

Acquisition and variation of the palatal affricate phoneme in Panama City: a phonetic-acoustic study in fifth-grade children

Adquisición y variación del fonema palatal africado en la ciudad de Panamá: estudio fonético-acústico en niños de quinto grado

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Abstract

This study compiled, organized, and critically analyzed a body of research on the behavior of the tense palatal affricate /tʃ/ in Spanish, especially in the Panamanian variety of Spanish. It was found that the tense palatal affricate /tʃ/ exhibits interesting variations in terms of phonetic context, age group, and geographic distribution as the most notable aspects. In the Panamanian context, the first studies revealed marked differences, ranging from having recorded the affricate /tʃ/ as the only allophone or the sound being clearly evolving into a fricative /ʃ/ to recognizing a process of articulatory lenition. Furthermore, research was conducted on the fricativization of this sound and its realization in American countries, including Panama and parts of Spain. Other concurring conclusions argued for the articulation of both allophones, the affricate /tʃ/ and the fricative /ʃ/, in many Spanish-speaking regions. For example, a study conducted in Puerto Rico documented six different types of realization of this phoneme. The various investigations thus indicated that in the realization of this sound there is a phonetic alternation or variation that has been of interest to many scholars for some time. Therefore, interest was sparked in understanding the most relevant bibliography on this articulation when it comes to configuring its variation according to the variables that condition it.

Key words: Phonetics and Phonology, palatal voiceless affricate, fricative, allophonic variants, fricativization, lenition.

Resumen

En este estudio se recopiló, ordenó y analizó críticamente un grupo de investigaciones realizadas sobre el comportamiento de la palatal africada tensa /tʃ/ en la lengua española, especialmente en la variedad del español de Panamá. Se logró constatar que la palatal africada tensa /tʃ/ presenta variaciones interesantes en cuanto al contexto fonético, el grupo etario o la distribución geográfica como aspectos más sobresalientes. En el contexto panameño, los primeros estudios revelaron diferencias marcadas, desde haber recogido como único alófono, el africado /tʃ/ o que el sonido estaba en franca evolución a una fricativa /ʃ/ hasta reconocer un proceso de lenición articulatoria. Además, se investigó sobre la fricativización de dicho sonido y su realización en países de América, entre ellos Panamá y parte de España. Otras conclusiones coincidentes, argumentaron la articulación de ambos alófonos, el africado /tʃ/ y el fricativo /ʃ/, en muchas regiones de la lengua hispana, por ejemplo, un estudio realizado en Puerto Rico documentó seis tipos diferentes de realizaciones de este fonema. Las distintas investigaciones apuntaron, pues, que en la realización de este sonido existe una alternancia o variación fonética que resulta interesante para muchos estudiosos desde hace tiempo. Por ello, se despertó el interés por conocer la bibliografía más relevante sobre esta articulación a la hora de configurar su variación según las variables que la condicionan.

Palabras clave: Fonética y Fonología, palatal africada sorda, fricativa, variantes alófonas, fricativización, lenición.

INTRODUCTION

This paper presents a bibliographic review of phonetic and phonological studies on the behavior of the tense palatal affricate /tʃ/ in Spanish, with a particular focus on Panama. The aim is to compile a chronological overview and then conduct a critical analysis of the research carried out by various authors who have studied this phoneme, both internationally and in Panama.

The earliest research was based on articulatory phonetics, such as the studies by Robe (1960) and Alvarado de Ricord (1971), both of whom had different positions on the behavior of the voiceless palatal /tʃ/ in Panama. These have been complemented by more recent studies such as those by Casillas (2013) and Cardona Ramírez (2015), which show that in many Spanish-speaking regions, the tense palatal affricate /tʃ/ has allophonic variants. They also maintain that these articulations correspond to specific groups or regions of the continent. The conclusions of these studies indicate that there is a tendency toward lenition of the phoneme, with the consequent loss of the occlusive element in various regions of the world.

