

Tones and Prosody in Middle Chinese and the Origin of the Rising Tone

The purpose of this paper is to show that the rising tone developed through the loss of a final glottal stop, and to discuss two related topics: the phonetic features of the four tones in Middle Chinese and the criterion for the Level-Oblique distinction. A brief review of the current theories seems a convenient point at which to begin.

One of the statements often made about the Chinese language is that tonal distinctions are intrinsic to its morphemes. But “the Chinese language” is too inclusive a term, and the question naturally arises as to whether at every stage of its long history Chinese had tonal system similar to those exemplified in its modern dialects. From Middle Chinese on, the answer is quite clear. All modern dialects have tones composed of pitch and contour. From the fact that in the seventh and eighth centuries tonal difference was utilized to simulate the length contrast in Sanskrit, and the additional fact that a ninth-century Buddhist work describes the four tones in terms of pitch and contour and length (see below), we know that the tones of Middle Chinese were composed of these three features. Old Chinese, however, poses a more serious problem. It is known that in the Book of Odes rhyming words show a strong tendency to belong to the same tone-category.** But this only tells us that Old Chinese words fall into three or four categories and that these categories are intimately related to the four tones of Middle Chinese; it tells us very little about the phonetic basis of these categories in Old Chinese. (Hence the non-committal term “tone-category.”) If one makes the further assumption that tonal contrast is an intrinsic characteristic of the language, not derivable from any non-tonal contrast, one can of course conclude that tones are coeval with the Chinese language. Tung T’ung-ho, for example, has stated, “Ever since the beginning of the Chinese language, we not only distinguish tones, but [we find] a tonal system not much different from the four tones of Middle Chinese.”**

This prevalent view was challenged in 1954 by Haudricourt.** He proposed that, as in Vietnamese, the Chinese tonal system developed in historical times through the loss of certain final consonants. The departing tone of Middle Chinese corresponds to the hoi and nga tones of Vietnamese, which, as Maspero has shown, are reflexes of an earlier -h representing an original -s.** Moreover, some Chinese words in the departing tone were borrowed into Vietnamese as early as the Han dynasty, at a time when the hoi and nga tones were presumably still represented by an -s: 义 *ngia/ngjie, Viet. nghia(nga); 墓 *mâg/muo, Viet. ma(hoi).** Arguing from this fact and from analogy, Haudricourt then interprets morphological derivation in Old Chinese involving the departing tone as alternation between a final -s and its absence. For example, he posits dâk 度 for the verbal form “to measure,” and dâks for the nominal form “a measure”; âk 惡 for the adjectival form “bad,” and for the transitive verbal form “to dislike.” (The second member of these pairs is in the departing tone.) This idea was taken up by Forrest, who equates the reconstructed -s of Old Chinese with the -s suffix of Classical Tibetan,** and Pulleyblank in 1963 provides further evidence in the form of foreign words ending in -s whose Chinese transcriptions, dated the third century A.D., are in the departing tone- in his theory, -s<-ts.**

In the same 1963 paper, Pulleyblank proposes antecedents for two other tones: -ú and -δ for later level tone, and -□ for later rising tone. In his view, Old Chinese has no open syllables. And having reconstructed ú and δ as initial phonemes, he reasons that by symmetry they are also likely to occur in final position. Thus a level tone syllable, open in Middle Chinese, has or in Old Chinese depending on whether it shows contact with a velar of dental final consonant. Pulleyblank’s reason for connecting -□ and later rising tone is mainly based upon analogy with Vietnamese. There is, he argues, a high degree of parallelism between the Vietnamese and Chinese tonal systems. The steady accumulation of evidence for the -s theory suggests that specific analogies may even be valid. Now, since the sacand nang tones of Vietnamese developed through the loss of an earlier -□, it is quite likely that the Chinese rising tone was similarly derived. Pulleyblank also cites transcriptions of foreign words as evidence, but they are few in number and not uniformly convincing.

Argument from analogy is that best suggestive, and without testimony from more direct sources, the theory will remain as one of the many possibilities. Fortunately, three kinds of evidence can now be presented: modern dialects, Buddhist sources bearing upon Middle Chinese, and old Sino- Vietnamese loans.

Several dialects of the southeastern coastal area preserve a glottal stop in the rising tone, and the Buddhist

sources indicate that the rising tone of Middle Chinese is high, short, and level. Our thesis, then, is that the final glottal stop of Old Chinese is retained intact in the coastal dialects and developed into a high and short syllable in Middle Chinese. We know from acoustic studies that a syllable is high and short if it ends in a voiceless stop, low and long if it ends in a voiced stop, and medium in pitch and duration if it is open.** It is also reasonable to assume that when a final stop is lost, the tonal features are retained as reflexes. Therefore, if the final glottal stop (which is voiceless) indeed existed in Old Chinese, its descendant should have precisely the features we said the rising tone did have in the Middle Chinese.

The dialects that have a final glottal stop in the rising tone are: Wen-chou 温州 of Chekiang, P'u-ch'eng 浦城 and Chien-yang 建阳 of Fukien, Ting-an 定安 and Wen-ch'ang 文昌 of Hainan Island.** In Ting-an, the glottalization is so pronounced that the final nasals in this tone sound as if they are followed by a homorganic stop. As to the pitch level of the rising tones, Chien-yang and Ting-an are low (both being 21), Wen-ch'ang has a high one (yang-shang) and a low one (yin-shang), but P'u-ch'eng is high, and Wen-chou is high in the sense that both of its rising tones are higher than the other tones in the same register, thus:

Wen-chou	L	R	D	E	P'u-ch'eng	L	R	D	E
Yin	44	45	42	23	Yin	35	55	12	43
yang	31	24	11	12	Yang	24	54	11	

P'u-ch'eng is adjacent to Chien-yang, both situated at the northwest corner of Fukien. Wen-chou is at the extreme southeast of Chekiang, about two hundred miles away from P'u-ch'eng. Since Hainan Island is small, this gives us altogether two or three non-adjacent areas. Except for Wen-chou, which has been classified as Wu, the others are Min dialects, and the generally accepted view that Min branched off directly from Old Chinese makes it easy to understand why the final glottal stop turns up in these dialects but hardly anywhere else.

