

# A Typology of Stops in South American Indian languages\*

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## 1. INTRODUCTION

This paper presents the first results of an ongoing research intended to examine the main ways in which the phonological systems of South American Indian Languages (SAIL) differ from each other. Specifically, it focus on the subsystem of both stops and affricates, as they are analyzed in regard to (i) their overall number within a phonological system, (ii) their series (e.g., voiceless, voiced, aspirated, ejective, and so on), (iii) the number of places of articulation where they are produced, as well as the most common ones, (iv) the interaction between the preferred places and the manners of articulation, and (v) their phonemic opposition. Finally, this paper discusses the most relevant allophonic variations that may give an indication of pervasive phonetic features found in languages belonging to different genetic units.

The database is composed of 139 languages that belong to 59 genetic units as identified by Kaufman (1994).<sup>1</sup> Languages are grouped according to two criteria: their genetic affiliation (i.e., linguistic family) and their geographic location, (following Kaufman's division of South America into 12 cultural and ecological regions). The presence or absence of phonetic features (e.g., common allophonic variation of a particular phoneme) and phonemic oppositions between stops and affricates is studied for each language. The outcome is a picture of the genetic and geographic distribution of the features under investigation.

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<sup>1</sup> The bulk of the data comes from the excellent *Eduardo Lozano* Latin American Collection of the University of Pittsburgh; the personal library of Terrence Kaufman has also provide very useful information. The library of the Instituto de Lingüística of the Universidad de Buenos Aires also has been very helpful.

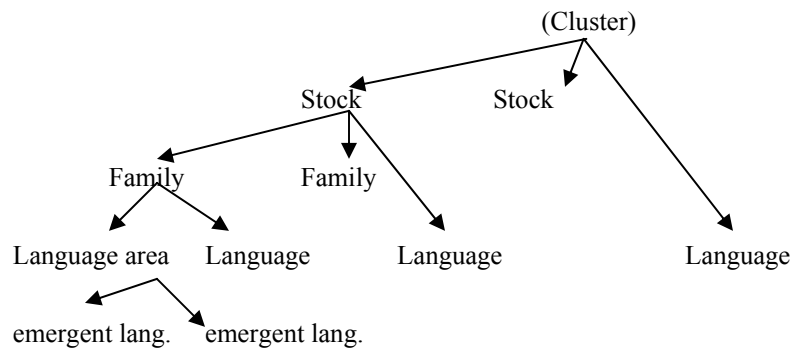
## 2. METHODOLOGY

In this section, I present the hierarchical organization of the surveyed linguistic units, as well as the geographic regions to which they belong. Finally, I present the phonetic and phonological features studied in this work.

### 2.1. The linguistic units

Kaufman (1994) establishes 118 genetic units in South America that include isolated languages, language areas (i.e., a group of emergent languages), language complexes (i.e., a group of virtual language), families (i.e., a group of languages), stocks,<sup>2</sup> and clusters.<sup>3</sup> The hierarchical organization of genetic units is represented in Figure 1.

Figure 1: Hierarchical Organization of Genetic Units



At this point of the research, no attempt has been made to provide an even representation of genetic units within the database. Instead, I have decided to include all the available information regardless of the number of other languages of the same genetic unit already present in the database. Consequently, this work is only intended to show general tendencies of SAIL phonological systems.

### 2.2. The regions

As stated earlier, Kaufman (1994) establishes twelve linguistic regions in which SAIL are grouped “based on genetic linguistic, typological linguistic, cultural, and geographical features [ . . . ] these are zones showing a high degree of geographical and cultural-ecological coherence wherein, in general,

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<sup>2</sup> "A set of languages plus or minus whatever subparts a family can contain [ . . . ]" (Kaufman 1994: 32).

<sup>3</sup> Clusters are defined as “a set of language families and/or isolates that seem likely to be genetically related, but that have not been demonstrated to be related. The groups designated by a macro-label I would call *clusters*” (Kaufman 1994: 32).

languages of one of the larger SA families predominate” (1990: 32). Table 1 shows the representation of languages according to the region to which they belong.

