AREAL DISTRIBUTION OF NASALIZED VOWELS

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ABSTRACT

This paper reviews the typology and distribution of vowel systems which include nasalized vowels. It is well-known that languages with distinctively nasalized vowels have an equal or lower number of nasalized vowel qualities than of oral vowel qualities. However, there are interesting areal differences in the distribution of systems with equal and fewer numbers of nasalized vowels. Languages in Africa usually have fewer nasalized than oral vowels; languages in the southern part of the Americas more often have equal numbers of oral and nasalized vowel qualities. The latter pattern is sometimes associated with a morphological function for vowel nasalization and with long-range nasal spreading.

Keywords: Vowel systems, nasalization, typology, areal linguistics

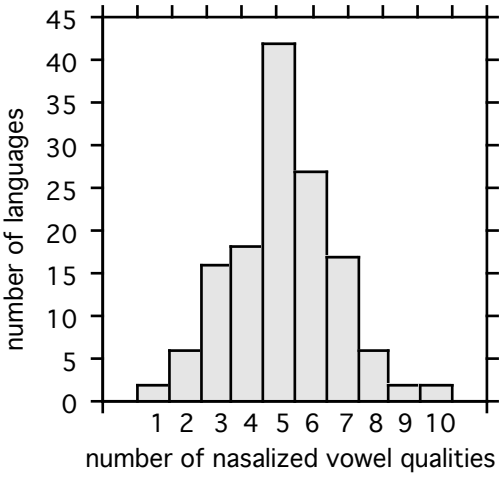
1. INTRODUCTION

In traditional phonetic terminology a nasalized segment is one whose production involves flow of air through both the mouth and the nose. The only common type of distinctive (i.e. 'phonemic') nasalized segments are nasalized vowels. That languages do not have vowel systems in which there are more distinctive nasalized than oral vowel qualities has long been recognized [1, 2, 3, 4]. Previous analysis of nasalized vowel systems has often focused on where the gaps in the nasalized vowel inventory fall in relation to the oral vowel inventory, or on the diachronic processes by which they originate or evolve [3]. However, there is an interesting difference in the areal distribution of systems with equal numbers of oral and nasalized vowels and those with fewer nasalized than oral vowels which does not seem to have attracted much prior notice. After a general review of data on the structure of nasalized vowel inventories this distributional pattern will be described.

2. NUMBER OF NASALIZED VOWELS

A sample of 670 languages, consisting of an expanded version of the UPSID sample [5] incorporating the 200 language sample used for the *World Atlas of Language Structures* [6] and numerous other additions, was surveyed for this paper. Of these languages, 138 are recognized as having one or more nasalized vowels in their vowel inventories. This is just over one-fifth of the total (20.6%). These vowel systems will be discussed in terms of numbers of basic vowel qualities rather than the total number of vowels. That is, only distinctions based on the primary vowel dimensions of height, backness and rounding, as well as tongue root position, will be considered. Quantity and phonation type contrasts are among the features not counted, in part because it is more difficult to establish uniform criteria for their recognition, given the available descriptions. The number of nasalized vowel qualities ranges from a high of 10, found in two languages in the sample, Sindhi and the West African language Koromfe, to a low of only one nasalized vowel, which is found in three languages — Gwari, another Niger-Congo language of West Africa, and in Cherokee and Copainalá Zoque in the Americas. In [4] Maba is also reported as having a single nasalized vowel, but our sources do not confirm this.

Figure 1: Number of languages in the sample with different numbers of nasalized vowel qualities.

