Problems in The Phonology of The Southern
Min Dialect of Taiwan

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Although in the last several decades there have been a number of careful studies made of the Southern Min dialect usually represented by the speech of Amoy,[1] some aspects of the phonological system remain to be described and other aspects present darticular problems which need to be discussed in detail. It is the purpose of this paper to try to provide a discussion of these matters in order to make available a more complete description of the phonology of this dialect as spoken in Taiwan. The speech of Li Ying-che, a native of Taichung County, is used as a basis.[2]

The following articles or books are assumed as a background for the discussion here, and the phonetic descriptions which they give of the phonemes on which there is general agreement will not be repeated here in detail: Lo Ch'ang-p'ei, *Phonetics and Phonology of the Amoy Dialect* (Peiping: Academia Sinica, The National Research Institute of History and Philology, Monograph A, No. 4, 1930); Tung T'ung-ho, "Phonology of the Amoy Dialect", *Bulletin of the Institute of History and Philology, Academia Sinica*, Vol. XXIX, Part I (Nov., 1957); Nicholas C. Bodman, *Spoken Amoy Hokkien*, Vol. I (Kuala Lumpur, 1955); Li Ying-che, "The Relevance of Phonemic Analysis in Teaching English to Taiwanese Speakers," *Tunghai Journal*, Vol. IV, No. 1 (June, 1962.)[3]

Since a number of problems in interpretation of the segmental phonemes are directly related to the question of their place within the larger phonological units, the discussion will begin with these larger units.[4] Borrowing terms which are usually used to describe grammatical rather than phonological units, we can set up a hierarchy composed of the following units, from the largest to the smallest: sentence, clause, phrase, word, syllable, segmental phoneme.[5]

The sentence and clause are characterized by an intonation. Three contrasting intonations are described by Bodman.[6] These intonations are written by him with the following symbols, /, //, and . , which are also said to be terminal junctures. The important parts of his description are as follows:

'Double bar' (//) 'and full stop' (.) are utterance-final terminal junctures. Phrases ending in either of these final junctures are *sentences*... The characteristic value of the intonation symbolized by double bar is: a fairly high relative level of pitch which is maintained without any falling off throughout the phrase and which ends quite abruptly. The stress throughout is also relatively strong and the tempo is usually fairly rapid... The contrasting characteristic value of the intonation sym bolized by *full stop* is: a relatively lower pitch level throughout the phrase

which gradually falls off toward the ending point... Single bar juncture occurs non-finally only. Phrases terminating in single bar are *non-final phrases*. A sentence may include one or several of such non-final phrases... The characteristic value of the intonation in these non-final phrases is: a pitch level starting at a point intermediate to that of double bar and full stop phrases and gradually rising toward the ending point with the last syllable prolonged and gradually increasing also in loudness toward the end. There is no abrupt ending as in the case of double bar.

We would use the same phenomena to set up two types of large units, the *sentence* and the *clause*, the latter being used for Bodman's *phrase*. A clarification can be made, however, by recognizing a similarity between // and . in contrast with /. This similarity is obscured by the use of the two symbols . and //. They are both called "utterance-final" and this presumably refers to the end of a stretch of speech spoken by one person. On the other hand, the same terminal junctures may occur within an utterance, and it is in such cases that the contrast with / (which always occurs within an utterance) becomes clear. The length of the pause where // and . occur is definitely longer than that occuring at /.[7] Sentences may contrast in only this one respect.[8] It would seem preferable, then, to recognize two types of pauses, | and ||. | is a clause boundary, and || is a sentence boundary. A sentence may be composed of one or more clauses. A clause boundary which co-occurs with a sentence boundary will not be marked.

If we say that the double bar, no matter at what angle, is the sentence boundary marker, then the contrasting intonations can be represented separately by the angle of the double bar: // for Bodman's "double-bar intonation" and || for his "full-stop intonation." Since there are no contrasts in intonation at the | boundary, no intonation marker is necessary. It is probably preferable to say that intonation is a sentence characteristic only, not a clause characteristic.[9]

The phrase and word units are also delimited by types of juncture. Using Bodman's terminology, we can say that the end of a phrase has plus juncture(+)and the end of a word has space juncture. The essential difference between these two types of junctures is described when Bodman says, "The difference between the sounds of the syllable preceding plus or space juncture is that with plus juncture, the syllable has more stress and the vowels are longer."[10] The syllable preceding plus juncture always has its, morphophonemically speaking, isolation tone form. This is also true before clause and sentence boundaries, where plus juncture can be said to co-ocur, but need not be marked. A clause may be composed of one or more phrases. A phrase may be composed of one or more words.[11]

Bodman sets up two other junctures which contrast with space juncture: compounding juncture (represented by a hyphen) and close juncture (represented by no intervening space or symbol). Actually, however, there is no contrast between these two junctures. Bodman mentions several places where close juncture is normally found in fast speech but writes it only where the suffix "ā" occurs.[12] The other examples also involve second syllables beginning with vowels. The same allophonic or morphophonemic variations (to

be described below) occur where he writes - before a syllable beginning with a vowel. There is no contrast in juncture between what he writes as "piēng-ân" and "bângà". We will use the term *close juncture* only.