I should now explain how the features of the rising tone in Middle Chinese are ascertained. Contrast in length is a phonetic feature of Sanskrit, and several Buddhist works, written between the seventh and ninth centuries, recommended ways to represent this contrast. In I-ching's Nan-hai chi-kuei nei-fa chuan 义净, 南海寄归内法传** the method suggested is as follows: "The twenty-five characters, 脚 etc., mentioned above and the eight characters following them-thirty three characters altogether- are called the first group [varga]. They should all be read in the rising tone. Do not just look at the characters and pronounce them in the level, departing, and entering tones."** The fact that the thirty-three characters all represent Sanskrit short syllables (ka, k'a, ga, g'a, etc.) and that each of the four tones appears at least once in this set of characters makes I-ching's meaning clear: when representing Sanskrit short syllables, all characters are to be pronounced in the rising tone, irrespective of the tones they are originally in.

I-ching's statement is also corroborated by the transcriptional practice recorded half a century later but almost certainly used at the time of I-ching. Eight pairs of the Sanskrit basic syllabary- a, ā, i, ī, u, ū, ##, e, āi, o, āu- show the most prominent contrast in length. But in several Buddhist texts, both members of a pair are represented by the same character, with the length contrast indicated by some other means. Of special interest to us are the texts which introduce subscripts to specify the desired tone. In all five texts that use this method, whenever the shortness of a Sanskrit syllable is simulated via a tone subscript, the subscript invariably consists of shang or shang-sheng "rising tone." The attached table, listing the transcriptions of the first four pairs of Sanskrit basic syllabary, will illustrate what I mean.

This table is adapted from Lo Ch'ang-p'ei 罗常培, 梵文颚音五母之藏汉对音研究, CYYY3(1931), after p. 276, which lists transcriptions in nineteen texts. Lo's table also appears in Chou Fakao, 中国语文论丛, after p.22. Several of these texts are discussed in Mabuchi Kazuo (see citation in note 14 below), I, p. 36ff. The first two items, not directly relevant to our discussion, are included for the sake of comparison.

The conclusion to be drawn is that the rising tone of Middle Chinese, because of its shortness, is thought to be the most appropriate equivalent form the Sanskrit short syllable. Later, we shall return to consider why the above interpretation is more plausible than the one proposed by Chou Fa-kao, that is, the Level tone is long and the Oblique tones are short.**

1 大般泥洹经	a	ā	i	ī	u	ū	##	##
	短	长	短	长	短	长	厘	厘

Taishō 376; A. D. 417 2 文殊师利问经	阿	阿	伊	伊	忧	忧	厘	长
Taishō 468; A. D. 502-556 3 文殊问经(不空译)	阿	阿	伊	伊	坞	忧	口吕	厘 口吕
Taishō 469; A. D. 746-774	上	引	上	引	上	引		引
4 瑜##金钢顶经释字母品(不空译)	阿	去	伊	去	坞	去	哩	上 哩
Taishō 880; A. D. 746-774	上	引	上	引		引		引
5 智广悉昙字记	短	去	短	去	短	长	纒	上 纒
Taishō 2132; A. D. 780-804	阿	阿	伊	伊	瓠	瓠	里	梨
	上	依	上	依	上	上		
	声	声	声	字	声	呼		
	短	长		长				
6 慧琳一切经音义	呼	呼	臀	呼	坞	污	乙	乙
Taishō 2127; A. D. 788-810		去	伊	去			上	去
		声	字	声			声	声
		兼	上	兼				引
7 空海悉昙字母释义	阿	引	声	引	坞	污	哩	哩
Taishō 2701; A. D. 803-835	上	去	上	去		长	弹	弹
	声	声	声	声		声	舌	舌
	呼	长		长			呼	去
		引		引				声
		呼		呼				引
								呼

A second source of information on Middle Chinese tones is the *His-t'an tsang* by the Japanese monk, Annen, written in the year 880 A.D.; ** in fact it is the most valuable record now extant. Annen's work contains a description of the tones in four traditions successively brought back to Japan. The oldest of these, reflecting the pronunciation of the early eighth century, is most relevant for our purpose.

... Of the two readings that originally came to us in Japan, that of Piao was as follows: the level tone was level and low, with both the light and the heavy [allotones]; the rising tone was level and high, with only the light but not the heavy; the departing tone was slightly drawn out, with no [distinction between] the light and the heavy;

the entering tone stops abruptly, having neither the inner nor the outer; the level tone [carried by syllables] with nasal or lateral initials was indistinguishable from the heavy [allotone]; and the heavy [allotone] of the rising tone was no different from the departing tone.

Let me defer a more complete exegesis to a later section and for the present concentrate on what Annen says about the rising tone. The key phrases are 平声直低....上声直昂, which I have translated as “the level tone is level and low... the rising tone is level and high.” Chih, literally “straight,” can refer to a level contour or a rising contour with a constant slope. But p’ing-sheng means “level tone.” Hence chih in the first phrase means “level” and should mean the same in the second phrase. Ti means “low” and ang, its antonym in this context, means “high.”

Ti and ang also occur as antithetical terms in lines 38-39: 入有轻重, 重低轻昂. Later we shall see that ch’ing “light” means the allotone induced by voiceless initials, and chung “heavy,” the allotone induced by voiced initials. In modern dialects such as Wu, the first is low and the second is high. The fact that ti and ang mean “low” and “high” in this context confirms the interpretation given in the last paragraph. On the other hand, even if ang means “rising” our theory still holds, since a rising contour can also be interpreted as the reflex of an earlier glottal stop.