As arguments, this is a common lenition process in Andalusia studied in the work of Jiménez Fernández (1999), who maintains that the prepalatal affricate phoneme /tʃ/, which, upon losing its occlusive element, changes to a fricative realization [ʃ] (*muchacho* [mušáʃo]), and Morillo-Velarde (2001) affirms the existence of localities in which frication predominates, Écija being one of them.

Also, in Mexico, Brown (1989) proposed that the fricative articulation is found in the speech of 81.25% of informants and is the typical youthful pronunciation in Sonora. These are some of the studies carried out on the process of lenition or phonetic change, which consists of the weakening of a consonant from strong to weak.

Another change that must be explained in this work is de-affrication, a phonetic process whereby an affricate sound, such as the Spanish /ch/, loses its occlusive component, transforming into a fricative. In simpler terms, the explosive part of the sound disappears, leaving only the friction.

From an articulatory point of view, in the case of [ch], the tongue is placed close to the palate, creating a complete obstruction, and

then released through the center of the mouth, generating friction. In this process, the occlusive phase of the affricate sound is lost. The tongue is placed in the position to produce friction, but the previous complete obstruction is not produced. For example, instead of producing a complete [ch], only friction is produced, which can resemble an <s> or an <sh>.

Regarding acoustics, the affricate sounds are characterized by a brief pause followed by a friction noise. The pause corresponds to the moment when the airflow is completely obstructed. In the case of de-affrication, the pause disappears or is considerably shortened, and the sound is reduced mainly to the friction noise.

Other studies argue that the behavior of the tense palatal affricate /tʃ/ and its allophones, the affricate /tʃ/ and the fricative /ʃ/, are used freely among the inhabitants of a same region. This case is particularly defended by Navarro Tomás (1985), who already supported the idea that there is allophonic variation in many places in America and Spain.

This review aims to highlight the most relevant studies on the voiceless palatal affricate phoneme /tʃ/. Another fundamental aspect is to recognize the findings of each study in order to make future comparisons about this sound.

DEVELOPMENT

Justification and methodological basis

In the Panamanian educational context, the direct antecedents of this research are the studies conducted by Robe (1960) and Alvarado de Ricord (1971), both published more than 50 years ago, nevertheless, they are very valuable in showing possible similarities and differences between the articulatory characteristics of the tense palatal affricate /tʃ/ in the last third of the 20th century and those of 2024, that is, they point to a possible phonetic change.

In the conclusions of his work on rural areas of Panama, with participants who were mostly farmers and lay people, Robe (1960) does not mention having collected the fricative allophone [ʃ] and points to the voiceless affricate [tʃ] as the only allophone, while the academic Alvarado de

Ricord (1971), in her work with informants aged between 25 and 65, middle-class professionals living in the capital city, defends the following thesis. “Everything indicates that in Panama, the voiceless palatal affricate [tʃ] tends to disappear in the short term and will be completely replaced by the voiceless fricative [ʃ]” (Alvarado de Ricord, 1971, p. 95).

As can be seen, these are contradictory results that highlight the need for updating. This is precisely the focus of this research, whose theoretical foundations encompass three areas or sub-fields of Linguistics: (a) phonological acquisition and development (didactics); (b) sociophonetics (Panama area); and (c) linguistic attitudes and beliefs (tradition and behavior of speakers).

- a) The first, phonological acquisition, is related to the construction of the phonological repertoire of the first language or mother tongue and the speech therapy aspect or alterations in the study of sounds as initial elements of speech development, which can enable or limit correct grammatical structure and meaning.
- b) The second subfield, sociophonetics, is related to sociolinguistic stereotypes (linguistic features that correlate with both social and stylistic variables) that speakers may or may not consciously perceive, often associating them—usually categorically—with certain social groups (Labov, 1973).
- c) The third perspective focuses on the reasons why articulation may be maintained or changed, according to the speaker’s own awareness of sounds and pronunciation; that is, the linguistic attitudes and beliefs of language users, as López Morales (1989) and Moreno Fernández (2005) have pointed out. Both are undoubtedly a reflection of psychosocial perceptions and attitudes regarding their membership in a group or the image they wish to project when communicating messages.