Two syllables separated by space juncture have approximately equal stress,[13] and the division between syllables will be distinct (as it is at +, |, and || or //, where space juncture can be said to co-occur). We agree that the initial consonant of a second syllable in a word is articulated more weakly than the first and that the second syllable of a three-syllable word is shorter than the second word in a phrase of three one-syllable words,[14] but we disagree with the statement that there is weaker stress on the first syllable of a two-syllable word, than on the second syllable.[15] The first syllable of a two- or three-syllable word has stronger stress than the others and this is accompanied by clearer articulation of the inital consonant of that syllable.[16]

Close juncture must be distinguished from all other junctures, any one of which can be said to occur automatically at any higher level juncture. That is to say, they are end boundaries for words, phrases, clauses, and sentences respectively, and a unit on one level is composed of one or more units on the next lower level. Close juncture, on the other hand, is not an end boundary for a syllable. The syllable is defined otherwise and close juncture is really just the absence of any of the other junctures. These other junctures, which we can class together as open junctures, should not be considerd phonemes in themselves. They do not exist in distinction to the units (sentence, clause, phrase, word) whose end boundaries they mark. Whether these units are to be considered phonemes is another matter which is perhaps a purely academic question of how broadly to define the term "phoneme". They seem to parallel the segmental phoneme unit in the abstract, rather than any individual segmental phoneme; and, at least in the case of the sentence and the syllable, they can be realized, like the segmental phoneme unit, by one of a set of contrasting phonemes, i. e., by one of two contrasting intonation phonemes in the case of the sentence, and by one of a number of a tone phonemes in the case of the syllable. So they probably should not be considered phonemes.

The syllable unit is characterized by the occurrence of one tone and at least one vowel. The range of the tone is the whole syllable. There are two contrasting series of tones—one occurring in phrase final position and one in phrase non-final position. Leaving aside the so-called "entering" tones for the moment, we can state that in phrase final position there are the following tones: 1) high level; 2) low rising; 3) high falling; 4) low falling; 5) mid level. In phrase non-final position there are 1) high level; 2) low rising; 3) high falling; 4) low level; 5) mid level. These two sets can be combined into one set of five tone phonemes. Since pitch levels are relative to each other, and intonation is super-imposed on the tones, and stress probably widens the range of pitch variation, it is difficult to say whether tones 1 and 5 have different allophones in the two positions.[17] Tone 2 does not rise so high in the non-final position;[18] tone 3 in the non-final position does not fall so low as in final position; tone 4 does not fall in non-final position except in over-articulated speech.

Here it must be made clear that the difference between the two allophones of one tone is a completely different matter from the morphophonemic changes in tone which regularly take place. In all cases, except if the neutral tone occurs, a phrase final syllable will have that morpheme's basic or "isolation" tone. With certain regular exceptions, describable in grammatical or morphological terms, phrase non-final morphemes have the changed or "combination" tone unless followed by a neutral tone. Tone 2 is not a combination tone; like the other isolation tones, it occurs non-finally, only for example, if that syllable is a verb followed by a personal pronoun object in the neutral tone, or if it is the last syllable in a word group followed by the morpheme /ɛ/ which shows that that word group modifies the noun following the /ɛ/.[19] In such cases the isolation tone is not followed by plus juncture and therefore has its non-final allophone.[20]

The regular morphophonemie tone changes are: tone 1 and tone 2 both change to tone 5; tone 3 changes to tone 1; tone 4 changes to tone 3; tone 5 changes to tone 4.

The neutral tone has already been mentioned. It is a combination tone in the sense of being a tone into which an isolation tone can change morphophonemically, but it usually occurs in phrase or word final position. The neutral tone has a number of allophones. If it is preceded by space, it is low. If it is not, it has the same pitch level as the end point of the preceding syllable's tone, i. e., high after tone 1, mid after tone 2 or tone 5, low after tone 3 or tone 4. Stress is relatively weak on syllables with neutral tone.[21]

Except for contrastive stress, different degrees of stress are not phonemes in themselves, but indications of juncture. A contrastive stress has a range of one syllable, but if it occurs on the first syllable of a word, the meaning would seem to be emphasis on the whole word. If it comes on what is normally a second or third syllable of a word, the meaning emphasis is on that particular morpheme and it is preceded by space.[22] Two contrastive stresses will be separated somewhere by at least a + juncture. In other words, contrastive stress is a phrase characteristic although it occurs on a specific syllable in that phrase. We will indicate it by underlining the syllable.

The interpretation of the so-called "entering" tones also involves the interpretation of the segmental phonemes, particularly the finals [-ʔ, -p, -t, -k]. Most descriptions recognize the syllables ending in these sounds as having tones distinct from the five already described. However if [-ʔ, -p, -t, -k] are marked as such, there is redundancy involved, since they only occur with the entering tones and the entering tones always end with them. To reduce this redundancy, [-ʔ] could be left unmarked, but [-p, -t, -k] would have to be written to indicate the contrasting points of articulation. Bodman and Egerod get rid of the redundancy by writing all four final sounds and considering the tones allophones of certain of the five previously mentioned tones. Such an analysis is preferable to any others proposed so far.

However, there is another solution which seems to result in greater simplicity, especially with reference to what happens to [-ʔ, -p, -t, -k] at close juncture. The solution

is, simply, to consider [-ʔ] part of the tone and therefore not mark it, mark the entering tones as distinct from the other five, and interpret [-p, -t, -k] as allophones of /-m, -n, -ŋ/ respectively. [-m, -n, -ŋ] are found only in the five non-entering tones, and are therefore in complementary distribution with [-p, -t, -k].23

Two preliminary confirmations of this analysis are the following. 1) [-ʔ] should not be considered as contrasting with [-p, -t, k] since these latter are accompanied by glottaliz-ation.24 Glottalization is a characteristic of the tone (and we shall hereafter call the entering tones glottalized tones) and [-p, -t, -k] contrast with absence of a final rather than with a phoneme /ʔ/. Furthermore, as will be explained below, [-U, -ɪ] after /a/ should be considered as final consonants /-w, -y/, contrasting with /-m, -n, -ŋ/. But there are cases of [-Uʔ, -ɪʔ]; if [-ʔ] is considered a final consonant, these would be the only cases of clusters of final consonants. 2) The limitations on the vowels or vowel sequences with which [-p, -t, -k] may combine are exactly the same as for [-m, -n, -ŋ]. This is not including [m̩] or [ŋ̍].