Annen did not discuss the length of the rising tone in Piao’s reading. But later when he went on to describe the pronunciation of Chin and Cheng (two traditions that come to Japan after Piao), he said something quite interesting. “The rising tone [in Cheng’s pronunciation] has the light and heavy [allotone]... the heavy is like the heavy [allotone]

of Chin’s rising tone, without, however, the abrupt articulation (不突呼之)” (lines 30, 34, 35). The last phrase implies that the rising tone was short for Chin, but its heavy allotone did not have this feature for Cheng. In other words, Annen’s account also tells us that the rising tone is short in a certain Chinese dialect, probably the Wu dialect corresponding to Go-on.

Our third source of information is the Japanese tradition of bombai 梵口贝— Sanskrit psalmody transliterated into Chinese, and brought over in this form to Japan, probably during the T’ang dynasty. The tradition prescribes explicit rules for the pronunciation of the tones, although these rules are not always followed in actual recitation. Since the history of the transmission of bombai has not been traced as clearly as we might wish, this evidence needs to be handled with caution. On the other hand, the report on the rules of the Shingon sect, given in the Hobogirin, is the clearest and most complete description of a tonal system which may reflect the T’ang pronunciation.**

(1) The level tone is level and relatively low; words having this tone are chanted in the 1st, 2nd, 3rd (or 4th) degree; (2) the rising tone is the highest and the shortest; it is chanted in the 5th or 6th degree; (3) the departing tone is characterized by a prolonged rise of the voice, either from the 4th to the 5th degree or from the 5th to the 6th degree. (4) as for the entering tone for words ending in a consonant, it is short and forced and changed with a drop, either from the 6th to the 6th degree or from the 5th to the 4th degree.

Some remarks about the reliability of these sources and their interrelationship are now in order. As we shall soon see, Annen describes several developments that are well authenticated by modern dialect data and other philological sources. His reliability is beyond reasonable doubt; the problem lies mainly in understanding his terminology. The equivalence between shortness and the rising tone, deduced from I-ching’s statement and the five Buddhist texts, also seems to be on firm ground. And now, what we learned from these sources is confirmed by the Hobogirin statement: “The rising tone is the highest and shortest; it is chanted in the 5th or 6th degree,” which further implies a level contour. In addition, the Hobogirin describes the level tone the same way that Annen did, low and level. Such convergence of evidence not only enhances our confidence in the bombai tradition, but also increases the likelihood that Annen and I-ching were talking about similar dialects.

In using Buddhist sources to argue for our thesis, we of course had to assume that the features of the MC rising tone thus ascertained are relevant, but this assumption needs to be examined. Let us consider the question of date. If the hypothesized glottal stop was lost early and the date of our sources is late, the case is unfavorable. For in that event, there would be ample time for the features of the rising tone to change- from the immediate

reflexes of the lost glottal stop to those of a much later date. I-ching's work is 690-692 A.D. and Piao's reading is probably early eighth century, both fairly late for the study of tones in their primordial state. On the other hand, among the hypothesized final consonants, the glottal stop is the only one preserved in some modern dialects, and this fact seems to indicate that its disappearance from the other OC or MC dialects was of a relatively late date.

No matter how the problem of date may be eventually decided, it does not affect our argument based upon shortness. The fact that the length contrast is sub-phonemic in all modern dialects implies that this contrast tends to disappear in time; specifically, a long tone and a short tone, when left to themselves, would both gravitate towards a non-distinctive length. Hence, from the fact that the rising tone is short in the seventh century, we can infer that it has been short up to the presumed disappearance of the final glottal stop and beyond.

A third kind of evidence consists of Sino-Vietnamese loans. In Sino-Vietnamese (Chinese words borrowed into Vietnamese during the T'ang dynasty), MC initials and tones uniquely determine the resultant Vietnamese tones in the following way.**

	level	rising	departing	entering
voiceless	bang	hoi	sac	sac
voiced	huyen	nang	nang	nang
nasals and laterals	bang	nga	nang	nang

This scheme, however, does not hold for the old Sino-Vietnamese loans (words borrowed into Vietnamese during the Han dynasty). Here the rising tone behaves as follows:

rising	
voiceless	Sac
voiced	Nang
nasals and laterals	Sac

According to Haudricourt's theory, the sac and nang tones of Vietnamese originated from the loss of a final glottal stop. This is shown by the fact that the final glottal stop is still preserved in many dialects of the Palaung-Wa group.**

fish	ka□ (Khmu, Riang)	ca(VN, sac tone)
leaf	hla□ (Khmu) la□ (Riang)	la(VN, sac tone)
dog	so□ (Khmu, Riang)	cho(VN, sac tone)
rice	rānko□ (Khmu), ko□ (Riang)	gao(VN, nang tone)

He also points out that this could be deduced from internal evidence, since these two tones were the only ones noted for words which preserved the final stops -c, -t, -p.

Since the rising tone corresponds to the sac and nang tones in old Sino-Vietnamese loans and at the time of borrowing these two VN tones had a final glottal stop, it is reasonable to infer that the Chinese rising tone also had a final glottal stop at that time. The following list, whose Chinese entries are all in the rising tone, will illustrate what has been said in the last few paragraphs.

S-V (hoi)	Old S-V (sac)	S-V (hoi)	Old S-V (sac)
软 tram	chem	点 diēm	chm
主 chu	chua	纸 chi	giây
卷 quyên	cuôn	府 dē	day
感 cam	cam	种 chung	giông
锦 câm	gâm		
S-V (nang)	Old S-V (nang)	S-V (nga)	Old S-V (sac)
簿 bô	ba	舞 vu	mua
市 thi	cho	藕 ngâu	ngo
舅 cyu (? ,nga)	câu	瓦 ngoa	ngoi

A further point to be noted is that the development of a tone from a final glottal stop is not an altogether uncommon phenomenon. The case for Vietnamese has just been summarized above. The high tone of Modern Burmese, which corresponds to –□ in Ching-p’o (景颇, also called Kachin), is probably derived in a similar manner.** In the Lolo dialect of Lahu (a branch of Lolo-Burmese), according to Matisoff, the “high rising tone” derived through glottal dissimilation, that is, first □-----□ and then □– with a “high rising tone.”** Closer to home, we may cite the fact that in many Chinese dialects –p, -t, -k first collapsed into -□, and when –□ disappointed, it left behind a pitch-and-contour tone.

