

THAI NASALISED VOWELS

JOSEPH R. COOKE

It is a matter of common knowledge that under certain conditions Thai vowels may be subphonemically nasalised. Roughly speaking, the conditions are as follows: all vowels are ordinarily nasalised following initial nasal consonants (/m/, /n/, /ɲ/); and the vowels /a/ and /aa/ (and sometimes other vowels) are nasalised following initial glottal consonants (either the stop /ʔ/ or the fricative /h/).¹ The first type of nasalisation (that following nasal consonants) is, I believe, quite general. That is, such nasalisation regularly takes place with all native speakers. But vowel nasalisation following glottal initials is more variable. That is, some speakers will ordinarily nasalise only /a/ and /aa/ following glottal initials, other speakers will nasalise other vowels, particularly following /h/, and some speakers will nasalise all vowels following /h/, but only some of them following /ʔ/. Also nasalisation of this kind is more likely, or at least more obvious, when the vowel is long or followed by a sonorant.

The above patterns of nasalisation may appear a little strange in spots. Certainly the first type of nasalisation seems natural enough, for one is not surprised to find vowels nasalised after initial nasal consonants. But why should initial glottals condition nasalisation? And why should that nasalisation occur with some vowels and not with others? The purpose of this paper is to examine these phenomena in terms of distinctive feature analysis and to see if thereby we can shed light on the questions that the phenomena raise.

Let us first consider the more straightforward type of nasalisation – that involving vowels following initial nasal consonants. Here, obviously, we have a simple case of assimilation: the vowel assimilates to the immediately preceding consonant as to the feature of nasalisation. Or, to put it another way, the velic, which is open during the articulation of the nasal consonant, remains open for the articulation of the following vowel. Thus the feature of nasalisation carries over from the initial consonant and affects the following vowel also. This process may be summarised in distinctive feature terms as follows:

Rule 1 V → [+nasal] / [^C +nasal] --

Here the rule as stated clearly shows that the vowel has assimilated to its environment as to the feature of nasality. Nothing could be more straightforward. Not only the facts with regard to the sound change but also the motivation for that change are clear from the rule.

When we consider the second type of vowel nasalisation, however, we encounter a little more difficulty. Here, if we consider the fairly common pattern in which /a/ and /aa/ are nasalised after /ʔ/ or /h/, and then attempt to state this pattern in terms of the usual set of distinctive features at our disposal, we come up with something like the following rule:

$$\text{Rule 2} \quad \left[\begin{array}{c} \text{V} \\ - \text{high} \\ + \text{low} \\ - \text{round} \end{array} \right] \rightarrow [+ \text{nasal}] / \left[\begin{array}{c} - \text{syllabic} \\ - \text{consonantal} \\ - \text{sonorant} \end{array} \right] \quad \text{---}$$

Now this rule certainly describes the facts accurately enough, but it doesn't seem to explain anything. Intuitively we know, or at least suspect, that some process of assimilation is at work, but there is nothing in the rule that helps us see what feature of the conditioning segment is carried over to the conditioned. Why should the features [- syllabic, - consonantal, - sonorant] cause the appearance of a feature [+ nasal]? And what is there about the features [- high, + low, - round] that makes this particular vocalic combination more susceptible to nasalisation than other vocalic combinations? And why should the glottal features have any particular effect upon the vocalic features? When we look at rule 2 in the light of such questions it appears completely arbitrary and unmotivated. What we need to do is to find some feature or combination of features that is relevant at the same time to glottal consonants, to low central vowels, and to the process of vowel nasalisation. Let us therefore look a little more closely at the articulatory mechanisms involved in the production of the various sounds we are considering, and let us see what we can discover.