Objections to this analysis may be raised by some readers. It may be objected that since the initial voiceless unaspirated stops are in contrast with the initial voiced nasals and must be kept as separate phonemes, final [-p, -t, -k] must also be considered phonemes distinct from [-m, -n, -ŋ]. This objection has validity, however, only within a contrasting series of phonemes found in one certain position, that is, within one class of phonemes. At this point, we have no basis for identifying the initial consonant class with the final consonant class; the positions are different and the membership in each class, i. e., the number and kind of contrasting phonemes for each class, is quite different. But even if we were not to keep initial and final consonants as completely distinct classes, there is sufficient phonetic dissimilarity between [-p, -t, -k] and [p-, t-, k-] to keep them separate. Strong release seems to be an important feature of initial [p-, t-, -k].25 Final [-p, -t, -k] are unreleased.

Another problem raised by interpreting [-p, -t, -k] as allophones of /-m, -n, -ŋ/ is how to maintain the contrast when the syllable has the neutral tone. If the neutral tone wipes out the distinction between glottalized and non-glottalized tones, then it will be impossible to distinguish [-p, -t, -k] from [-m, -n, -ŋ] since the tones are the conditioning factor. The obvious answer is that two neutral tones must be posited, a glottalized one and a non-glottalized one. Whether this multiplication of tone phonemes outweighs the economy of reducing the number of final consonants is a question which can only be answered after all the related facts are presented.

Another confirmation of our interpretation of final [-p, -t, -k] as allophones of final /-m, -n, -ŋ/ is found in the phonetic changes that take place in those finals when in close juncture with a following syllable which begins with a vowel. They become, respectively, [b, l, g], identical with initial [b-, l-, g-].26 These changes would have to be considerd morphophonemic changes from one phonene to another if we were to identify final [-p, -t, -k] with initial [p-, t-, k-] since these latter have voicelessness as a feature in contrast to [b-, l-, g-]. On the other hand, as has been described before,27

initial [b-, 1-, g-] are in complementary distribution with initial [m-, n-, ŋ-], the latter occurring before nasalized vowels, the former before oral. The phonetic changes occurring at close juncture before a following vowel can thus be simply described as allophonic variations. Final consonants contrast only in point of articulation, and have non-contrasting variations in the matters of voicing and nasalization.

Other allophonic variations at close juncture have yet to be described, but at this point the question of the number of glottalized tones can first be discussed. Most varieties of Amoy seem to have two glottalized isolation tones, a mid falling and a high falling.[28] The mid falling tone changes to high level in combination if there is a final [-p, -t, -k]. If there is no final, it becomes a high falling non-glottalized tone. There are a few exceptions which change to a high level non-glottalized tone.[29] The high falling glottalized isolation tone becomes a low level glottalized tone in combination if there is a final [-p, -t, -k]; otherwise it becomes a low level non-glottalized tone. These are morphophonemic changes. Phonemically, there are only three glottalized tones, apart from the neutral one, since the isolation high tone which is phrase non-final (not followed by +) does not contrast with the combination high tone. But the mid falling(isolation) tone when phrase non-final does contrast with the low level (combination and always phrase non-final) tone. Although Li Ying-che's dialect has only the mid falling isolation tone,[30] it is still necessary to have three tone phonemes, since the one isolation tone changes to the same two combination tones, high and low.[31] Counting the glottalized neutral tone, there are four glottalized tones in all. This makes a total of ten tones. The following symbols, to be written over the vowel, or the second vowel if there are two, will be used. Non-glottalized tones: ^(high level); ′ (low rising); ‛ (high falling); ˇ(low falling, or low level);‾ (mid level); ˙ (neutral). Glottalized tones: ‟ (mid falling); ″ (high falling or high level); ‥ (low level); ″ (neutral).

The reduction of the number of contrasting consonant phonemes at close juncture reveals something that seems to have been overlooked up until now. As long as, for example, the [n] and the [l] were written differently in the following expressions, [tsʰānà] "fields" and [(dziã̄) tsʰàlá] "very noisy", the contrast between them, apart from the tonal differences, was indicated. But if we write both [n] and [l] by one phoneme symbol, we recognize that the contrast is in the two final vowels and must be so indicated. In the first it is nasal; in the second it is oral. An oral vowel following in close juncture a nasalized vowel or a /-m, -n/ or /-ŋ/ in a syllable with non-glottalized tone always becomes nasalized. This is an automatic morphophonemic change which should have always been indicated, since oral and nasal vowels contrast phonemically.