So far the following evidence has been presented to support the thesis that the rising tone developed through the loss of a final glottal stop. First, in five dialects of the southeastern coastal area, the rising tone has a final glottal stop. Especially noteworthy is the dialect of Ting-an, in which rising tone syllables end in a nasal sound as if they were followed by a homorganic stop – a fact not easily explained by the contrary hypothesis that glottal stop was a secondary development. Secondly, Buddhist sources indicate that the rising tone in Middle Chinese had the features short and high, where high means either a level high pitch or a rising contour. We know from acoustic studies that a syllable is high and short if it ends in a voiceless stop. Thus, if the final glottal stop indeed existed in Old Chinese, its reflex should have precisely the features short and high in Middle Chinese. Thirdly, in old Sino-Vietnamese loans, the rising tone corresponds to the sac and nang tones, which, according to Haudricourt’s theory, were derived from a final glottal stop. Finally, it was pointed out that the development of a tone from a glottal stop had occurred in several Southeast Asian languages.

The evidence from Min dialects and from old Sino-Vietnamese loans both point to the Han dynasty as the time when the final glottal stop was still preserved. The situation is, however, much less clear for the pre-Han period. According to Chang Jih-sheng, whenever the rhyming words in the Book of Odes belong to both the rising and entering tone categories, the rhyme-categories involved invariably end in a velar, specifically -ək, -əg, -ok, -uk in Karlgren’s reconstruction (之入, 之阴, 宵入, 侯入; Karlgren’s Category 19, 20, 25, 30).** By this, Chang means that (a) the Book of Odes has rhymes predominantly in the entering tone category (-ək, -ok, or -uk) which also include words in the rising tone category (respectively - əg, -og, -ug), and rhymes predominantly in the rising tone category (- əg) which also include words in the entering tone category (-ək), and (b) these rhyme categories are the only ones in which the rising and entering tone categories co-occur. Since –k is phonetically similar to -□, it is tempting to regard Chang’s observation as indicating that the rising tone had –□ during the Shih ching period. However, complication sets in because there is no general agreement on the tone of a character in OC, nor on the rhyme scheme of a given poem. A close examination of Chinag’s examples yields only eight clear-cut cases—too few to support our thesis.

The existence of –□ is even more uncertain in the case of Sino-Tibetan. On the one hand, studies in acoustic phonetics and Southeast Asian languages both seem to indicate that tones are developed from segmental features. On the other hand, we are as yet unable to establish correspondences for tones in the Sino-Tibetan family, nor can we find any final consonants in the Tibetan cognates of Chinese rising tone words, for example, “five,” OC 𠄎五, Written Tibetan 𑄎𑄆; “nine,” OC kiŋg 九, WT dgu; “bitter,” OC k’o 苦, WT k’a. Hence in the absence of further evidence, it seems best to regard the existence of –□ in the pre-Han period as probable but not proven. The ultimate origin of –□ must be left open; it could have developed from some other consonant (s) or from prosodic features.

The next item on our agenda is to consider Annen’s statement. I shall present the text and a translation first. The exegetical notes follow immediately after.

(安然悉曇藏卷五(大正新修大藏经卷八, 页四一四)

1...我日本国元传二音:

表则平声直低,

有轻有重;

上声直昂,

... Of the two readings that originally came to us in Japan, that of Piao was as follows: the level tone was level and low, with both the light and the heavy [allotones]; the rising tone was level and high, with only the light [allotone] but not the heavy; the departing tone was slightly drawn out, with no [distinction between]

5 有轻无重;

去声稍引,

无重无轻;

入声径止,

无内无外;

10 平中怒声与重无别;

上中重音与去不分。

金则声势低昂

与表不殊,

但以上声之重

15 稍似相合

平声轻重,

始重终轻,

呼之为异,

唇舌之间, 亦有差升。

20 承和之末,

正法师来; 初习洛阳,

中听太原,

终学长安,

声势大奇。

25 四声之中, 各有轻重。

平有轻重,

轻亦轻重,

轻之重者,

金怒声也,

30 上有轻重。

轻似相合

金声平轻, 上轻,

the light and heavy [allotone]; the entering tone stopped abruptly, having neither the inner nor the outer; the level tone carried by syllables with nasal or lateral initials was indistinguishable from [one having] the heavy [allotone]; and the heavy [allotone] of the rising tone was no different from the departing tone.

The reading according to Chin did not differ from that of Piao with respect to pitch and contour. However, [Chin's] heavy [allotone] of the rising tone was somewhat like a combination of the light and heavy [allotone] of the level tone, beginning with the heavy and ending with the light. Enunciating them makes the difference. In the process of articulating [Chin's rising tone] there is also a differential rise.

At the end of the Ch'eng-ho era (847), the Reverend Cheng came, having first learned the Lo-yang dialect, then listened to the T'ai-yan dialect, and finally studied the Ch'ang and dialect. The pitch and contour have become quite strange. Each of the four tones has the light and heavy [allotones].