*Table 1: Representation of Geographic Areas in the Database*

Regions	Total number of languages	Number of languages in the database	Percentages
VIII. Chaco region	20	10	50%
III. Western Amazonian II	29	14	48%
IV. Northern foothills region	28	11	39%
XI. Central Amazonia	67	26	39%
IX. Eastern Brazil	40	13	32.5%
II. Western Amazonian I	81	26	32%
VI. Southern foothills region	38	10	26%
XII. Northern Amazonia	52	11	21%
V. Andes region	32	6	19%
VII. The Cone	7	1	14%
I. North-western region	51	9	18%
X. North-eastern Brazil	11	1	9%

As can be seen from Table 1, the Chaco region is the most represented region, since 50% of languages that belong to this area, that is 10 languages, are considered in this study. On the contrary, the database has data about only one language of North-eastern Brazil (Kipea), which stands for 9% of the total number of languages that belong to this area. Although the ultimate goal is to have an even representation of genetic units and linguistic regions in the database, such a goal may never be reached as geographic regions and genetic units vary in regard to the number of languages already extinct within a given unit.

For practical purposes, I have divided Kaufman’s Western Amazonian I region into Western Amazonian I North and Western Amazonian I South. The reason for this division is that once languages are plotted into the map of South American Indian Tribes, this region appears as having two groups of languages distinctly separated from each other. In Table 1, however, the Western Amazonian I region is not divided into two areas.

### **2.3. The features under investigation**

The phonetic and phonological features considered in this work are presented here:

*Places of articulation of consonants:* This includes the study of the bilabial, dental-alveolar, retroflex, palatal, velar, post-velar, pharyngeal, and glottal points of articulation. The more frequent places of articulation exploited for phonological purposes are examined, as well as those distinctive to a particular family or geographic area. For instance, languages of the Andes and the Chaco regions share the feature of contrasting plosives at dorsal places of articulation

(e.g., voiceless velar stop [k] vs. voiceless post-velar stop [q] (Andes Region) vs. glottal stop [ʔ] (Chaco Region)). No distinction is made in this work between the dental and the alveolar places of articulation for a given segment because most of the consulted sources use these terms interchangeably. The same is true for the post-alveolar and the palatal places. The only case where the difference between a dental and an alveolar consonant has been taken into account is when consonants oppose phonologically on the basis of this feature. A language that makes such opposition is Mapudungún (Isolate).

*Relationship between place and manner of articulation:* This study allows the prediction of the place of articulation at which a given consonant will be produced according to both its manner of articulation and the number of other consonants of the same type present in the phonemic inventory. For instance, if a language has only one plosive, it will be possible to predict the most likely point of articulation at which this consonant will be produced.

*Number of series of stops:* This criterion will serve to make a further analysis of stops, which will be considered according to whether or not they are voiceless, voiced, ejective, implosive, aspirated, or pre-nasalized.

*Co-articulated segments:* This criterion will serve to distinguish languages that have labialized [C<sup>w</sup>] and/or palatalized [C<sup>y</sup>] consonants. However, positing a labialized or palatalized consonant as a single segment is a matter of phonological analysis.

*Allophonic variations:* This includes the most relevant allophonic variations that may give an indication of pervasive phonetic features found in languages belonging to different genetic units. In this paper, I discuss aspiration, since it appears to be one of the most common phonetic features found in SAIL.

*Presence/absence of phonemic oppositions:* This criterion will be used to distinguish languages that have sounds that function as allophones of the same phoneme from languages that oppose the same set of sounds.

### 3. STOPS AND AFFRICATES

A survey of the occurrence of stops and affricates in the segment inventories of SAILs is made in this section. Affricates are treated altogether with stops as they share articulatory similarities (i.e., they are both plosive segments) and usually fill in the gaps left by stops within a phonemic system. I will first consider stops and then investigate the characteristics of affricates.