Also, Tinoco (2014) concludes in his work that after collecting, observing, and analyzing the results obtained in the surveys and measuring their values, we can affirm that in our country there are differences in the language that the common speaker perceives or, at least, has in mind at the moment of communication (Tinoco, 2014, p. 52).

For this research, a reasoning process is proposed in which the observation and analysis of specific cases in Panama, in contrast with practices in other regions of the Americas and Spain, will allow general conclusions to be drawn.

State of the Question

The tense palatal affricate, represented by the symbol /tʃ/ in the International Phonetic Alphabet (IPA), is a consonant sound common in many languages around the world, including many varieties of Spanish. In Panama, the tense palatal affricate /tʃ/ presents interesting variations in terms of its phonetic context, age group, and geographical distribution. This section presents the studies that support the present research, as well as the main findings of each of them.

Robe (1960), in his research in four provinces in central Panama (Coclé, Herrera, Los Santos, and Veraguas), whose population was predominantly rural and largely illiterate, with a sample of 26 men and 2 women aged 23 to 102, makes the following observations about the voiceless palatal affricate in Panama:

- The voiceless palatal affricate ([tʃ]) is a common sound in Panamanian Spanish.
- The only allophone found is the voiceless affricate [tʃ].
- It can be found in all positions within a word, but is most common at the beginning of a syllable.
- The voiceless palatal affricate is a distinctive sound in Panamanian Spanish and is not confused with other sounds.

Robe’s (1960) work was pioneering in the study of the voiceless palatal affricate [tʃ] in Panama, and his findings have marked a milestone in the study of the phonetics and phonology of Panamanian Spanish.

Eleven years later, in her study carried out in Panama City with middle-class informants, professionals aged between 25 and 65, Alvarado de Ricord (1971) concluded that:

Among children and adults under the age of 25, what is pronounced is not an affricate but a voiceless palatal fricative [ʃ]. This is especially true in the country’s capital. In older people, it can also be observed that even at the beginning of

the tense phase itself, there is no true occlusion. [...] Among males, there is a small percentage who still do not achieve exclusive friction, but it can be heard that the occlusion is not so complete (p. 94).

According to this author, “everything indicates that in Panama, the voiceless palatal affricate [č] tends to disappear in the short term, and that it will be completely replaced by the voiceless fricative [š]. It is identical to the one pronounced in certain regions of Andalusia” (Alvarado de Ricord, 1971, p. 95).

In her research, Cedergren (1973) presented the following findings:

As for the palatal affricate, on other occasions, contextual factors seem to determine its appearance: in Panamanian speech, Cedergren (1973) documented that the fricative realization is partially conditioned by the phonetic context, being more frequent in intervocalic position [mušašo] than after a consonant, where the affricate [pinčo] usually appears.

Cedergren (1973, cited by Casillas, 2012) states the following about the researcher:

In a study of Panamanian speech, Cedergren (1973) found that the fricative variant occurred more frequently in internal position, especially when the phoneme /tʃ/ was preceded by a vowel. She adds that women tended to produce the fricative variant more frequently and that the phenomenon was more productive in the speech of young people (Casillas 2012, p. 75).

The author argues that the phenomenon of /tʃ/ is conditioned by the phonetic context and evidences the frequency of the fricative variant in internal position.

Likewise, Antonio Quilis and María Vaquero (1973) conclude in their work that:

We must mention again the variation in realizations in the sample analyzed: the number of five types of realizations of a phoneme that are constantly repeated is considerable (the sixth, only in one informant). This variation extends, like a fan, from the normal affricate type to the normal fricative, passing through a series of intermediate nuances that reveal the instability of the variants

of this phoneme. The social, and perhaps geographical, distribution of the phenomenon in the same area remains to be investigated.