The level tone has the light and heavy [allotones]. The light is further [distinguished into] the heavy and the light. The heavy of the light corresponds to the tone carried by the syllables with nasals and lateral initials in Chin's reading. The rising tone has the light and heavy [allotones]; the light [allotone] is like combining the light [allotone] of the level tone and the light [allotone] of the rising tone in Chin's reading, beginning with the level tone and ending with the rising tone; the heavy [allotone] is like the heavy [allotone] of Chin's rising tone, without, however, the abrupt articulation. The departing tone has the light and heavy [allotones]; the heavy is long and

始平终上呼之；

重似金声上重，

35 不突呼之。

去有轻重，

重长轻短。

入有轻重，

重低轻昂。

40 元庆之初，

聪法师来，久住长安，

委搜进士，

亦游南北，

熟知风音。

45 四声皆有轻重著力。

平入轻重

同正和上。

上声之轻，

似正和上上声之重；

50 上声之重，

似正和上平轻之重。

平轻之重，

金怒声也，

但呼著力为今别也。

55 去之轻重，

似自上重；

但以角引为去声也。

音响之终，

妙有轻重；

60 直止为轻，

稍昂为重；

the light is short. The entering tone has the light and heavy [allotones]; the heavy is low and the light is high.

In the beginning of the Yan-ch'ing era (877), the Reverend Ts'ung came, having stayed long in Ch'ang-an, where he made wide acquaintance with men of learning, and also through his travels north and south, became familiar with the various dialects. All four tones have the variants distinguished by light versus heavy and forceful versus non-forceful. The level and entering tones, with respect to the light and heavy [allotones], are the same as those of Monk Cheng. The light [allotone] of the rising tone is similar to Monk Cheng's heavy [allotone] of the rising tone;

and the heavy [allotone] of the rising tone is like Monk Cheng's heavier light [allotone] of the level tone- the heavier light [allotone] of the level tone being the tone carried by syllables with nasal and lateral initials in Chin's reading, though the distinction is now made by a forceful enunciation. Both the light and heavy [allotones] of the departing tone sound as if they are derived from the heavy [allotone] of the rising tone, which is, however, prolonged to yield the departing tone. There is a subtle distinction between the light and heavy [allotones of the departing tone] at the end of the syllable, the one stopping directly being the light and the one with a slight rise being the heavy. The more forceful variety in this [departing tone] is also the nasals and laterals.

此中著力，亦怒声也。

The four transmitters of Chinese readings were referred to by their abbreviated names. Their identity, insofar as can be determined, is as follows. 表 is probably a corruption of 袁, the surname of Yan Chin-ch'ing 袁晋卿, a Chinese savant of phonology who went to Japan in 735 at the age of eighteen or nineteen; 金 is probably Kim Ye-sin 金礼信, a Korean and transmitter of Go-on; 正 is Issei 惟正, whose itinerary of travel and date of return coincide remarkably with Ennin's, and hence he probably belonged to the same mission; 聰 is Chis 智聰.** The text as punctuated in the Taish differs from ours at two places: a full stop after 合 in line 15 and also after 平轻 of line 32. I have followed Mabuchi and others in making the emendations.

Whenever a modern dialect has both the voiced-voiceless distinction in the initials and the yin-yang (high-low) distinction in one or more of its tones, the voiced initials in general co-occur with the yang tone, and the voiceless initials with the yin tone. The nasal and lateral initials (平中怒声) belong to the yang group for the level, departing, and entering tones; this is a fact true for all Chinese dialects. The behavior of these initials in the rising tone, however, varies from dialect to dialect; in some dialects they belong to the yin group (such as Mandarin), and in others (such as Cantonese and Wu), they belong to the yang group. The noteworthy exception is Kan-on, in which the nasal and lateral initials of both the rising and entering tones belong to the yin group.

With these facts as background, we can now turn to an examination of lines 10-11, which I have translated: "the level tone carried by syllables with nasal and lateral initials () was indistinguishable from [one having] the heavy [allotone]; and the heavy [allotone] of the rising tone was no different from the departing tone." The term nu-sheng was used by Annen in another place to refer to the two voiced series of Sanskrit: g, j, d, d, b and gh, jh, dh, dh, bh. But in this context, as Arisaka has pointed out, it refers to the nasal and lateral initials of MC.** We know that Sanskrit voiced initials were transliterated by MC nasal initials. And since the dialect described here is Kan-on, Annen probably intended to call attention to the fact that whereas the nasal and lateral initials belong to the yin group for the rising and entering tones, these initials belong to the yang group for the level tone. Thus, his first statement describes the co-occurrence of voiced initials (including nasals and laterals) and the yang level tone. His second statement refers to the merger of the voiced rising tone with the departing tone – a fact we also know from the following sources: (1) in many modern dialects the same development has taken place, (2) words in these two tone sometimes rhyme in the poetry of Po Ch-I and Yan Chen,** and (3) Li P'ei 李涪 complained at the end of the ninth century that the distinction between these two tones in the Ch'ieh is based upon the peculiarities of the Wu dialects, the implication being that this distinction was no longer maintained in his standard Lo-yang dialect.**

Given a system in which the two contrasts voiced-voiceless and yin-yang (high-low) regularly co-occur, we can regard the first as the determining feature and the second as the determined feature. In other words, a tone is regarded as consisting of two allotones whose selective realization is conditioned by voicing. This explains why in the translation the word "allotone" is sometimes inserted after "light" or "heavy."

Annen's account is arranged according to the order of transmission of the four readings, which also seems to imply that the proliferation of tones follows a definite sequence: splitting occurs first in the level tone, then in the rising tone, and finally in all tones, thus yielding successively five tones for Piao, six for Chin, and eight for Cheng and Ts'ung. Upon closer analysis, this view is implausible, for once the voiced rising tone was merged with the departing tone (which Annen stated for the first reading, Piao's), the rising tone had no voiced initials and could no longer split into two allotones under the condition of voicing. A more plausible view is this: in the common ancestor of Piao's dialect and Chin's dialect, splitting took place in Piao's but not in Chin's; and as Annen implied by his repeated comparisons, the six tones of Chin developed successively into the eight tones of Cheng and Ts'ung.