#### 3.1. Stops

In this section, I consider stops, their series (e.g., voiceless, voiced, aspirated, and so on), and the places of articulation where they are produced (e.g., bilabial, alveolar, velar, and so on). Although voiceless and voiced stops belong to the same class of segments, they are different in that they represent the two main series of stops exploited by the phonological systems of SAILs. This is why voiceless and voiced stops are treated separately. The most frequent places of articulation for voiceless and voiced stops will be examined, as well as the

most frequent places of articulation at which they contrast within a given phonological system. Finally, a brief look at the most common allophonic variation of voiceless stops (aspiration) is given, as this may be an indicator of pervasive phonetic features that go beyond genetic boundaries.

### 3.1.1. Stops: Number of exploited series

A series is defined by Maddieson as:

A set of stops (perhaps including affricates) which share in a general sense the same “manner”. That is, they share the same phonation type (voiceless, voiced, breathy voice, laryngealized), the same airstream (pulmonic, velaric, glottalic ingressive, and glottalic egressive), the same relative timing of the onset of the voicing (unaspirated, aspirated, pre-aspirated) and the same relative timing of the velic closure (nonnasal, pre-nasalized, nasally-released). (1984: 26)

Eight series have been detected in the phonological systems of SAIL. The most common series is that of plain voiceless stops; all languages of the database have a segment of this kind. Next follow the voiced stops, which are present in a significantly smaller proportion, that is 55%. Next, and far behind the voiced stops, follow the aspirated voiceless stops, which are present in 15% of the phonological systems. Finally, voiceless ejectives are part of the segmental inventory of 12% of the languages of the database. Other series encountered are: voiced implosive, voiced pre-nasalized and voiced post-nasalized.<sup>4</sup> Table 2 shows the occurrence of series in the database in terms of their absolute numbers and their percentages.

Table 2: Number of Series of Stops

	Number of languages	Percentage
Plain voiceless	139	100
Plain voiced	77	55
Aspirated voiceless	21	15
Voiceless ejective	17	12
Voiced implosive	4	3
Pre-nasalized voiced	3	2
Post-nasalized voiced	1	0.7

As I said earlier, the most common pattern found in SAIL is for the languages to have 2 series of stops: voiceless and voiced. A total number of 71 languages, that is 51%, display this tendency. Although to a lesser extent, this confirms the pattern found at the world level by Maddieson (1984), who also reports voiceless and voiced stops as the two series that co-occur in 72% of languages in his database. Notice, however, that the proportion of languages that contrast voiceless with voiced stops remains high if compared to languages of Mesoamerica and North America (Kaufman p.c.).

<sup>4</sup> Pre- and post-nasalization are probably the result of nasal harmony.

If we look carefully at languages that exploit two series, we can see that the most common combination (besides voiceless vs. voiced) is for the voiceless stops to contrast with either ejectives or aspirated consonants. The number of languages that exploit this opposition is, however, significantly smaller than the number of languages that exploit the voiceless/voiced opposition. Thirteen languages, that is 9%, have been found to oppose their stops on the bases of other kinds of series. Three out of five languages that oppose plain voiceless stops to ejectives stops are Matakaoan languages from the Chaco Region: Chulupí, Chorote, and Maká. Finally, only two languages of the database oppose voiceless to voiced implosives stops: Koaia (isolate) and Movima (isolate).<sup>5</sup>

Following the languages with two series of stops, there are languages with only one series of stops. Their total number is 39, that is 28% of the languages surveyed. In all cases, this series corresponds to voiceless stops. Finally, 26 languages, that is 19%, oppose three stop series. In these cases, the most common opposition is between voiceless, voiced, and aspirated stops. Other combinations are given in Table 3, which also provides the number of languages in relation to the number and the nature of series they exploit for phonological purposes. The partial percentage of a combination of series (e.g., voiceless vs. ejectives) is given so that the proportion of a given combination can be appreciated within a group of languages that exploit a given number of series. For example, the voiceless vs. voiced opposition represents 80% of cases of languages with two series.