Another point in the analysis of the segmental phonemes is also raised by these close juncture phenomena. For example, [-ap] plus [a-] in close juncture will be [-aba-], and so will [-a(ʔ)]plus [ba-];[-am] plus [a-] in close juncture will be [-amā-], and so will [-a] plus [mā-]; but [-ip] plus [a-] in close juncture will not be the same as [-i(ʔ)] plus [ba-], nor will [-im] plus [a-] be the same as [-i] plus [mā-]. Similarly, [-ala-] may be from [-at] plus [a-] or from [-a(ʔ)] plus [la-], [-anā-] may be from [-an] plus [a-] or

from [-a] plus [nă-]; [-aga-] may be from [-ak] plus [a-] or from [-a(?)] plus [ga-], and [-aŋă-] may be from [-aŋ] plus [a-] or from [-a] plus [ŋă-]; but [-ut] plus [a-] will not be the same in close juncture as [-u(?)] plus [la], nor will [-it] plus [a-] be the same as [-i(?)] plus [la-]; [-un] plus [a-] will not be the same in close juncture as [-u] plus [nă-]; [-in] plus [a-] will not be the same as [-i] plus [nă-]. So what is written as [-in-] is not really the same in both items of each of these two sets: [mǐnūā̄] "hard-working" and [bīnâcăɪ] "tomorrow"; [tǐnā̂ã] "chopstick holder" and [tǐnâ] "rattan". The answer to the question where the phonemic difference between these words lies, comes from an examination of the classes of segmental phonemes and their characteristics as classes.

Assuming for the moment that aspirated initial stops are unit phonemes, an examination of the possible combinations of segmental phonemes in one syllable shows that there is an upper limit of four phonemes to a syllable. This means that there are at least four classes of phonemes, the phonemes in each class contrasting with each other in one position. The initial consonants are /b, p, m, d, t, n, j, c, z, s, g, k, ŋ, h/.[32]

The possible sequences of three phonemes (excluding nasalized vowels) which can be preceded by an initial consonant are: /iaw, iam, ien[33] ieŋ, iaŋ iɔŋ, uay, uan/. On the basis of these contrasting sequences, we set up three classes: first position vowel, with members /i/ and /u/; second position vowel, with members /a, e, ɔ/; final consonant, with members /w, y, m, n, ŋ/. Final /w/ and /y/ are written as such rather than as /u/ and /i/ to show that they belong to a different class of phonemes, contrasting with different phonemes in the final position than in the first vowel position. Besides, the tongue position for /y/ and /w/ is not so high, and /w/ is scarcely rounded. They contrast at close juncture in such items as /gǎuá/ "teach me" and /gǎwá/ "arrived".

By comparison with the above, we classify the following sequences of two phonemes, which can also be preceded by initial consonants, as combinations of second position vowel plus final consonant: /aw, ay, am, ɔm, an, en, aŋ ɔŋ/. These next are combinations of first position vowel and second position vowel: /ia, ua/. In this group may obviously be included /ue/ and /io/, though these sequences do not occur with a final consonant. Thus /o/ is added to the class of second position vowels. The following single vowels occur: /i, e, a, ɔ, o, u/. This shows that the first position and second position vowels are subclasses of a general vowel class (if single /i/ and /u/ are considered equal to first position vowels /i/ and /u/—but see below). Remaining to be interpreted are the sequences usually written as follows: "iu, ui, m, ŋ (ng), im, in, un". The last three are intended to include what are usually written as "ip, it, ut". They are the ones involved in the problem, mentioned above, of phonemic contrast at close juncture. Written as sequences of two phonemes, they do not follow the pattern established by the list of three phoneme sequences, in which /i/ and /u/ are always separated from the final consonant by an intervening /a/ vowel. Notice has already been made by Lo[34] of the fact that "un" has an intervening [ə] vowel and that "in" has an intervening [ɪ] vowel. We propose then that a vowel phoneme, to be written /ə/, should be recognized as occuring in "im, in, un" (/iəm, iən, uən/). This then provides for a contrast between the words /mǐnūā̀/ and

/miə̄najǎy/, and /dǐnə̄ə̀ / and / diə̄nə̀/, etc.

It has also been noted[35] that a central vowel occurs between an initial consonant (except for /h/) and "ŋ". This vowel will be identified with /ə/, although, for reasons explained below, it will be considered nasalized. It will also be written in the syllables [ŋ̩], [hŋ̩=ŋ̩ŋ], [m̩], and [hm̩=m̩m], (/ə̄ŋ, hə̄ŋ, ə̄m, hə̄m/), since this preserves the structural pattern and avoids the necessity of including syllabic nasals in the vowel class or of interpreting them simply as final consonants, thus making an exception to the rule that a syllable always has at least one vowel. If [-m̩ʔ] and [-ŋ̩ʔ] are to de included in the data covered by our analysis[36] they can be interpreted as having glottalized tones even though the final consonant remains a nasal, since there is no contrasting [-əʔp] or [-əʔk]. The nasality of the vowel may also be a conditioning factor.

Three possible interpretations of what are usually written "iu" and "ui" are these. 1) They are sequences of two vowels: /iu/ and /ui/. 2) They are sequences of two vowels plus a final consonant: /iəw/ and /uəy/; 3) They are sequences of one vowel plus a final consonant: /iw/ and /uy/. All three interpretations have difficulties. The first would mean we had two exceptional cases of /u/ and /i/ in the second position vowel class. The second is objectionable since there are no cases of /əw/ and /əy/ with no preceding /i/ or /u/. There would therefore be a lack of parallelism with /aw/, /ay/, /iaw/, and /uay/, which are the only other cases of /-w/ and /-y/. Phonetically, there is no indication of an intervening /ə/ as there is in Kuoyü (Mandarin) in at least the third and fourth tones. The third possible interpretation contradicts the principle of never having /i/ and /u/ followed directly by a final consonant, which we used to confirm our interpretation of [uᵊn] as /uən/, etc. So the first interpretation will be adopted here since it seems to be confirmed by the fact that /i/ and /u/ can be followed by a large variety of second position vowels. Without a final consonant we can have /ia, io, ua, ue/ and now also /iu/ and /ui/. That is, /i/ combines with one central and two back vowels, and /u/ with one central and two front vowels. With a final consonant we have /ie-, ia-, iɔ-, iə-, ua-, uə-/. /i/ and /u/ will then have to be included in both subclasses of vowels. This means that all the vowels which occur singly also occur in the second vowel position. It is possible, then, to say that single /i/ and /u/ are equal to second position vowels /i/ and /u/; that there is no general class of vowels; and that first position vowels are a distinct class of two members, /i/ and /u/, for which two different symbols should really be used.