The five-tone system of Piao, with two allotones in the level tone, is typical of Mandarin dialects before the disappearance of the entering tone; so is the merger of the voiced rising tone and the departing tone. The relation of the other three dialects described by Annen to modern dialects is less certain. The six-tone system of Chin is rarely encountered nowadays. The eight-tone system of Cheng and Ts'ung bears some resemblance to Cantonese and Proto-Hakka, but no positive identification can be made on the basis of our present knowledge.

In a recent article, Chou Fa-kao pointed out that the three entering tones of Cantonese can be explained in terms

of two pairs of oppositions: voiced versus voiceless and nei-chuan 内转 versus wai-chuan 外转, which oppose short vowel against long vowel.** The voiced initials give rise to yang-ju (lower entering tone). For the yin-ju, developed from voiceless initials, the tone is hsia yin-ju (the lower of the upper entering tone) if the final belongs to wai-chuan, and shang yin-ju (the upper of the entering tone) if the final belongs to nei-chuan. This theory throws some light upon lines 8-9: 入声径止, 无内无外. What these lines say is that in Piao's dialect, the entering tone is short and the distinction between nei (short vowel) and wai (long vowel) is neutralized.

There are several terms and passages which resist my exegetical efforts. I shall list them with brief comments. Line 19 says either that the vowel is affected by the tone or that rising contour extends all the way to the (initial) segment successively articulated by the lip and tongue, whatever that means. Lines 14-17 and lines 31-33: these are statements that describe a tone, X, as a combination of tone Y and Z. The most plausible explanation is that Annen was trying to approximate these tones (X) with rising contour by specifying their end points; it is less plausible that tone X begins with a level contour (tone Y) and then jumps to another level contour (tone Z). If so, lines 14-17 and 31-33 show that Annen has a standard phraseology for contoured tones. Since he did not use it for Piao's rising tone, that tone is probably high and level, as we have argued. Lines 45, 54, 62: the meaning of the term 著力 is unclear. Line 57: the term 角引 can be explained in two ways. One, yin means "prolong, draw out" and chiao is its modifier; and here chiao is either a corruption or refers to a note in the musical scale. Two, chiao yin as an established compound, is a technical term borrowed from musical terminology.** But in either case, the meaning cannot be determined with greater precision.

Let us now form a synthetic picture of the four tones, using Annen's account of Piao's reading as the primary source and the rest as supplementary evidence.

- (1) Level tone: long, level, and low, with a higher and a lower allotone. The first feature is inferred from the tradition associated with the monk I-ching.
- (2) Rising tone: short, level, and high, its lower allotone having merged with the departing tone.
- (3) Departing tone: slightly drawn out and hence longish. This feature is described both by Annen and the Hobogirin.
- (4) Entering tone: short.

The above summarizes what I think can be reasonably inferred from the evidence now available. It will be noted that I have not included the pitch and contour of either the departing tone or the entering tone, although the Hobogirin has something to say about both. The entering tone is high according to the Hobogirin and according to our theory that a voiceless final stop induces a high pitch. This is almost certainly true, reliable but until more evidence becomes available, it seems prudent to suspend our judgment. In the case of the departing tone, I should like to mention a plausible, if not conclusive, argument for believing that the Hobogirin is essentially right. If the rising tone and the departing tone are respectively 55 and 45 as the Hobogirin says, then under the assumption that a voiced initial lowers the pitch of the initial segment, say, from 5 to 4, the merger of the voiced rising tone into the departing tone immediately follows as a kind of phonetic corollary.

A word also needs to be said about the "drawn out" articulation of the departing tone. Four texts in the previously presented table—the earliest dated 746—774—have 引去, 去声长引, 去声兼引, "drawn out departing tone," "departing tone lengthily drawn out," "departing tone also drawn out" as subscripts for characters simulating Sanskrit long syllables. If the departing tone is intrinsically and unambiguously long, why is it necessary to add the redundant instruction "drawn out" or "lengthily drawn out"? The explanation we propose is that by mid or late eighth century, in some dialects and for some speakers, the departing tone had lost its longishness, and the subscripts are there to make sure that the departing tone is pronounced in the conservative fashion. There are other reasons for believing in this explanation: in Piao's pronunciation, the departing tone is described as "slightly drawn out" (Piao went to Japan in 735); the length contrast in Chinese tends to get neutralized; and if Old Chinese indeed has an -s, it may have left a long and contoured syllable as its reflex.

There are many other kinds of evidence that bear upon this problem, the most important being the data on modern dialects. But in the absence of a generally accepted theory that classifies and explains diachronic regularities of tone change, the comparative method cannot be applied, and consequently, the dialect data must

be temporarily held in abeyance.** The second kind of evidence consists of the formulas in which scholars and monks from the T'ang dynasty on record their observed or inferred impressions of tones. The two earliest ones are of some value.**

平声哀而安，上声厉而举，去声清而远，入声直而促。

平声平道莫低昂，上声高呼猛烈强，去声分明哀远道，入声短促急收藏。

These two formulas confirm that the level tone is level, the rising tone is high, and the entering tone is short. The third kind of evidence sometimes used is the names of these four tones.** But clearly, these slippery terms can hardly lead us to any firm conclusions. It is also sometimes said that the Chinese phonetic terms tend to be their own exemplars, but that shang (rising tone, “up, high”) is an exception. Hence the

character should be read in the rising tone, but because of its voiced initial (MC z-), later shifted to the departing tone. The fourth kind of evidence consists of Kan-on syōmyō 汉音声明, the Japanese tradition of reading the sutras in the Kan-on pronunciation (which is some-what different from bombai, chanting Sanskrit psalmody). Rai Tsutomu, who made a detailed study of this tradition, came to the conclusion that (a) since the tones are intertwined with the musical setting, their phonetic values cannot always be extracted, and (b) but insofar as the values can be determined, they coincide with what Annen said in the His-t'an tsang.**

I shall now discuss, as promised, Chou Fa-kao's thesis that the Level tone is long and the Oblique tones are short (see note 13 above). The evidence, according to him, consists of the following three kinds. (1) In Hsuan-ying's 玄应 I ch'ieh ching yin-i 一切经音义 (ca. A.D. 649), seven pairs from the Sanskrit syllabary (a, ā, i, ī, etc.) are represented thus: long always corresponds to Level and short to Oblique; among the latter, three characters are rising (哀, 塢, 理) and one is entering (壹). (2) In I-ching's work, thirty-three short syllables are represented by Oblique tone characters. (This we discussed earlier, pointing out that all thirty-three are to be pronounced in the rising tone.) In addition, six pairs (ka, kā, ki, kī, etc.) are represented thus: long always corresponds to Level, and short to Oblique; of the latter, two characters are rising (枳, 矩), two are departing (计, 告), and one is entering (脚). (3) When the length contrast affects the meaning of a pair of Sanskrit words, it is reflected in Chinese transliterations by means of tonal differences. Four pairs are cited.