*Table 3: Number and Types of Series of Stops*

Number of series	Nature of series	Number of languages	Partial Percentage
1	Voiceless stops	39	100
Partial total		39	
2	Voiceless vs. Voiced	57	80
	Voiceless vs. Ejectives	6	8.5
	Voiceless vs. Aspirated	5	4
	Voiceless vs. Implosive	2	1.5
	Voiceless vs. Pre-nasalized	1	1.4
Partial total		71	
3	Voiceless vs. Voiced vs. Aspirated	9	35
	Voiceless vs. Voiced vs. Ejective	6	23
	Voiceless vs. Aspirated vs. Ejective	5	19
	Voiceless vs. Voiced vs. Implosive	2	8
	Voiceless vs. Aspirated vs. Pre-nasalized	2	8
	Voiceless vs. Voiced vs. Pre-nasalized	1	4
	Voiceless vs. Aspirated vs. Post-nasalized	1	4
Partial total		26	

<sup>5</sup> However, sources are contradictory in regard to Movima. Plaza Martínez (1985) and Aikhenvald and Dixon (1999) report an opposition between plain voiceless and plain voiced stops. On the other hand, for Judy and Judy (1962) the opposition is between plain voiceless and implosive voiced. I follow here Judy and Judy.

### 3.1.2. Secondary articulations

Labialization and palatalization, as secondary articulations, have also been analyzed. Twenty-three languages (16%) are reported to have labialized stop consonants against 13 (9%) with palatalized stops. Similarly to what is found at the world level, voiceless stops are more likely to have any kind of secondary articulation than voiced stops are. Notice, however, that, as I said earlier, to posit a labialized or palatalized consonant as a single segment is a matter of phonological analysis. Tupian languages, from the Central Amazonian region, are characterized by opposing labialized consonants to their plain counterparts. In contrast, no languages with any secondary articulation are found either in the Western Amazonian I (north) region or the Chaco Region. Table 4 shows the number and percentage of languages that oppose stops on the bases of their secondary articulations.

Table 4: Number of Languages with Secondary Articulations

Secondary articulations	# of languages	Percentage
Labialized voiceless stop	19	14
Palatalized voiceless stop	9	6
Labialized voiced stop	4	3
Palatalized voiced stop	2	1
Palatalized pre-nasal voiced	2	1

### 3.1.3. Points of articulation of stops

In this section, voiceless and voiced stops are analyzed in regard to the points of articulation at which they are produced. I focus on the number of points of articulation that a language may make use of, as well as the most common ones. The glottal stop [ʔ] will be considered as part of the stops system. Notice that Maddieson discusses this type of segments separately from voiceless stops, and this for reasons related to articulatory constraints: “glottal stops cannot vary in manner” (1984: 31). The reason why I consider this segment altogether with stops is because I am interested in evaluating its place within the broad system of stops.

### 3.1.4. Voiceless stops

The most common pattern for SAIL is to produce their voiceless stops at either four or three different points of articulation. Languages that exploit four points of articulation are, however, most common (50%) compared to languages that exploit three points of articulation (40%). This is shown in Table 5.

Table 5: Number of Points of Articulation for Voiceless Stops

	Number of points of articulation for voiceless stop				
	1	2	3	4	5
N° of languages	2	2	55	69	10
% of languages	1.5	1.5	40	50	7

All languages have at least a velar voiceless stop [k] and no language has any retroflex stops.<sup>6</sup> Jamamadi (Arawan) and Karajá (Macro Je cluster) are examples of languages whose only stop segment is a velar voiceless stop. Two languages in the database exploit two points of articulation for voiceless stops: Wambisa (Hivaro-Kawapanan) and Waiwai (Kariban F). In both cases, one of the stops is a [k] and the other is either a bilabial voiceless stop [p] (Wambisa) or an alveolar voiceless stop [t] (Waiwai).

