of 9), the participant's lip aperture was too large to pronounce the sound correctly. And in 33.33% of cases (3 out of 9), the errors were caused by insufficient lip aperture.

We could observe that in 88.89% of the errors (8 out of 9), the participant's lip aperture problem was based on a small nuance between two neighboring degrees of aperture. But in one case (which represented 11.11% of cases), where the participant had difficulty distinguishing between [e] and [a], he opened his lips too much, causing a substitution of [e] for [a].

4.1.2. Articulation Zone

Table 3. Vowel errors caused by the articulation zone

Too anterior	Pronunciation of [ɛ̃] instead of [ã] (anterior / central); Pronunciation of [ã] instead of [ɔ̃] (central / posterior);
Too posterior	Pronunciation of [e] instead of [i] (both anterior); Pronunciation of [ɛ] instead of [i] (both anterior); Pronunciation of [a] instead of [e] (central / anterior); Pronunciation of [ə] instead of [œ] (central / anterior); Pronunciation of [u] instead of [y] (posterior / anterior); Pronunciation of [ə] instead of [e] (central / anterior);

After categorization in Table 3, we could observe that 75% of the errors (6 out of 8) were caused by an articulation zone that was too posterior, and two errors, which represented 25% of cases, were caused by an articulation zone that was too anterior.

To pronounce anterior vowels, the tongue must be moved forward; to pronounce central vowels, the tongue must be rested naturally; to pronounce posterior vowels, the tongue must be moved back. From the errors made by the participant, we could see that he frequently retracted his tongue excessively, leading to inaccurate articulation and causing mispronunciations (e.g., pronouncing posterior vowels instead of central ones), or he did not move his tongue forward, causing mispronunciations such as pronouncing central vowels instead of anterior ones.

In addition, he pronounced [ɛ̃] instead of [ã], which was a lip problem, and [u] instead of [y], which was a tongue problem.

To summarize the analyses of vowel errors from an Articulatory Perspective, the participant's tongue was often in a too posterior position to produce the sound properly, he often moved his tongue back to an incorrect position, or he did not move his tongue forward at all. And the participant's articulatory muscles were often very relaxed.

4.2. Consonant Errors

4.2.1. Articulation Zone

Distortion of [ʁ]

The consonant [ʁ] is a sonorous uvular fricative consonant, characterized by the vibration of the uvula, the back part of the soft palate. The participant's pronunciation of [ʁ] was not very correct, he produced this consonant with inconsistent intensity, sometimes too loudly and other times barely audible.

The pronunciation of [ʁ] in French is different from that in

English or Mandarin Chinese. In French, there is an anterior mode: the tongue when pronounced is bulging, and there is an anterior resonance despite posterior articulation. The apex must be placed on the lower incisors to avoid an [r] pronunciation in English. In addition, there is friction for the [ʁ] in French.

During pronunciation, the participant's uvula was towards a more backward or higher position in the oral cavity, and generated an overly loud pronunciation of [ʁ]. Furthermore, during pronunciation, lacking uvular vibration, the participant produced the sound of [ʁ] in a much less vibrant way, and made it very weak: he had not yet learned to produce this friction correctly.

Aspiration of voiceless consonants [p] [t] and [k] in front of vowels

Aspiration is caused by a release of air when the consonant is articulated. When pronouncing the voiceless consonants [p] [t] and [k] in front of vowels, the participant kept too much pressure in the oral cavity when the consonant was pronounced. This resulted in the aspiration of voiceless consonants in front of vowels.

Confusion of voiced and voiceless opposition between [p] and [b], [t] and [d]

[b] and [d] are voiced consonants, the vocal cords vibrate during articulation, but [p] and [t] are voiceless consonants, the vocal cords do not vibrate during articulation. These two consonant pairs are homorganic: [p] and [b] are labial, [t] and [d] are alveolar. The only articulatory difference in each pair is the vibration of the vocal cords, i.e., voicing.

This kind of error in Table 4 could be due to inappropriate control of the larynx. On the one hand, when the participant pronounced [t] instead of [d], there was an absence of vocal cord vibration; on the other hand, there was an unnecessary addition of vocal cord vibration during pronunciation. Or, as throughout the production of voiced consonants like [b] and [d], a certain amount of pressure needs to be kept under the vocal cords. As a result, when the pressure was too high, it could prevent the vocal cords from vibrating, and the participant may produce [t] instead of [d].