The first thing we may note is the fact that the glottal consonants are in a sense more neutral with respect to the feature of nasalisation than other consonants are. That is, it is physiologically possible to articulate [h] and [ʔ] with the velic either open or closed. In the case of [h] this means that during articulation the airstream can pass through either the mouth or the nose or through both at the same time. And with [ʔ] this means that, after the stop is released, the airstream will pass through the mouth or through the nose or through both, depending on whether the stop is articulated with the velic closed or open. Clearly, then, these sounds have a potential for nasalisation simply by virtue of the fact that they are glottals.²

The case of the low back (or central) unrounded vowels is a little different. My guess is that the lower and more relaxed the tongue is, and the wider and more relaxed the pharyngeal opening, the more likely (from a physiological point of view) it is that the muscles controlling the velic will be relaxed. The result, at least for Thai speakers, is the increased propensity for nasalisation that is characteristic of the low central vowels /a/ and /aa/. And we can note also the fact that other low vowels seem to be more readily nasalised than higher vowels.³

Perhaps it is worth noting, here, that historically, in some of the Thai languages, the glottal /h/ and the nasal /ŋ/ do pattern together, for we know that the proto-Thai form /ŋ/ is reflected as /h/ in some of the dialects of southern Thailand. This provides an independent bit of evidence for the assumption that glottals and nasals do indeed have some features in common.

And (to go further afield) one might note the way in which glottals, nasals and a low central vowel seem to be interrelated in the American colloquial expressions 'u-huh', meaning 'yes' (pronounced

[ʔh̃h̃] with nasalised vowels) and ‘hu-uh’ meaning ‘no’ (pronounced [h̃h̃ʔh̃], also nasalised). One might suspect that these forms, being borderline words, have escaped the tyranny of the usual English subphonemic nasalisation rules, allowing the natural physiological processes to assert themselves. Thus the lax, low central vowel is here nasalised following glottals. Note, further, that when one is panting heavily from exertion, it is very natural to have the mouth open in something like the [ʌ] or [a] position, with the velic open and the breath escaping in a rapid series of vigorous glottal fricatives.

Be all this as it may, we have to assume that glottals and low central vowels in Thai have a special propensity or potential for nasalisation. So I suggest that we postulate a distinctive feature [+ p. nas] (propensity for nasalisation) as a characteristic of each of the phonemes in question. The relevant features for the classes of phonemes under consideration, then, may be summarised in the following matrix:

FEATURES	NASAL CONSONANTS ⁴	GLOTTALS	OTHER CONSONANTS	/a/, /aa/	OTHER VOWELS
Nasal	+	-	-	-	-
P. nas		+	-	+	-

If we assume the above feature configurations, we can restate rule 2 above in a more revealing manner as follows:

$$\text{Rule 2a} \quad \begin{bmatrix} C \\ + p. \text{ nas} \end{bmatrix} + \begin{bmatrix} V \\ + p. \text{ nas} \end{bmatrix} \rightarrow \begin{bmatrix} C \\ + \text{ nasal} \end{bmatrix} + \begin{bmatrix} V \\ + \text{ nasal} \end{bmatrix}$$

Here the rule clearly shows that a kind of assimilation is taking place, and we can see exactly what there is about the environment that causes the nasalisation to take place. Then we can complete the picture by writing another rule that states that all other occurrences of [+ p. nas] segments, and all cases of [- p. nas] segments are realised as [- nasal]. This can be stated in the form set forth in rule 3 below (assuming that rule 3 must apply after rule 2). Or it can be stated more fully as rule 3a. In the latter case we catch the generalisation (gleaned by comparing rules 2a and 3a) that nasalisation takes place when two [+ p. nas] segments occur in sequence, but not when a [+ p. nas] segment stands alone. Note that in rule 3a the symbol α (according to the usual convention) may signal either plus or minus the feature in question, but always the same value throughout the equation for each application of the rule.