Languages that exploit three points of articulation—55 languages, that is 40%—produce their voiceless stops at the bilabial, alveolar, and velar places. Only two of them, Iñapari (Arawakan Maipuran VI) and Shavante (Je II), diverge from this pattern, as they utilize the bilabial, velar and glottal places of articulation. Languages with four points of articulation may add either the alveolar-dental distinction or the velar-uvular distinction. Languages of the first type are Bániva (Arawakan Maipuran I) and Mapudungún (isolate), while languages of second type are Kechua, Hakaru, Aimara (Kechumaran stock) and Chipaya (Uru-Chipaya family). Finally, languages that utilize five places of articulation may add both the dental and the glottal places in addition to the already mentioned places. Trumai (isolate) is a language of this kind; they may use the palatal place of articulation, as in the case of Munichí (isolate), Hevero (Kawapanan), and Koaia (isolate); or they may exploit the velar-uvular-glottal distinction, as in the case of Tewelche and Ona (Chon), Wichí and Maká (Matakoan), Pilagá and Mokoví (Waikuruan), and Vilela (Lule-Vilelan stock).

Notice that languages that oppose velar to post-velar spots are found in both the Andes Region—Kechua, Hakaru, Aimara (Kechumaran stock), and Chipaya (Uru-Chipaya family)—and the Chako Region—Wichí and Maká (Matakoan), Pilagá and Mokoví (Waikuruan), and Vilela (Lule-Vilelan stock). The Southern foothills Region also has two languages of this type: Tewelche and Ona (Chon).

### 3.1.5. Voiced stops

The number and distribution of places of articulation for voiced stops is more restricted. In the SAIL database, languages appear to use four points of articulation for voiced fricatives (against five for voiceless fricatives). In addition, a total number of 60 languages, that is 43%, lack any kind of voiced stop.

The most frequently used point of articulation for voiced stops is the dental-alveolar region. However, one cannot predict that if a language has a

<sup>6</sup> Retroflex segments are commonly found in languages of India (Kaufman p.c.)



voiced stop, this is a dental-alveolar one. Languages that have only one voiced stop may produce them at three different points. Some of them may have a bilabial voiced stop [b], as in the cases of Bora-Iñeje (Bora) and Kamsá (isolate). Others may have an alveolar voiced stop [d], which is the case of Piohé-Secoya (Western Tukanoan), Yatê (Macro-Je cluster), Nambikuara (Nambikuaran), and Trumai (Macro Otomakoan cluster). Still others utilize the velar point of articulation [g] for voiced stops; this is true of Kanichana (Macro Tekiraka-Kanichana cluster), Kaingang (Je III), Guarayú (Tupian I), and Makurap (Tupian VII).

An important percentage of languages (83%) with two voiced stops produce them at the bilabial and alveolar places, whereas 11% of them use the alveolar and velar places and only 3% utilize either the alveolar and the uvular places, as in the case of Mocoví (Waikuruan), or the bilabial and the alveo-palatal places, as in the case of Koayá (isolate.) As for languages with voiced stops produced at three different points of articulation, the more frequent points are bilabial, alveolar, and velar.

Finally, only five languages, that is 4%, use four points of articulation for voiced stops. These points may be bilabial, alveolar, palatal, and velar or bilabial, alveolar, velar, and uvular. Table 6 shows the number of points of articulation for voiced stops.

*Table 6: Number of Points of Articulation for Voiced Stop*

	Number of points of articulation for voiced stop				
	0	1	2	3	4
N° of languages	61	10	36	27	5
% of languages	43	7	26	19	4

Since a large number of languages lack voiced stops, similarly, there is a significant number of regions whose languages do not have any kind of voiced stop. This is mainly the case of the Western Amazonian I South region, the Northern Foothills region, the Andes Region, and the Northern Amazonia region. Other regions with a relatively large number of languages without voiced stops are the Chaco Region and the Central Amazonian Region. As for the genetic distribution of languages without voiced stops, they are mostly found in the following genetic units: Macro-Paezan cluster, Arawakan Maipuruan IV, V, VI, VII, Hívaro-Kawapanan sub-stock, Saparo-Yawan stock, Matakooan family, Tupian I, and Kariban sub-stock.