Long	Short
a śāriputra 奢利富多口罗	śārīra 舍梨子
b śīla 尸罗	śīla 试罗
c purusāh 补噜沙	purusah 补噜洒
d purusāh 布路沙	purusah 布路杀

The tones of the relevant characters are: level, 奢, 梨, 尸, 沙, all representing long syllables; rising, 洒, departing, 舍, 试, entering, are representing short syllables.

The issue is whether shortness is supposed to be represented by the rising tone only or by all Oblique tones. Thus an Oblique character not in the rising tone would count as a vote for Chou's thesis if it also represented a short syllable. I-ching's statement that “they should all be read in the rising tone...” disqualifies in one fell swoop all thirty-three characters as votes for Chou's thesis. The rest of Hsuan-ying and I-ching combined only yields four syllables that fulfill the above qualification, two each in the departing tone and the entering tone. Of course, three in I-ching's list are suspect; since the character 脚 appears in both the thirty-three character set and the six pair set, I-ching's statement almost certainly is meant to apply to all the characters concerned. As for (3), the Kuang yün has another reading for 舍 in the rising tone, and 洒 is in the rising tone anyway. This leaves only three votes for Chou's thesis.

While the evidence is insufficient, Chou's thesis may still be true, for in order to simulate the length contrast, the Oblique tones need not be short, but only shorter than the Level tone, and from the longest; departing is the next longest; rising and entering are short.) Furthermore, the reason why the other Oblique tones are regarded as inappropriate simulators of the Sanskrit short syllable may be other than the fact that they are not short enough; the entering tone may have been disqualified by its final stop, and the departing tone by its dynamic contour. In other words, the only clear conclusion to be drawn from Chou's data is that the rising tone is short. The remaining issues will have to be left undecided for the present.

We are now drawn inexorably to a consideration of the Level-Oblique distinction in prosody. And my aim here is not so much to offer a solution but rather to delineate the issues and suggest some ways to approach them.

By the time of Shen Ch'an-ch'i 沈##期(650—ca. 715) and Sung Chih-wen 宋之问 (656-712), the Level-Oblique distinction is firmly established in prosodic practice. Earlier, Shen Yeh (441-513) and his friends had theorized about the use of four tones in poetry, but it has yet to be shown that any of the Six Dynasty poets consistently applied the Level-Oblique distinction in their poetry. The period between 500 and 650 might then be conveniently regarded as the focal point of our problem.

In order to find out why and how the four tones became classified into two prosodic categories, we need to consider three questions: (1) How were the four tones pronounced at that time? This seems to be the only firm base for extrapolation. (2) Which phonetic features did the poets pay attention to? This is an important point, but one often neglected in discussions on prosody. (For example, the length contrast is present in modern English, but except for a few experimental poets, never used in poetry.) It is perhaps significant that in the key texts on literary criticism of this period, there is clear mention of the high-low contrast, but never, as far as I know, of the long-short contrast.** (3) What tonal patterns can we find in Proto-Recent Style poetry, that is, poems written between 500 and 650? In what follows, I shall suggest some questions that we can put to that yet unexplored corpus.

The Level-Oblique distinction is based either on length or on pitch; these two features are the leading candidates by common consensus. Poets around Shen Yüeh's time apparently operated with four prosodic categories, that is, the four tones. Later there are only two. The process of change may have been gradual or sudden. Thus, we have altogether four models to consider.

- (1) Sudden change based upon long-short. The evidence against it are (a) the long-short contrast is not mentioned in literary criticism, and (b) the departing tone, by our extrapolation, must be fairly long around the sixth and seventh centuries.
- (2) Sudden change based upon high-low. The stumbling block is our ignorance concerning the precise pitch and contour of the departing and entering tone. The Hobogirin has something to say about both, and our phonetic theory predicts that the entering tone should be high. But these considerations are too conjectural as the basis for further inference.
- (3) Gradual change based upon long-short. There would be an intermediate stage where the level and departing tones are grouped together as long and the rising and entering tones as short. As the departing tone gradually loses its longishness, it migrates into the short (Oblique) category.
- (4) Gradual change based upon high-low. The intermediate stage would consist of a low category, the level tone; a high category, the rising and departing tones; and a category consisting of the entering tone by itself.** Then, by fiat or by convention, the entering tone is included in the high category. The fact that the voiced rising tone and the departing tone have merged no later than Piao's time points to their similarity in pitch and contour. Since the rising tone is high, so is the departing tone; this seems to be the main consideration in favor of this model.

One of the functions of prosody is to define how the various slots are to be filled by prosodic categories, and what a study of Pro-to-Recent Style poetry can tell us is whether its prosodic categories consist of (L) and (R, D, E) as in (1) and (2), or (L, D) and (R, E) as in (3), or (L), (R, D), and (E) as in (4). My favorite model is (4), but at present this view is based upon nothing more reputable than a hunch.