$$\text{Rule 3} \quad \left\{ \begin{array}{l} [+ p. \text{ nas}] \\ [- p. \text{ nas}] \end{array} \right\} \rightarrow [- \text{ nasal}] \quad / \quad _ _$$

$$\text{Rule 3a} \quad \left\{ \begin{array}{l} \left[\begin{array}{c} C \\ - p. \text{ nas} \end{array} \right] + \left[\begin{array}{c} V \\ - p. \text{ nas} \end{array} \right] \\ \left[\begin{array}{c} C \\ \alpha p. \text{ nas} \end{array} \right] + \left[\begin{array}{c} V \\ - \alpha p. \text{ nas} \end{array} \right] \end{array} \right\} \rightarrow \left[\begin{array}{c} C \\ - \text{ nasal} \end{array} \right] + \left[\begin{array}{c} V \\ - \text{ nasal} \end{array} \right]$$

The above rules now cover the case where speakers nasalise /a/ and /aa/ after /h/ or /ʔ/. But what about speakers who nasalise other vowels more freely after /h/ than /ʔ/?

The simplest case, of course, is that in which speakers nasalise all vowels after /h/, but only /a/ or /aa/ after /ʔ/. (I might add that this is by no means a rare pattern among speakers of the language.) Here all we need to do is to classify /h/ as a nasal consonant⁵ leaving /ʔ/ as the only consonant having the feature [+p. nas]. Then nasalisation following /h/ would fall under rule 1 above, which states all vowels are nasalised following a nasal consonant; nasalisation of /ʔ/ would be covered by rules 2a and 3 (or 3a).

A more complicated situation exists for cases where a speaker nasalises all low vowels after /h/, for example, but only /a/ or /aa/ after /ʔ/. Here it seems that we have a situation where /h/ and /a/ or /aa/ have a larger propensity for nasalisation than /ʔ/ and other low vowels, but /h/ still does not condition nasalisation in the manner nasal consonants do. Clearly, then, we are dealing with different degrees of propensity for nasalisation, and it would be well for our analysis to reflect that fact. Let us therefore postulate two levels of this propensity: [p. nas₁] for the first or higher level; and [p. nas₂] for the second or lower level. The matrix of features would then be as follows:

FEATURES	NASAL C	/h/	/ʔ/ ⁶	OTHER C	/a/,/aa/ ⁶	OTHER LOW V	OTHER V
Nasal	+	-	-	-	-	-	-
P. nas ₁		+	-	-	+	+	-
P. nas ₂			+	-		-	-

If we assume the structuring of relevant features as above, we can rewrite rules 2a and 3a as follows. (Here the subscript symbol x represents either level 1 or 2 of [p. nas] but always the same level throughout the equation for each application of the rule.)

$$\text{Rule 4} \quad \left[\begin{array}{c} \text{C} \\ + \text{ p. nas}_x \end{array} \right] + \left[\begin{array}{c} \text{V} \\ + \text{ p. nas}_x \end{array} \right] \rightarrow \left[\begin{array}{c} \text{C} \\ + \text{ nasal} \end{array} \right] + \left[\begin{array}{c} \text{V} \\ + \text{ nasal} \end{array} \right]$$

$$\text{Rule 4a} \quad \left\{ \left[\begin{array}{c} \text{C} \\ - \text{ p. nas}_x \end{array} \right] + \left[\begin{array}{c} \text{V} \\ - \text{ p. nas}_x \end{array} \right] \right\} + \left\{ \left[\begin{array}{c} \text{C} \\ \alpha \text{ p. nas}_x \end{array} \right] + \left[\begin{array}{c} \text{V} \\ -\alpha \text{ p. nas}_x \end{array} \right] \right\} \rightarrow \left[\begin{array}{c} \text{C} \\ - \text{ nasal} \end{array} \right] + \left[\begin{array}{c} \text{V} \\ - \text{ nasal} \end{array} \right]$$

This modified rule could cover varying patterns of vowel nasalisation on the assumption that each variation between speakers (or even between different speech acts of the same speaker) presupposes a different matrix of classification of [p. nas] values for the vowels involved. Thus if a speaker were to nasalise everything except high vowels, following /h/, then all but the high vowels would be classified as [+p. nas₂]. And rules 4 and 4a would still hold good.