Table 4. Voiced and voiceless opposition between [p] and [b], [t] and [d]

Error	Type of error	Cause of error
Pronunciation of [p] instead of [b]; Pronunciation of [t] instead of [d];	Lack of voicing	Absence of vocal cord vibration; Excessive pressure under the vocal cords during pronunciation;
Pronunciation of [b] instead of [p]; Pronunciation of [d] instead of [t];	Inappropriate voicing added	Unnecessary addition of vocal cord vibration; Insufficient pressure under the vocal cords during pronunciation;

To summarize the analyses of consonant errors from an Articulatory Perspective, the participant's lips were often very involved, the participant's muscles were often very tense and the tension in the oral cavity was often too high when the consonant was pronounced. The participant also encountered difficulties when involving the uvula, which gave rise to errors in the pronunciation of [ʁ]. In addition, there were some errors concerning the opposition between voiced and voiceless consonants in the pairs [p] and [b], [t] and [d], which

come from inappropriate control of vocal cord vibration, or pressure under the vocal cords when pronouncing sounds.

5. Analysis of Errors by the Verbo-Tonal Method

5.1. Vowel Errors

5.1.1. Labiality, Acuity and Tension

Table 5. Vowel errors caused by labiality, acuity and tension

Pronunciation of [e] instead of [i]; Pronunciation of [e] instead of [ø]; Pronunciation of [ɛ] instead of [i]; Pronunciation of [a] instead of [e]; Pronunciation of [ə] instead of [œ]; Pronunciation of [ã] instead of [ɔ̃]; Pronunciation of [ə] instead of [e]; Pronunciation of [ɛ̃] instead of [ã]; Pronunciation of [o] instead of [ɔ]; Pronunciation of [u] instead of [y]; Pronunciation of [ə] instead of [e];		
	Trait to reduce	Trait to reinforce
Labiality	Pronunciation of [a] instead of [e]; Pronunciation of [o] instead of [ɔ]; Pronunciation of [ə] instead of [e];	Pronunciation of [ə] instead of [œ]; Pronunciation of [e] instead of [ø]; Pronunciation of [ã] instead of [ɔ̃]; Pronunciation of [ɛ̃] instead of [ã];
Acuity	Pronunciation of [ɛ̃] instead of [ã];	Pronunciation of [e] instead of [i]; Pronunciation of [ɛ] instead of [i]; Pronunciation of [a] instead of [e]; Pronunciation of [ə] instead of [œ]; Pronunciation of [u] instead of [y]; Pronunciation of [ə] instead of [e];
Tension	Pronunciation of [o] instead of [ɔ];	Pronunciation of [e] instead of [i]; Pronunciation of [ɛ] instead of [i]; Pronunciation of [a] instead of [e]; Pronunciation of [ə] instead of [œ]; Pronunciation of [ã] instead of [ɔ̃]; Pronunciation of [ə] instead of [e]; Pronunciation of [ɛ̃] instead of [ã];

After categorization in Table 5, we could observe that in 72.73% of cases of errors (8 out of 11), the participant had great difficulty with tension, and that in 63.64% of cases of errors (7 out of 11), he also had significant problems with labiality and acuity.

From the labiality perspective, the sound produced by the participant was too labialized in 42.86% of cases of errors (3 out of 7), caused by lips that were too rounded. And in 57.14% of cases of errors (4 out of 7), the sound produced by the participant was not very labialized, caused by lips that were too stretched. For the production of the vowel [œ], as it is a labialized vowel specific to French, for the participant it was

difficult to grasp the degree of rounding or lip involvement, and so the participant confused [ə] and [œ].

From the acuity perspective, the sound produced by the participant was too low-pitched in 85.71% of cases of errors (6 out of 7), caused by a very posterior position of the tongue or insufficient muscle tension. And in one case (14.29%), the sound produced by the participant was too high-pitched, caused by a very anterior position of the tongue.

From the tension perspective, the sound produced by the participant was often too relaxed (7 out of 8), caused by relaxed muscles or little articulatory effort. And in one case (the pronunciation of [o] instead of [ɔ]), the sound produced by the participant was too tense, caused by overstretched muscles or too much articulatory effort.