### *3.1.6. Voiceless/voiced opposition of stops*

The more common points of articulation at which voiceless and voiced stops contrast are the dental-alveolar and the bilabial regions. The dental-alveolar place is exploited by 71 languages out of 89 that have the voiceless/voiced opposition, that is 80%. The bilabial place follows with 65 languages (73%), which in turn is followed by the velar place with 13 languages (9%), and the palatal place with 6 languages (4%). Finally, only three languages

show a voiceless/voiced opposition at the uvular place of articulation. They are Mokoví (Waikuruan) and Vilela (Lule-Vilela stock) both from the Chaco Region and Tewelche (Chon) from the Southern Foothills Region. Map 1 shows the geographic distribution of languages that contrast voiceless to voiced stops (green shade) and languages that do not have such contrast (red shade).

*Map 1: Voiceless / Voiced Opposition for Stops*

**SEE MAP 1**

Map 2 shows the geographic distribution of languages that oppose post-velar segments on the basis of phonation type (i.e., voiceless vs. voiced).

*Map 2: Geographic Distribution of Post-velar Segments [q] and [ɢ]*

**SEE MAP 2**

*3.1.7. Most common allophonic variation of voiceless stops*

The purpose of the discussion about allophonic variation is to identify the phonetic features of consonants, which may extend over genetic units. In this section, I discuss the most common allophonic variation of voiceless stops. Although voiceless stops have a big range of allophonic variation, I concentrate on the genetic and geographic distribution of aspirated voiceless stops, as they appear to be the most recurrent.

A total number of 40 languages, that is 29%, have either a phoneme or an allophone that are aspirated voiceless stops. This figure unquestionably contrasts with the ones given in Table 2, where 21 languages (15%) were reported to have an aspirated voiceless stop phoneme. This means that it is a relatively common phenomenon for a voiceless stop to have an aspirated allophone. The voiceless dental-alveolar stop [t] is the more likely segment to be aspirated, followed by the velar voiceless stop [k] and the bilabial voiceless stop [p]. It is striking to see that the majority of languages with aspirated voiceless stops—either as phonemes or as allophones—are found in both the North-Western Region and the Western Amazonian I North region. Other regions that have languages of this type, although in a lesser proportion, are the Western Amazonian I South region, the Western Amazonian II region, the Andes Region and the Eastern Brazil region. In terms of the linguistic distribution of aspirated voiceless stops, the Macro-Arawakan cluster has a large proportion of languages (48%) that have either an aspirated phoneme or an aspirated allophone. Other genetic units with a significant number of languages of this type are: the Tukanoan stock (e.g., Korewahe, Secoya, Tukano, and Wanana-Pirá); the Kechumaran cluster (e.g., Kechua, Hakaru, and Aimara); the Chokó family (e.g., Embera and Saija), and the Core Chibchan family (e.g., Kogi and Wiwa).

Map 3 shows the geographic distribution of languages that have aspirated segments, while Map 4 displays the geographic distribution of languages that exploit aspiration for phonological purposes.

*Map 3: Languages with Aspirated Segments*

**SEE MAP 3**

*Map 4: Languages that Contrast Aspirated vs. Plain Segments*

**SEE MAP 4**

### 3.2. Affricates

In this section, I consider the series and the places of articulation of affricate consonants. Like stops, voiceless and voiced affricates will be treated separately. Finally, the most common places of articulation at which voiceless and voiced affricates contrast will be examined.

Affricates are part of the phonemic inventory of 80% of SAIL. They are here defined as “consonant[s] whose articulation involves a complete oral closure followed by a comparatively slow release with perceptible friction noise.” (Trask 1996: 14). Voiceless affricates are, by far, more frequent than voiced affricates, and no voiced affricate is found without its voiceless counterpart.