For some dialects of this language, what we have written as /ieŋ/ is more nearly like [iəŋ] than [ieŋ],[37] but for Li Ying-che, /ieŋ/ and /iəŋ/ contrast. /miéŋ/ "bright" is different from /miə̌ŋ/ in /miə̌ŋgiə̄n/ "face towel". Such sequences as /-iəŋ/, which occur due to assimilation of /-n/ at close juncture, have not been included in the above discussion of syllable types.

Final /-n/ undergoes regular morphophonemic changes at close juncture. It becomes /-m/ before labials and /-ŋ/ before velars (excluding /h/). For example, /siə̄mmuə́n/ "news", /siə̄mbu/ "daughter-law", /cuə́mbàn/ "publish". /cuə̌mmiǎ́/ "famous", /cuə́ŋgièŋ/ "leave the country", /miə̌ŋgiə̄n/ "face towel". Before voiceless stops or affricates

(aspirated or unaspirated) in close juncture, /m, n, ŋ/ in syllables with glottalized tones have voiceless allophones; before voiced consonants they have voiced allophones. This is true whether or not morphophonemic changes are involved. In syllables with glottalized tones, before a following initial /s/, /-n/ becomes /s/: /cuə̃ssĭ/ "be born". Final /-ŋ/ in syllables with glottalized tones followed by a syllable in close juncture beginning with a consonant is regularly lost but the glottalized tone remains. Thus we have /gõmiə́n/ "citizens" in contrast with /gômiə́n/ "ancient peoples". Final /-m/ does not undergo automatic morphophonemic changes at close juncture.

Up till now we have been distinguishing between the class of initial consonants and that of final consonants, but no conclusion has been exclusively based on this assumption. However, the fact that in close juncture before vowels the finals /-m, -n, -ŋ/ become identical with the initials /m-, n-, ŋ-/ lessens the distinction between the two classes. And now we must add /s/ to the class of final consonants, although its distribution is very limited. It would seem then that the distinction between initial and final consonants cannot be absolutely maintained, since a number of the members of both position classes are identical.

We now turn to nasalized vowels. The simple nasal vowels /ĩ, ẽ, ã, õ/ and the sequences of vowels /ĩã, ĩũ, ũã, ũẽ, ũĩ/ occur. With final consonants we have /ãy, ãw, ũãy, ĩãw, õm, õŋ/. These are the possibilities for syllable morphemes cited in isolation. [mõŋ] and [nõŋ] occur, but never [bəŋ] or [ləŋ]. So, since /õŋ/ and /əŋ/ never contrast and there are these cases where it is clearly /õŋ/, we will say that only nasalized /õ/ occurs before /-ŋ/ if not preceded by /i/ or /u/. Similarly, [m̩] will be interpreted as /õm/ rather than /əm/. Most syllables with final /-m, -n, -ŋ/, when uttered in isolation, have oral vowels. However the morphophonemic change from oral to nasal vowels already mentioned in such words as /cãẽ/ "fields" also affects vowels followed by final consonants. Thus /biéŋ/ and /ʌn/ combine with close juncture as /biẽŋ ẽn/ "peace". In a practical orthography this alternation could be left unmarked, since any vowel preceded in close juncture by /m, n/ or /ŋ/ in a syllable with non-glottalized tone, will automatically be nasalized. Phonemically, however, it needs to be marked.

Nasalized vowels present a special problem of interpretation. In this language they have usually been considered as unit phonemes, in contrast to the oral vowels.[38] This means doubling the number of vowel phonemes and involves a certain amount of redundancy since, if one vowel in a sequence of vowels is nasalized, the other is also. (If first position vowels /i/ and /u/ are not identified with /i/ or /u/ occurring singly or in second vowel position, they may be said to simply vary allophonically. Also, /-w/ and /-y/ may have nasalized allophones after nasalized vowels.) In a practical orthography the nasalization need only be indicated once in a syllable. Another possibility is to interpret nasalization as a separate phoneme which occurs only once per syllable. But the question immediately arises as to which class of phonemes it belongs to. It does not fit into any of the four classes of segmental phonemes we have so far set up, since it can occur in a syllable in addition to one phoneme from each class, e. g. /sũãy/ "rude".

If we classify it as a final consonant, as Egerod does,[39] it means we have to allow for clusters of final consonants, which we have so far been able to avoid. If we say it belongs to a fifth class, we then have a class of just one member, or else we must posit a contrasting phoneme in the same class to represent oral quality. To have a class of phonemes with just one member is theoretically impossible as long as we consider a phoneme a point in a set of contrasts in one position. This principle seems necessary in order to draw the line between phonemes and their "distinctive features" or "phonetic components." (It is for this reason that we do not accept the interpretation of aspiration of initial stops as a distinct phoneme. Doing so would set up a new position class with only one member.) But to mark a contrasting phoneme of oral quality seems uneconomical. A third possibility would be to think of nasality as characterizing a unit smaller than the syllable but larger than the segmental phoneme, namely, the vocalic nucleus. The range of the nasalization could then be said to cover whatever number of vowels a syllable had. (But, of course, voiced initials or finals /w,y/ are also affected by it.) Again, however, this is objectionable unless we set up a contrasting phoneme of oral quality. We return then to the first interpretation, analyzing nasalized vowels as unit phonemes, as additional members of the vowel class. Although this multiplies the number of phonemes, it preserves the simple structure of the syllable, demands no intermediary type of unit between segmental phoneme and syllable, and remains faithful to a realistic theory of the phoneme. Nasalization as such can only be recognized on the distinctive feature level. To emphasize this interpretation and also to avoid the difficulty of writing both tone and nasalization marks above the vowels, we will use italicized vowels as symbols for the nasalized vowels.