In fact, I suspect that the general scheme set forth above could be modified still further to account for other variations in the conditions governing nasalisation: the possibility that long vowels are more subject to nasalisation than short; or live syllables more than dead; or vowels in live syllables with nasal finals more than vowels in other live syllables. But the general picture seems reasonably clear:

that there is a feature of propensity for nasalisation in Thai; and if one is to account for variations in nasalisation patterns, it is necessary to postulate degrees of this feature.

NOTES

1. For an earlier treatment of this second type of nasalisation, see Mary R. Hass and Heng R. Subhankha, 1945.

2. Note that this propensity toward the nasalisation of glottals (and also of low vowels) has been noted by others. See James A. Matisoff (1975), and John J. Ohala (1972, 1974 and 1975). Concerning the nasalisation of glottals, Ohala explains (1974:364) that glottal consonants 'do not require soft palate elevation since they involve air pressure build up further back in the vocal tract than the point where the nasal and oral cavities join'. And again (1972:1168) he explains that 'it is possible to produce acoustically acceptable versions of these consonants regardless of the state of the soft palate'. And yet again, he explains (1975:301) that the sound produced by these consonants is such that 'any oral-nasal coupling would have little acoustic and thus little perceptual effect on it'.

3. Ohala (1974:368) suggests an acoustic or perceptual reason for this propensity toward the nasalisation of lower vowels by explaining that the lowering of the velum with lower vowels is more tolerable than with higher vowels because nasal coupling has less effect on their acoustic quality.

4. Note that no [p. nas] value is assigned to nasal consonants here. This omission is intentional, for to assign a plus value would be to imply that nasal consonants have a propensity for nasalisation that is not always realised, and rule 3 and 3a (in this paper) would in fact yield un-nasalised vowels following nasals, which is incorrect. But nasal consonants can hardly be classified as [-p. nas], for this implies that they are not subject to nasalisation in the presence of [+p. nas] vowels. The problem here is that we are dealing with degrees of the same thing, potential nasalisation being of a lower degree than actual nasalisation. So actually [+nasal] implies all that [+p. nas] does and more.

5. It should be noted, however, that /h/ does not pattern with the regular nasals in all respects. For example, the latter occur as syllable-final segments in live syllables whereas /h/ does not. The point is that /h/ resembles the regular nasals in having the feature [+nasal] but it differs from them, for example, in that it has the feature [-sonorant].

6. Again, as in the case of the feature matrix underlying rule 2a, no [p. nas] value is given for nasal consonants; similarly no [p. nas₂] value is given for the segments /h/, /a/ or /aa/. The problem once more is the fact that both plus and minus values are misleading; once again we are dealing with degrees of the same kind of thing, such that the higher degree feature always presupposes at least what is implied at the lower level, and more. This means that in the application of rules 4 and 4a, if [p. nas₁] is interpreted as [p. nas₂], then /a/ or /aa/ must be assigned at least a plus value for [p. nas₂], since these vowels have that great a propensity for nasalisation, and more.

BIBLIOGRAPHY

- FERGUSON, J.A., L.M. HYMAN and J.J. OHALA, eds
 1975 *Nasálfest: papers from a symposium on nasals and nasalization*. Stanford University Press.

HAAS, Mary R. and Heng R. SUBHANKHA

1945 *Spoken Thai*. New York: Henry Holt.

MATISOFF, James A.

1975 Rhinoglottophilia: the mysterious connection between nasality and glottality. In Ferguson, Hyman and Ohala, eds 1975:265-287.

OHALA, John J.

1972 Physical models in phonology. In A. Rigault and R. Charbonneau, eds *Proceedings of the Seventh International Congress of Phonetic Sciences*, 1166-1171. The Hague: Mouton.

1974 Experimental historical phonology. In J.M. Anderson and C. Jones, eds *Historical Linguistics: proceedings of The First International Conference on Historical Linguistics*, Edinburgh. Vol.II, Theory and description in phonology, 353-389. Amsterdam: North-Holland.

1975 Phonetic explanations for nasal sound patterns. In Ferguson, Hyman and Ohala, eds. 1975:289-316.