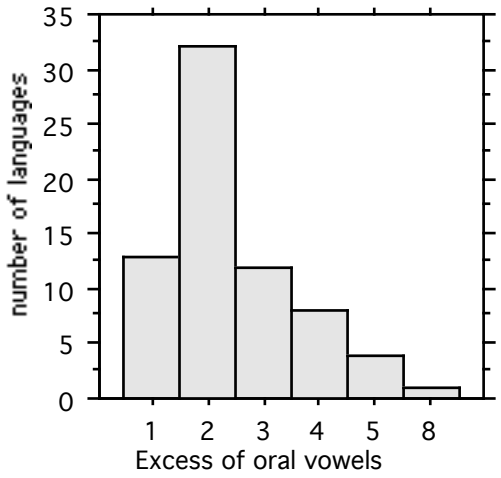


As is shown in Figure 1, the most common pattern is to find five nasalized vowel qualities, which is the same modal number as is found among vowel qualities in general. However there

are proportionally fewer languages with six, seven or more nasalized vowels in comparison with the number of languages with six or more vowel qualities in their overall vowel quality inventory [7].

None of the languages in the sample has more nasalized vowel qualities than oral ones, as expected. The most common single pattern is for each of the oral vowels to have a nasalized counterpart. This is true for 68 (49.3%) of the languages with nasalized vowels. In the remaining 70 languages there are fewer nasalized than oral vowels. The most common pattern in this case is for the number of nasalized vowel qualities to be two less than the number of oral vowel qualities, this being so for 32 of the languages (23.2% of those with any nasalized vowels). The largest difference in the sample between the number of oral and nasalized vowel qualities, eight, is found in French, which has 11 oral vowels but only 3 nasalized vowels in the analysis adopted here. The numbers of additional oral vowel qualities in the languages with fewer nasalized than oral vowel qualities is shown in Figure 2.

Figure 2: Excess of oral vowel qualities over nasalized vowel qualities.



For almost all the languages each nasalized vowel can readily be considered to be the nasalized counterpart of one of the oral vowels in the language's inventory. However, based on the description in [8], Cherokee is interpreted as an exception, being reported to have five oral vowel qualities (i, e, a, o, u) plus one nasalized vowel (/ɐ̃/) which does not have an oral counterpart, so that in this case the nasalized vowel adds one to the total of basic vowel qualities in the language. Interestingly, different accounts of the language disagree on whether this vowel is nasalized in all its occurrences, or is only nasalized next to certain consonants, such as /h/.

3. DISTRIBUTION OF NASALIZED VOWELS

In mapping the distribution of nasalized vowels those languages with equal numbers of oral and nasalized vowels are distinguished from those with fewer nasalized than oral vowels. On the 'ghost map' in Figure 3 the former are coded with larger open circles and the latter with filled black circles. Languages with no distinctive nasalized vowels are shown by small grey circles. The map is a rectangular projection with no land or sea areas defined, and reflects current or historic locations of indigenous languages. Nasalized vowels are notably absent from certain areas, particularly in the northwest of North America and the northeastern quarter of Africa, as well as Australia, and northern part of Asia. The first two of these are areas which are each marked by a number of other phonological characteristics, some of which the two areas share. For example, both are areas where ejectives are common [9]. Among Australian languages an absence of nasalized vowels joins other shared features of their phonological inventories, several of which are also absences of classes of sounds that commonly occur elsewhere, such as the general absence of fricatives or voiced plosives (or at least an absence of any voiced/voiceless contrast) [10, 11]. Nasalized vowels are more commonly found in much of the rest of the Americas (particularly the south), and in western and southern parts of Africa, and are rather more sporadically found in Europe, New Guinea and in south and southeastern parts of Asia (cf [4]).

The frequency of occurrence of systems with only oral vowels, equal numbers of nasalized and oral vowel qualities, and fewer nasalized than oral vowel qualities is shown in Table 1. The languages are subset into 6 major groupings based on genetic and geographical criteria. In forming these groupings genetic factors override purely areal ones to keep related languages together. All languages in a family are included in the area of its major concentration. For example, Semitic languages spoken in Asia Minor are grouped with other Afro-Asiatic languages under the African area, and all Austronesian languages are grouped together in the East and South-East Asian area, including even Malagasy and Maori. The division between the Americas is the Isthmus of Tehuantepec, placing Mayan languages of

Mexico to the south with the rest of Mayan. The areas are as follows:

- •1 Europe, West & South Asia (110 lgs.)
- •2 East & South-East Asia (122 lgs.)
- •3 Africa (151 lgs.)
- •4 North America (94 lgs.)
- •5 South & Central America (96 lgs.)
- •6 Australia & New Guinea (97 lgs.)