In conclusion, we present a short text written phonemically, with glosses in Chinese character and translation in English.

dǐ dǎygǎ┼ǔ jiēnē sôjāy┼hɔ̆jò tì diǎm *suâ* ‖ guáně hiɔ̆nē tìdiāms*uâ* │ ǔ jiēnē gɔ̀sū ‖ dǐ
在　大甲　有 一個　所在　呼做　鐵砧　山　　關於　那個　鐵砧山　有一個 故事 在

tìdiāms*uâ* hiɔ̆nē sôjāy ┼ ǔ jiēnē giàm jè ‖ dǐ giàmjèē *biâ* │ ịāw nǎn kị jiēnē miō │ hɔ̆jò
鐵砧　山 那個　所在　有一個　劍井　在　劍井的邊仔　以後 人 起 一個　廟　呼做

gɔ̆ŋsièŋmiō ‖ iênui hiɔ̆nē giàmjè │ *tiâê* gôŋ sǐ │ diôsǐ gôŋ sièŋ iá┼dɔ̌ sièŋ gôŋ┼nāygâ
國　姓　廟　因為　那個　劍井　聽　講　是　就是　國姓爺鄭　成　功　來到

hiɔ̆nē sôjāy ịāw │ nāwtuán náyɛ gɔ̀sū ‖ gɔ̀sū sǐ anị ‖ hiɔ̆nē sǐjuɛ̄┼gɔ̆ŋsieŋ iá dɛ̆sịɛŋgôŋ│
那個 所在 以後 留傳　來的故事　故事是這樣 那個 時辰　國姓爺鄭 成功

jiâ duị dāynám┼dịɛŋniɔ̂ŋ │ ajiâ duà ịɛ guānduị │ duị nǎmbō┼hịɔ̀ŋ bǎŋbo │ nāygâ jiēnɛ
才 對 臺南 登陸　才帶伊的軍隊 對 南部 向 北部 來到 這個

tìdiāms*uâ* jiēnē sôjāy ‖ â┼iênui guānduị duàdǐ hiâ │ ǔ jiēnziên │ juị┼sâ mòa │ â guānduị ┼
鐵砧　山 這個 所在　　因為 軍隊 住在那裡 有 一 日 水 却 無 啊 軍 隊

nôŋ mō juị┼tāŋɔ̃ niɛ̄m ‖ gɔ̆ŋsièŋ iá dɛ̆sịɛŋgôŋ┼dɔ̆ pàynáŋ kị┼sịɛ̆ŋguèkị cuě *kuà* ǔ juị mo ‖
總　無 水 可以 飲　國姓爺鄭 成功 就 派人去 四 處 去找 看 有水 嘛

â I gādī uānâ kɪ hùgiān+dâmâ cuē | cuě kuâ ǐ juɪjuà+âsǐ gāwà | ǔ juɪ+tāŋâ niâm+mo ||
伊 自己 也 去 附近　在 那兒 找　找 看 有 水泉　或是 溝仔 有 水 可以 飲　　嘸

â I kɪgâ+tɪdiāmsuâ hiâ | dâmâ cuē | I dǐhiâ giā náy giā kǐɛ sǐjuēn | nāygâ jiēnē sôjay ||
伊去到 鐵 鉆 山那裡・在 那兒找 伊 在那裡 行 來　行 去的 時 辰　來 到 一個 所在

â I ŋia Iɛ giăm+cuěnnáy | dāmɛ̄ tɔ́ɛ+nɛ ŋiàwɛ sí | huɛ̆nzēngân+Iɛ giăm+siâ diâm nuɛ̆
伊 舉伊的 劍　出 來　在 那 土的 正掘 的 時　忽 然 間 伊的 劍 却 沈 落

tɔkâ̄ɛ năymiān ki | â duɪ tɔkâ̄ɛ năymiān+sâ jâw juâjuɪ cuěnnáy || hiɛ̆nē sôjay ăwnáy+dɔ̌
土脚的 內 面 去　對 土脚的 內 面 却 走 泉水 出 來　那個 所在 後 來 就

bɪ̆jô jiēnē gôjè || â náŋ+giò hiɛ̄nē jè+ hɔ̆jò giàmjè || jɛ diɔ̌sǐ hiɛ̄nē giàmjè jiēnē miâ̄
變做 一個 古井　人　叫 那個 井　呼做 劍 井　這就是 那個 劍 井 這個 名的

iūnáy ||
由 來

At Tachia there is a place called Iron Anvil Mountain. There is a story about this Iron Anvil Mountain. There is a Sword Well at Iron Anvil Mountain. Afterwards a temple was built beside Sword Well, and it is called Koxinga Temple, because it is said that the story comes down from the time Koxinga Cheng Ch'eng Kung arrived at this place. The story is as follows. At that time Koxinga Cheng Ch'eng Kung had just landed at Tainan and had just led his troops from the south to the north, to this place Iron Anvil Mountain. Now since, one day, when the troops were staying there, there was no water for any of the troops to drink, Koxinga Cheng Ch'eng Kung sent men everywhere to look and see if there was any water. And he himself went nearby to look and see if there was a spring or stream with water to drink. He went to Iron Anvil Mountain to look there and as he was walking back and forth, he came to a certain place. Now, he pulled out his sword, and as he was digging in the earth, suddenly his sword sank into the ground and from the ground a spring flowed out. Afterwards this place became a well. So people called the well "Sword Well". This is the origin of this name "Sword Well".