This study provides a detailed description of the variation in the realization of /ch/ in Puerto Rican Spanish. In our analysis, we have found six different types of realization of /c/:

- **Type 1:** affricate (occlusive moment + fricative moment).
- **Type 2:** fricative (fricative moment only).
- **Type 3:** affricate (with three moments: fricative + occlusive + fricative). It is perceived as an affricate.
- **Type 4:** fricative (with two moments of friction: the first less intense, and the second more intense, friction + friction). It is perceived as fricative.
- **Type 5:** fricative (with three moments of friction, differentiated by their intensity: Friction + friction + friction). It is perceived as fricative.
- **Type 6:** affricate (with three moments: occlusive + fricative + fricative). It is perceived as an affricate.

Quilis and Vaquero conclude:

To conclude, we must mention once again the variation in realizations in the sample analyzed: there are five types of realizations of a phoneme that are repeated constantly (the sixth appears in only one informant). This variation extends, like a fan, from the normal affricate type to the normal fricative, passing through a series of intermediate nuances that reveal the instability of the variants of this phoneme (Quilis and Vaquero, 1973, 66).

For Gili Gaya (1978), “the point of articulation, the breadth of the linguopalatal contact, and the relative duration of the occlusive and fricative elements present notable linguistic differences.” This author also supports the thesis of a range of variants if they are classified by the duration of the occlusive and fricative elements.

According to Navarro Tomás (1985, p. 97), dialectal pronunciation and articulation of the Spanish ch present a multitude of variants, both in terms of the length of contact between the tongue and the palate, and in terms of the point

of articulation, the specific position of the back of the tongue, and the duration of the fricative element, etc. In the Spanish pronunciation, the extent of this contact also varies according to the greater or lesser force with which the sound is produced.

This study presents the possibility of studying the variety of articulations according to their extension, the point of articulation, or the force with which the phoneme is produced.

Canfield Delos (1988, p. 80) states in his study: Regarding the change in articulation mode, it is realized as a fricative in the Argentine region of Misiones, the central highlands of Ecuador, the Amazonian lowlands of Peru, northwestern Mexico and the border with the United States, and sometimes in the Andean and Amazonian highlands of Peru. The phenomenon also extends to Panama, Cuba, Chile, and Puerto Rico. This contribution supports the thesis that the behavior of the voiceless palatal affricate [tʃ] is clearly trending toward a fricative [ʃ] in many regions of the Americas, such as North America, Central America, and South America.

According to Graell & Quilis (2003):

In Panama, both affricate and fricative allophones appear in all informants, in free distribution, and are independent of the level of education. Both authors note the variety of allophones in all respondents, a situation that reinforces the thesis that in Panama there is variation in the voiceless palatal affricate phoneme [tʃ].

For her part, Herrera-Zendejas (2006) addresses the weakening of /tʃ/ in two varieties of American Spanish (specifically Mexican and Panamanian). Unfortunately, only a few notes on this topic can be found online:

In the case of the Panamanian speaker, words with /tʃ/ appeared in a set of simple sentences that I asked her to read. The contexts of occurrence included the intervocalic and after a resonant consonant (nasal, liquid, and vibrant); Care was also taken to ensure that the affricate appeared in both the tonic and postonic positions. This seems to indicate that the process is not restricted to specific contexts, but rather that in these varieties of Spanish, the affricate is realized as a fricative. The author evidences a change and records it in the participant from Panama (Herrera-Zendejas, 2006, p. 12).

Cardona Ramírez (2010, 2012, and 2015) states in his study that he has recorded the two realizations of the voiceless palatal affricate phoneme [tʃ] and its allophones, the affricate [tʃ] and the fricative [ʃ].

Also, Casillas (2013), in a sociolinguistic study, reports that the fricative variant [ʃ] occurs in six countries, including Panama, Mexico, Spain, Cuba, Puerto Rico, and the United States. The study was conducted in a contact zone between languages or dialects, English and Spanish, on the border between the United States and Mexico. The judgments of 122 listeners were considered as they listened to four people—two high school students and two doctoral students—read a script. This study suggests that the way the /tʃ/ sound is pronounced can affect listeners' perceptions of the speaker's competence, kindness/solidarity, reliability, and credibility, especially in a context where affricate pronunciation is considered the standard norm. In other words, non-standard pronunciation can lead to the speaker being perceived as less competent or less trustworthy.