Table 1: Areal distribution of languages with and without nasalized vowel qualities; languages with nasalized vowels are separated into those with equal numbers of oral and nasalized vowel qualities and those with fewer nasalized than oral vowel qualities.

Group	Oral only	Equal NV	Fewer NV
1	94	11	5
2	111	4	7
3	118	6	27
4	69	10	15
5	51	32	13
6	89	5	3
Total	***532***	***68***	***70***

There is an interesting difference between the two of these groups in which nasalized vowels are most common. In 32 of the 45 languages with nasalized vowels in region 5, the South and Central America region, the number of nasalized vowels is equal to the number of oral vowels. This pattern is particularly evident around the north of South America and extends into Central America and Mexico in the south of Region 4. In Region 3 on the other hand, among the African languages with nasalized vowels, almost all have fewer nasalized than oral vowels. This is so for 27 of the 33 languages concerned.

This difference may be linked to a tendency for nasalization of vowels to function differently in the languages of these areas. The American languages more often have a pattern where nasalization is shared by several or all vowels in a word (whereas 'nasal spreading' in African cases is often limited to within a single syllable as in Doyayo [12]). Vowel nasalization also serves as a marker of particular grammatical categories in certain American languages. For example, in Shipibo, a Panoan language of Peru, the ergative case of a noun is marked by changing a final oral vowel into its nasalized counterpart [13]. In Coatzospan Mixtec of Mexico the second person familiar is formed by nasalizing the final vowel of the verb [14]. Nasalization then spreads to earlier syllables across intervening consonants apart from most voiceless obstruents. In Panare, a Cariban language of Venezuela, nasalization of a word-final vowel is apparently the mark of first singular possession (e.g. /ko/ 'weapon', /kõ/ 'my weapon' [15]. In such situations each oral vowel very naturally is paired with a nasalized counterpart. Tucanoan languages, such as Cubeo [16] and Desano [17] in Colombia, are among those languages in which nasalization of vowels spreads in a purely phonological process. The Tupian language Kaiwá of Brazil displays a spreading of nasality to vowels within a phonological word ('stress group') when a morpheme with an inherently nasalized vowel is part of the string [18]. Long range spreading of nasality from vowels in Apurinã, Warao, Epena Pedee, Barasano and Guarani is illustrated in [4]. These kinds of patterns often lead to proposals to treat nasalization as a prosodic or 'floating' property (a possibility not admitted in the process of standardizing the descriptions in the language sample.)

The difference between the African and American areas may also be linked to the overall number of vowel qualities distinguished. The 68 languages in the sample with equal numbers of oral and nasalized vowels have a mean of 5.71 basic vowel qualities; the 70 with fewer nasalized vowels have a mean of 7.04 basic vowel qualities — these means are significantly different ($F(1, 136) = 22.97$, $p < .0001$). In particular, of the African languages in question, 23 out of the 33 (69.7%) have seven or more vowel qualities, whereas such larger than average sized vowel inventories are considerably rarer in the Americas. Only 11 of the 45 (24.4%) south and central American languages with nasalized vowels have more than 6 basic vowel qualities. Considerable research on the acoustic properties of vowels has shown that it is more difficult for a listener to distinguish between different nasalized vowels than to distinguish between their oral counterparts [19, 20].

This observation probably helps to explain why the number of nasalized vowels in a language is so often less than the number of oral vowels. More specifically, this factor can be expected to operate with particular force when the number of vowels is larger. In the majority of languages with nasalized vowels the historical origin of these vowels can be traced to an earlier sequence of a nasal consonant followed by a vowel or a vowel followed by a nasal consonant [1, 3] 'fusing' together. Such processes are quite likely to affect all vowels and thus produce nasalized counterparts to each oral vowel. However, if the number of vowels is large,

maintaining the distinction between all the nasalized counterparts is difficult.

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Figure 3: 'Ghost map' of world-wide distribution of languages with and without nasalized vowels.