Notes

[1]See Lo Ch'ang-p'ei, *Phonetics and Phonology of the Amoy Dialect* (Peiping: Academia Sinica, The National Research Institute of History and Philology, Monograph A, No. 4, 1930), "Introduction," for a review of studies made previous to his. His own and subsequent studies are referred to in this paper.

[2]In reference to his dialect, Li Ying-che says, "It does not differ from the speech of my mother who was born in Hou-li, nor from my father who was born in Tachia but lived in Taichung since his childhood, both in Taichung-hsien." "The Relevance of Phonemic Analysis in Teaching English to Taiwanese Speakers," *Tunghai Journal*, Vol. IV, No. 1 (1962), p. 95.

3Other phonetic descriptions of perhaps lesser importance may be found in:

Thomas Carroll, "Notes on Pronunciation," in Ko Check Hoan and Tan Ping Tin, *An Introduction to Taiwanese Colloquial*, Vol. I (Taichung: Maryknoll Language School, 1960).

Fu Yi-chin, "A Comparison of Taiwanese and English Segmental Phonemes," *Bulletin of Taiwan Normal University*. Vol. IV (1959).

Søren Egerod, *The Lungtu Dialect* (Copenhagen: Ejnar Munksgaard, Ltd., 1956).

W. A. Saunders, "The Teaching of English Pronunciation to Speakers of Hokkien," *Language Learning*, Vol. XII, No. 2 (1962).

4This makes it very difficult to cite examples until all the segmental phoneme symbols have been decided. Most examples, therefore, will be given in footnotes, to which the reader can return after first finishing reading the whole article once.

5The point of view adopted here is that the grammatical (and morphological) system is independent of the phonological system, and that units in one may only roughly correspond to units in the other. Grammatical units are not defined by phonological criteria, nor vice versa.

6*Op. cit.*, pp. 99f.

7*Ibid.*, p. 85. "The words immediately preceding single bar are slightly prolonged or drawled, which gives the effect of a pause following them."

8This contrast in pause parallels such English contrasts as in ("Where did you go yesterday afternoon?") "I went downtown, because I needed to get some groceries," and ("Why did you go downtown?") "I went downtown because I needed to get some groceries."

9/nǐ mêkɪ dò uǐ// / "Where are you going?" /ŋuå mō mêkɪ dò uǐ || / "I'm not going anywhere." /ŋuå kɪ dāydiòŋ ɪāw | kāysɪ jò sieŋnɪ | dǎnsɪ sieŋnɪ mō gàǎ hò || / "After I went to Taichung, I started up in business, but business hasn't been so good." / ŋuå kɪ dāydiòŋ ɪāw | kāysɪ jò sieŋnɪ || dǎnsɪ sieŋnɪ mō gàǎ hò || / "After I went to Taichung, I started up in business—but business hasn't been so good."

10*Ibid.*, p. 205.

11/dāyuānuē+jiēn pâɥ ò̀+sǐ mò || / "Taiwanese is very hard to learn, isn't it?"

12*Ibid.*, p. 206.   13*Ibid.*

14Cf., *ibid.*, pp. 205f.   15*Ibid.*, p. 206.

16/såɥ ciå/ "drive a car"; /såɥciåe/ "a driver". /ciātáw/ "train engine"; /huēciātáw/ "railroad station". /cuǎnziəm/ "coming and going"; /cuǎn ziəm/ "go in and out". /sê ciûmiēn/ "wash up"; /sê ciû miēn/ "wash hands and face".

17Cf. Tung, *op. cit.*, p. 243, who marks the high level tone in phrase final position as 44: but in phrase non-final position as 55:. Also compare Bodman, *op. cit.*, p. 38, where he diagrams the high level and mid level tones as slightly higher in "combination" than in "isolation".

18 Bodman's statement that "the rising tone... before a plus juncture does not rise very much if only one toned syllable follows in the phrase: ɪ+ tuɪ E-mŕ̍g + láɪ" (*ibid.*) should probably be reinterpreted to mean that in such a sentence the isolation tone on

"mńg" is not followed by +and therefore does not rise as much.

19/Ĭ nê buê ŋuȧ/ "He's accompanying me"; / Ĭ náye sí/ "the time he came". .

20Cf. Bodman, *op. cit.*, p. 205. Bodman has chosen to write + after every occurrence of an isolation tone, so that his materials do not represent consistently how often (or how little) + actually occurs in speech at a normal speed.

21/Ĭ ŭ náy mȯ/ (neutral tone low) "Has he come?" /Ĭ giâni/ (high) "He's afraid of you." /Ĭ nê buéni/ (mid) "He's accompanying you." /Ĭ nê māŋni/ (mid) "He's asking you." /Ĭ nê gȯŋni/ (low) "He's talking about you." /Ĭ nê kuǎni/ (low) "He's looking at you."

22/nĭ dāŋsí mêkĭ // / "*When* are you going?" / ŋuȧ bȧysĭ mêkĭ || / "I'm going on *Thursday*." /nĭ bȧy guĭ mêkĭ // / "*Which* day of the week are you going?" /ŋuȧ bȧy sĭ mêkĭ || / "I'm going on the *fourth* day (Thursday)."

23Cf. Li, *op. cit.*, p. 16.