#### 3.2.1. Affricates: Number of exploited series

The number of series exploited by affricates is smaller than the number of series exploited by stops. Affricates usually contrast on the bases of four series, while stops were reported to phonologically exploit seven series. In addition, the number of languages that phonologically exploit series like ejective and aspirated decreases significantly in relation to stops. This is shown in Table 7.

*Table 7: Number of Series of Affricates*

	Number of languages	Percentage of languages
Plain voiceless	105	100
Plain voiced	33	24
Ejectives	7	7
Aspirated	5	5

Ejective affricate phonemes are commonly found in languages of the Chaco Region (e.g., Chulupí, Maká, and Vilela) and the languages of the Andes Region (e.g., Aymara, Quechua, Chipaya, and Jaqaru.) Other languages with ejective affricates are Tehuelche (Chon) and Trumai (isolate). As for aspirated affricates, they are also found in the Andes Region (e.g., Aymara, Jaqaru, and Quechua); this means that languages of this region contrast their affricates (as well as their stops) on the bases of three series: voiceless, ejective, and aspirated. Other languages with aspirated affricates are Bora-Iñeje (Bora), Paez-Caldono (Paezan), and Yatê (Macro-Je cluster).

### 3.2.2. *Voiceless affricates*

One hundred and five language, that is 76%, have at least one affricate consonant, while 33 languages, that is 24%, do not have any kind of affricate segment.

Among languages with affricate segments, the most frequent pattern is for a language to have one voiceless affricate. This is the case of 76 languages that represent 55% of languages with affricate segments. Next follow languages with two affricates (17%) and, finally, languages with three affricates (4%). Table 8 shows the number of places of articulation altogether with the number and the percentage of languages that exploit different numbers of voiceless affricates.

*Table 8: Number of Places of Articulation for Voiceless Affricates*

	Number of places of articulation for voiceless affricates			
	0	1	2	3
Number of languages	33	76	23	6
Percentage of languages	24	55	17	4

The most frequent place of articulation where voiceless affricates are produced is the alveo-palatal region (here used as a cover term for the post-alveolar and the palatal regions); 92 languages, that is 88%, produce their affricates at this place. Significantly, this region represents a gap in the system of stops, which is filled by this segment.

The alveolar region follows the palatal region in regard to the frequency of voiceless affricates. However, the number of languages that use this region to produce their voiceless affricates is more restricted; 43 languages, that is 41% of languages with voiceless affricates, produce them at the alveolar region. Finally, only seven languages have retroflex affricates; they are Wambiano (Kokonuko), Amuesha and Chamicuro (Arawakan Maipurean IV), Hakaru (Haki), Chipaya (Uru-Chipaya), Takana (Takanan), and Kamsá (isolate). Only one language, Jabuti (Jabutian), is reported to have a bilabial voiceless affricate [ps] altogether with an alveo-palatal affricate [tʃ].

Given that affricates are common segments of phonological systems of SAIL and that most languages usually have one affricate in their segment inventory, it is interesting to look at genetic units or geographic areas that lack this kind of segment. The Tukanoan languages (e.g., Korewahe, Piohé-Secoya, Piohé-Siona, Jauna-Retuara, and Tukano) are characterized by the lack of affricate consonants in their phonemic systems. Other genetic units with a significant number of languages without affricates are the Saparoan family (e.g., Arabela and Ikito), the Arawakan-Maipurean sub-stock (e.g., Jamamadí, Arawak, Palikur, Terena and Iñapari.), the Kariban family (e.g., Tiriyó, Macushi and Apalai) and the Tupian stock (e.g., Guarani, Mbü'a, Urub'ú Kaapor, Wayampi, Jo'é and Mundurukú). As far as their geographic distribution is

concerned, these languages are mainly found in the Western Amazonian II, the Central Amazonian, and the Northern Amazonian regions.

To sum up, the distribution of voiceless affricates allows for the following generalization: if a language has one affricate this segment will be voiceless and most likely produced at the post-alveolar place of articulation. A language with two affricates will have them produced at both the post-alveolar and the alveolar regions. Finally, a language with three affricates will add a retroflex affricate consonant to its inventory.