The study demonstrated the importance of pronunciation in communication and how variations in pronunciation can influence social perceptions and evaluations of speakers. In this regard, the researchers showed that the realization of /tʃ/ is an important factor in assessing the credibility of the speaker in the Tucson speech community, thus expanding the field of research on the construct of credibility. The fricative variant received lower competence ratings. We believe this is because it is considered the non-standard variant.

Cardona Ramírez (2015), in his work, analyzes the distribution of various phonemes in Panama, including the voiceless palatal affricate [tʃ]. In this regard, he explains that the loss of the occlusive element in the voiceless affricate occurs throughout Panama and states that in the central region (Tolé, Santiago, Chitré, Pedasí, Santa Fe), the pronunciation of /tʃ/ is preserved, meaning that the region resists fricativization. The last characteristic that Cardona Ramírez (2015, p. 212) proposes for the division of zone 2 is resistance to the "fricativizing phenomenon of the affricate phoneme /tʃ/." He concludes that both variants are articulated in Panama and that this allows the national territory to be divided into two zones when drawing maps. One zone reflects the loss of the occlusive element and the other resists fricativization.

This study is very important, as it provides concrete evidence for the existence of both allophones in the Republic of Panama.

Vivar, Henríquez, and Cocio (2021) conducted a study of 161 children between the ages of 2 and 3 attending municipal preschools in the city of Temuco, Chile, to analyze the articulation of the phoneme /tʃ/. The demographic variables were age and socioeconomic status (SES), which can generate differences in the average percentage of emission, substitution, and omission of the phoneme in question. The researchers found that from the age of 2.5 years onwards, there was greater use of the standard affricate variant and that the group of children with high SES performed better in pronouncing the phoneme compared to the group of children with low SES, with 4.4% versus 10.4%.

This study is relevant because there is little or scarce research conducted with children of this age group.

Valenzuela-Hernández (2021) recorded interviews with thirty-two speakers (13 men and 19 women), compiling 16 hours of digitally recorded conversations for the corpus, in which he concludes that:

- It can be seen that, of the 67% of the 1,710 samples, the speakers pronounce the fricative variant [ʃ] 1,143 times and pronounce the affricate [tʃ] 567 times.
- The data imply that the lenition of [ʃ] is a prominent factor in this region, where the speaking community showed a preference for the weakened pronunciation of [tʃ].
- Words spelled with *de* in the first syllables of each word favor the pronunciation of the fricative variant. These results corroborate the predictors' position and recoded position.
- In the following sound factor (by displacement), the data shows that when the preceding vowel is /a/ (.535), speakers pronounce the lenition of [ʃ] more frequently
- The relationship between linguistic predictors and the articulation of [tʃ] is what we find with the lexical effect in this study. In other words, the lexical component provides evidence of how predictors work together in the production and frequency of lenition of /tʃ/.

This work demonstrates the richness of a well-structured phonetic study. It serves as a model for replicating its methodology in other Spanish-speaking regions. The structure, subject matter, and methodology of this study suggest that research into the phonetics and phonology of language is necessary and important in order to aid the communication and teaching-learning processes of new generations.

Bonilla (2022) concludes in his work that the full articulation of the affricate phoneme /tʃ/ occurs throughout Panama, with a greater tendency in the surrounding areas from the central region to the western and eastern borders. While it could be characteristic of Zone 2, as Cardona states, the percentages of realization are very similar. However, the author does not describe features or characteristics of the bordering zones that can be evidenced in the corpus, and although a transition can perceptually be observed.

This work focuses on the realization of the affricate phoneme throughout the country. However, there is one area that resists the phenomenon of fricativization and another that is undergoing dialectal transition. For this reason, it is not possible to conclude that the full articulation of the affricate phoneme belongs to a single dialectal area.