24Cf. Saunders, *op. cit.*, p. 156. Egerod, *op. cit.*, p. 16, says, in reference to Swatow, "The final labial, dental, and velar stops are unreleased and tend to be voiced and glottalized or preglottalized."

25Cf. Lo, *op. cit.*, pp. 5f.

26/jämɛ/[tsäbɛ]"ten(of them)"; /bänȧ/[pälȧ]"guava"; /sĭeŋȧ / [ɕïeŋȧ]"have become ripe".

27Tung, *op. cit.*, p. 233; Bodman, *op. cit.*, p. 183; Li, *op. cit.*, p. 99. Recognition of [b-] and [m-] as one phoneme, etc., makes the question Egerod raises about the relation between colloquial and literary forms of Amoy irrelevant; cf. Egerod, *op. cit.*, p. 209.

28Li Ying-che's high glottalized tone in phrase final position definitely has a slight fall. This has been observed in other Taiwanese speakers, but other descriptions of Amoy represent it as level. Cf. Lo, *op. cit.*, p. 26; Tung, *op. cit.*, p. 244; Bodman, *op. cit.*, p. 3.

29Cf. Tung, *op. cit.*, p. 244. He marks them with [ʔ].

30Li, *op. cit.*, p. 98.

31/nȧŋ/ "six"; /näŋjȧm/ "sixty". /cĭɔn/"seven"; /cĭɔ̆njȧm/ "seventy".

32These correspond respectively with what Li Ying-che writes as /p, p', b, t, t', d, c, c', z, s, k, k', g, x/ (*op. cit.*, pp. 98f.). The phonetic descriptions given there should be modified in two respects: 1) /c, c', s, z/ are always tongue blade, although still having allophonic variation between their occurrence before /i/ and their occurrence before other vowels (cf. Tung, *op.cit.*, p. 234); 2)/x/ is a voiceless vocoid, sometimes accompanied by glottal friction, with allophones varying according to the following vowel, as in English. At close juncture,when preceded by a vowel or voiced final, it has an at least partially voiced allophone.

33Any syllables with possible /ien/ are usually pronounced /en/ by Li Ying-che. This /en/ is in contrast with /an/ and so confirms the interpretation as /ien/ rather than as /ian/, although the latter does not occur. Cf. Tung, *op.*cit., p. 238. Bodman writes "ian" and "iat. Lo writes "ian" and "iɛt", *op.cit.*, p. 8.

34*Op.cit.*, p. 12.

35*Ibid.*, pp. 12, 13, 18; Tung, *op. cit.*, p. 239; Li, *op. cit.*, p. 100.

36Cf. Tung, *op.cit.*, pp. 251f. They seem to occur only in 譬況字(onomatopoeic words).

37See Lo, *op.cit.*, p. 8; Tung, *op. cit.*, p. 237; Bodman says, "What we write as *ie* before *k* and *ng* is the particular allophone of the phoneme *i* in this position" (*op. cit.*, p. 184).

38Tung, *op.cit.*, pp. 237f.; Bodman, *op.cit.*, p.184; Li, *op. c*it., pp. 100, 101.

39*Op.cit.*, pp. 18, 16.

臺 灣 閩 南 語 的 音 系 問 題

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　　本文旨在討論臺灣所通行的閩南語中，一些音系上的細節與問題，並想由此給予這方言一個涵蓋性的結構敍述。我們所根據的觀點是：音韻系統是一個獨立的梯級式系統，它有別於語法或構詞系統(grammatical or morphological system)；所謂一個音位(phoneme)是指在這個系統中，某梯級上一組同級而有差別的個體中的一個單位，而在成段音位 (segmental phoneme) 的一級上，我們認爲對於這些音位的分析與解釋，應依它們在音節中不同地位的類別來決定。

　　本文的敍述中，音韻系統的梯級有六級。有四種分離斷續度 (open juncture) 作爲四級較高單位 (句子 sentence, 子句 clause, 詞組 phrase, 詞 word) 的分界。在句子的一級中有兩種對照的高低音調 (intonation)。音節的一級有十個不同的聲調音位 (tone phoneme)，它們包括十個無喉塞音的 (non-glottalized) 聲調與三個喉塞音的 (glottalized) 聲調 (這些聲調都有在詞組尾 phrase final 時與非詞組尾 phrase non-final 時的同位聲調)，以及一個無喉塞音的輕聲與一個喉塞音的輕聲。本文提出了將尾音〔-p,-t,-k〕各別解釋爲尾音 /-m,-n,-ŋ/ 的同位音的意見。我們主要的論點是根據它們互補的分佈情形與發音上的改變情形 (這種改變是屬於同位音的變換，而不是 morpho-phonemic 變化)，發音上在閉合斷續度(close juncture) 的情形加上跟隨着首音是母音或濁子音的音節時改變爲〔-b,-l,-g〕。我們也說明了在閉合斷續度時，無鼻化母音 (oral vowel) 跟隨〔-m,-n,-ŋ〕後成爲 鼻化母音 (nasalized vowel) 的變化。由於在閉合斷續度時有最小差別 (minimal contrast) 發生的現象，它指出了設置一個與 /a/ 相對照的 /ə/ 母音在 /i/（或 /u/）與尾部子音間的必要。本文所敍述的成段音位是依照其在音節中不同部位分成四個序列的，有：首部子音，第一位母音，第二位母音，與尾部子音，而對於鼻化母音的解釋即在此一構架中來討論。我們的結論是鼻化母音應視爲獨立的音位。在本文的最後，我們就依據我們對這一音韻系統討論所見，用音位符號記錄了一篇口述短文作爲結束。