5.2. Consonant Errors

5.2.1. Labiality, Acuity and Tension

Table 6. Consonant errors caused by labiality, acuity and tension

	Trait to reduce	Trait to reinforce
Labiality	Pronunciation of aspirated [p] instead of [b];	-
Acuity	-	-
Tension	Pronunciation of [s] instead of [z]; Pronunciation of aspirated [p] instead of [b];	-

After categorization in Table 6, we could observe that the participant encountered problems with labiality and tension when pronouncing consonants: when pronouncing [b], the participant's lips were too involved, and the participant applied excessive muscular force while pronouncing. And when pronouncing [z], the participant's muscular forces were also too much to pronounce correctly.

6. Analysis of Errors by the Perceptual Perspective

As the sound input was limited to two weeks of language class observation (30 hours), this study could not get access to enough data to justify his perceptual level certainly. However, by going back over his errors, we could make some possible assumptions about the participant's perception of a few sounds:

Unnecessary addition of [ə] at the end of a word with a consonant

In this case of error, we could speculate on the participant's perception during sound input. If the input was too rapid for the participant, he might have had difficulty separating the prosody: e.g., his addition of [ə] at the end of a word ending in a consonant would probably be caused by a misperception of a sequence or link.

Pronunciation of [ɛ̃] instead of [ã]

In this case of error, we could hypothesize about the participant's perception: In his L1, the participant would have a Southern accent, in which the distinction between [an] and [ang], two nasal vowels similar to [ɛ̃] and [ã], is not very clear. Thus, in L1, he naturally pronounced [ɛ̃] instead of [ã] without perceiving the difference between these two nasal vowels, which could exert negative transfers on his perception of French vowels.

Confusion between vowels [ə] and [œ]

In this case of error, we could speculate on the participant's perception, since [œ] is a labialized vowel specific to French

and does not exist in his L1 (Mandarin Chinese) or L2 (English). For the participant, it was difficult to pronounce [ə] and [œ] correctly, as he could not perceive the differences between these two vowels. His ears were trained to perceive only Mandarin Chinese [ə], so any sounds that did not fit into his L1 system may be distorted when he listened.

Confusion of voiced and voiceless opposition between [p] and [b], [t] and [d]

In this case of error, we could speculate on the participant's perception, because in Mandarin Chinese and in English, these oppositions are realized differently from those in French. In Mandarin Chinese, the opposition between voiced and voiceless consonants (e.g., the differences between [bàn] and [pàn]) is much easier to perceive, and equally, in English, the opposition between voiced and voiceless consonants (e.g., the differences between "ten" [tɛn] and "den" [dɛn]) is also easy to perceive. Whereas in French, this opposition is much harder to perceive (e.g., the differences between the word "pain" [pɛ̃] and "bain" [bɛ̃] in French). Sometimes, the participant could not perceive clearly the distinction between these consonants, especially when the oral input was blurred or rapid.

For the participant, he encountered difficulties with consonant pairs: probably, he knew well how to vibrate the vocal cords, but his ears could not distinguish the differences between voiced and voiceless consonants in French. As a result, he had difficulty pronouncing these sounds correctly: learners cannot accurately produce sounds they cannot distinguish clearly on perceptual level.

7. Conclusion

This study analyzed the participant's phonetic errors by using the Articulatory Perspective, the Verbo-Tonal Method and the Perceptual Perspective. The participant's difficulties, which were analyzed through three complementary frameworks, reveal patterns in phonetic error production that demonstrate the value of multi-perspective analysis. These findings emphasize the importance of analyzing the sources of errors from multiple perspectives and methods, and integrating phonetic training into language instruction, especially for FFL learners at the intermediate level.

While this study is limited to the analysis of one participant, it contributes to a deeper understanding of the combination of the Articulatory Perspective, the Verbo-Tonal Method and the

Perceptual Perspective for the analysis of phonetic errors. Further studies with larger samples, more varied language proficiency levels and longer observation time and more varied observation methods would allow for broader generalizations and provide a more comprehensive and detailed understanding of phonetic error patterns in FFL learner's acquisition process.

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