### 3.2.3. *Voiced affricates*

The survey of voiced affricates, specifically of the alveo-palatal voiced affricate [dʒ], pose some problems mainly related to the allophonic variations that this segment may display. I will discuss two common allophones of the alveo-palatal voiced affricate: the alveo-palatal voiced fricative [ʒ] and the palatal nasal [ɲ]. Frequently, the alveo-palatal voiced affricate [dʒ] is reported to alternate with its fricative counterpart [ʒ], because it is common for this segment to become fricativized in intervocalic position. Notice that this is not the case of the voiceless alveo-palatal affricate [tʃ] and its fricative counterpart [ʃ], which are almost never reported as allophonic variations of the same phoneme. As a consequence, given a phonological system, a voiced alveo-palatal affricate may be posited as a phoneme of a phonological system for structural reasons (i.e., the language has a voiceless alveo-palatal affricate [tʃ], but not a voiceless palatal fricative [ʃ]). The second type of allophonic variation is for the voiced alveo-palatal fricative or the voiced alveo-palatal affricate to alternate with the nasal palatal [ɲ] in languages that display nasal harmony. This means that either the voiced alveo-palatal fricative [ʒ] or the voiced alveo-palatal affricate [dʒ] may or may not be posited as a phoneme of a language with nasal harmony according to the linguist's decision of representing the oral (e.g., [mb], [nd], [dʒ], and [ɲg]) or the nasal (e.g., [m], [n], [ɲ], and [ɲ]) counterpart of segments undergoing nasal harmony.<sup>7</sup> In other words, a language may be counted as not having any voiced alveo-palatal affricate segment if the nasal counterpart is chosen as the basic form. While authors may have phonological justifications for choosing one or the other allophone, one cannot ignore the fact that phonetically the segment exists and that it may be equally frequent as its nasal counterpart.

Voiced affricates are less common than voiceless affricates. Thirty-three out of the 105 languages with affricates segments, that is 24%, have a voiced affricate. The most common place of articulation is the alveo-palatal region, which is exploited by 28 languages, that is 84% of languages that have a voiced affricate segment. Far behind follows the alveolar region, exploited by only five languages: Paez-Caldono and Paez-Munchique (Paezan), Baniva

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<sup>7</sup> The Je languages display other types of alternations.

(Arawakan-Maipurean I), Kipea, and Yaruro, both isolated. Finally, only one language, Jabuti (Jabutian), is reported as having a voiced bilabial affricate [bz].

### 3.2.4 Voiceless/voiced opposition of affricates

A general implication may be suggested as a result of the analysis of affricate segments: if a language has a voiced affricate, it also has its voiceless counterpart. More specifically, while 105 languages have some kind of affricate segment, only 27 of them, that is 26%, contrast voiceless to voiced affricates. Those contrasts are mostly produced at the alveo-palatal place of articulation, although five languages are reported to contrast voiceless with voiced affricates at the alveolar region.

## 4. CONCLUSION

In this study, I have attempted to show some general tendencies displayed by the phonological systems of SAIL in regard to their subsystems of stops and affricates. Stops and affricates have been treated jointly because of their articulatory similarities (i.e., they are both plosives) and because affricates tend to fill the gaps of the sub-systems of stops.

Stops have been considered in regard to the number of series they exploit for phonological purposes. This has permitted the determination of the following patterns: while all languages have voiceless stops, only half of them have any kind of voiced stops. Other common series of stops are aspirated and ejective. Most languages have between three and four voiceless stops. The Andes Region and the Chaco Region are characterized by contrasting stops at the post-velar place of articulation. In addition, I have shown that a common allophonic variation of voiceless stops is for these segments to be aspirated. As for voiced stops, the most frequent point of articulation is the dental alveolar region. Voiced implosive stops are very rare in the phonological systems of SAIL. As for affricates, they are more restricted than stops in regard to their cross-linguistic distribution (i.e., they are less common than stops in phonological systems) as well as in regard to the number of series and the number of places of articulation they use.

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