Rangel (2023) In this study, data was collected from news programs, with six samples from the region of Andalucía and six samples from Panama City. A total of 12 reporters were analyzed. Three of the six samples are from female reporters and the other three are from male reporters. This division will help to see if lenition is more prevalent in one region than another and if the gender of the speaker influences the tendency toward lenition. The results indicated that all participants (except for two of the three female reporters from Panama) exhibited an affricate pronunciation, with no significant effect of region or gender. There was no difference in the duration of the phoneme [tʃ] between Panama and Seville. The only finding was that gender is significant within the Panama region for the fricative [ʃ].

This study highlights the comparison between countries and types of professionals, but as no significant differences were found, it highlights the variation amongst the articulations of Panamanian reporters, based on the variable of gender.

Finally, Soto-Barba, Pereira, and Aguilera Bustos (2024) conducted research with informants from a subsample extracted from the FONDECYT project corpus, where 10 speakers (prison slang), 16 speakers (non-professional speech), and 14 speakers (professional speech) were selected. The results show that of the 590 occurrences of the phoneme /tʃ/ by all speakers in Concepción, the affricate allophone was the least frequent, with 14.4% (85 occurrences); next was the affricate allophone with an occlusive tendency, with 20.8% (123 occurrences); followed by the affricate allophone with a fricative tendency, with 26.1% (153 occurrences); finally, the fricative allophone, with 38.6% (228 occurrences). It is also noteworthy that the allophone with the lowest phonetic-phonological manifestation is precisely the one that represents the voiceless alveolopalatal affricate phoneme /tʃ/, with only 14.4%.

According to the results of this research, four main allophones of the voiceless alveolopalatal affricate phoneme /tʃ/ can be identified, which are presented below and ordered by decreasing percentages of realization: a) Fricative [ʃ] b) Affricate with a tendency toward fricative [tʃ̠] c) Affricate with a tendency toward occlusive [tʃ̠] d) Prototypical affricate [tʃ]. Soto-Barba, Pereira, and Aguilera Bustos (2024).

This work examines the educational levels of the informants and the types of allophones identified in the study. Each characteristic of the phoneme allows for a deeper understanding of variation and behavior according to variables, and enables new proposals to be made for future research.

CONCLUSIONS

The tense palatal affricate [tʃ] provided scholars of phonetics and phonology with a wide variety of sounds articulated by speakers of the Spanish language, specifically in Panama.

This makes it a niche for much research at the national and international level. From the earliest studies on this variant, a fricative realization [ʃ] was recorded in a high percentage of participants, who represented many regions of the American continent (as well as Europe). However, the affricate phoneme has not disappeared entirely. In general, research on the voiceless palatal affricate in Panama showed that this phoneme

exhibited notable variability in terms of its phonetic context, social group, and geographical distribution.

The data presented evaluated the phonetic context, gender, social classes, educational level of the informant, age, and region, among other factors. All of these are valuable for understanding the speech of each place.

Therefore, the variability of the phoneme in certain contexts could be verified. In addition, four or six different types of realizations were found, ranging from the normal affricate to the normal fricative, with a series of intermediate nuances that reveal the instability of the variants of this phoneme in regions with a Spanish linguistic heritage.

Contribution to knowledge

In terms of contributions, this research will offer a significant analysis of studies that have addressed the tense palatal affricate, its behavior or evolution, and the most recent types, allophones, and findings. It will allow for the identification of details that need to be explored in greater depth and will serve as a reference point for future research as a starting point when conducting new fieldwork.

Limitations

Among the limitations, it is worth noting the difficulty in obtaining the authors' original books or publications. In the case of Panama, there is little documentation on the subject, and the few authors do not have their complete publications online. In terms of methodology, compiling documents from 1960, 1971, 1985, 1988 to the present day poses many difficulties due to the publications and interpretations of the authors who quote them. This study seeks to provide continuity to a very particular behavior of a phoneme in the Spanish language, a situation that may vary depending on the age of the participants, social class, or geographical region, but which is very valuable to document and incorporate into the phonetic map of Panama.

Author's contribution

Heidy Macías: Conceptualization, Formal analysis, Research, Methodology, Supervision, Validation, Writing – Original draft, Writing – Review and editing.

Conflicts of interest

The author declares that there are no conflicts of interest.

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