The conclusions of this paper are these: on the basis of Annen's account, the tonal system of Middle Chinese around the eighth century is found to be (1) level tone: long, level, and low; (2) rising tone: short, level, and high; (3) departing tone: longishness about to be lost and probably high in pitch and rising in contour. Annen also allows us to infer that the proliferation of tones under the condition of voicing follows a definite sequence, whose intermediate stages may represent the ancestors of several modern dialects; also that the merger of the voiced rising tone with the departing tone has already been accomplished by the late eighth century.

Reasons have been stated for the thesis that the rising tone of Middle Chinese developed through the loss of a final glottal stop: - is a feature in several coastal dialects, the rising tone of MC is short and high, and in old

Sino-Vietnamese loans, the rising tone corresponds to the sac and nang tones, at a time when these tones presumably had -□. It also seems probable that one reason why the Six Dynasty poets were so fascinated by the four tones was that the loss of final consonants, according to our conjecture, was not completed until a fairly late date – late enough so that those poets were excited by its novelty. (They could have been aware of this novelty if they had also known some dialects that still preserved the final consonants.) As the tonal system evolved further, it made possible the emergence of the Level-Oblique distinction, and the remaining problem is to find out how exactly that happened.**

1. As we shall see, the so-called rising tone is high and level in Middle Chinese. A more appropriate term might be the “high tone.” But I bow to convention and continue to use this self-incriminating expression.
2. See 段玉裁 “古四声说”, <六书音韵表>; 江有诰<唐韵四声正>; 周祖谟<古音有无上去二声辨>, <问学集>(Peking, 1966), pp. 32-80; George Kennedy, “Tone in Archaic Chinese,” in T. Y. Li, ed., *Selected Works of George Kennedy* (New Have, 1964), pp. 135-150; Chang Jih-sheng 张日日升<试论上古四声> in *The Journal of the Institute of Chinese Studies of the Chinese University of Hong Kong* 1 (1968). 113-170. Chang computes, for each tone category X, the ratio in the Odes between the occurrences of characters rhyming with characters also in X and the total occurrences of characters in X appearing as rhymes (the latter includes cases where characters in X rhyme with characters in non-X), thus: level 85%, rising 76%, departing 54%, entering 85%.
3. 董同禾<中国语音史>, p. 183.
4. A.G. Haudricourt, “Comment reconstruire le chinois archaïque,” *Word* 10 (1954). 351-364, and “De l’origine des tons en Vietnamien,” *JA* 242 (1954). 68-82.
5. H. Maspero, “*tudes sur la phontique historique de la langue annamite: les initiales,” *BEFEO* 12(1916). 102.
6. Tone marks for Vietnamese are usually omitted; when necessary, VN tones are indicated by their names in parentheses.
7. R.A.D. Forrest, “Les occlusive finales en Chinois archaïque,” *Bulletin dela Socit de Linguistique de Paris* 55 (1960). 228-239.
8. E.G. Pulleyblank, “The consonantal system of Old Chinese, Part II,” *AM* 9(1962). 206-265.
9. These facts are well established for English. See House and Fairbanks, “The influence of consonant environment upon the secondary acoustic characteristics of the vowels,” and Peterson and Lehiste, “Duration of syllable nuclei in English,” both in Ilse Lehiste, ed., *Readings in Acoustic Phonetics* (M.I.T. Press, 1967). Peterson and Lehiste noted that the postvocalic consonant has the greatest influence upon the duration of the preceding vowel, and the determining feature is the voiced-voiceless contrast. Recent studies seem to show, although not conclusively, that the correlations are linguistic universal. See Burckhard Mohr, “Intrinsic fundamental frequency variation: II & III,” and Matthew Chen, “Vowel length variation as a function [\pm voice] of the following consonant,” respectively in the June and July 1968 issues of the mimeographed Monthly Internal Memorandum of the Phonology Laboratory of the University of California, Berkeley.
10. Wen-chou is based upon <汉语方言词汇>(Peking, 1964), p. 9, note 5; see also 郑张尚芳<温州音系>, <中国语文>, 1(1964). 28-60; Wen-ch’ang on Hashimoto Mantarō 桥本万太郎 <海南语的声调体系>, <东京支那学报> 7(1961). 35-52, and 梁猷刚<海南方言中的喉塞音>, <中国语文> 6(1964). 463-465; Ting-an on Yamaji Enji 山路圆次 and Matsutani (?) Masa 松谷雅<海南岛语会话> (Tokyo, 1931), p. 5; P’u-ch’eng and Chien-yang on Jerry Norman’s field notes collected on Taiwan, which will be presented as part of his doctoral dissertation at the University of California, Berkeley.
11. The key passage cited below does not appear in the standard version, I-ching’s Nan-hai...(Taisho, No. 2125), but is quoted, with explicit mention of the title, by Annen in his His-t’an tsang (Taishō, No. 2702, Vol. 84, p. 380a). I have followed Chou Fa-kao in assuming that the passage quoted by Annen was written by I-ching. For bibliographic details on Annen and Chou, see notes 13 and 14 below.
12. The text and its preceding context are as follows: 脚####口卢俄者栋社##啫吒谿茶[Morohashi, No. 25043] 奴手他柝但娜跛巨婆梵摩名五五二十五字名便缮....野口罗##婆舍洒娑诃蓝叉(末后二字不入其数) 右脚等二十五字并下八字, 总有三十三字名初章, 皆须上声读之, 不可看其字而为平去入也。
13. 周法高<说平仄>, *CYYY* 13(1948). 153-162, and <佛教东传对中国音韵学之影响>, <中国语文论丛>(Taipei, 1963), pp. 21-50, esp. pp. 22-24. Chou’s view seems to have been accepted by Tamaki

- Ogawa 小川环树<唐诗概论> [=Yoshikawa and Ogawa, eds., <中国诗人选集>17, Tokyo, 1958], p. 102, and by Pulleyblank, "The Chinese name for the Turks," JAOS 85 (1965). 122, note 5.
14. 安然<悉曇藏>(Taish, No. 2702), p. 414b. Scholars who have studied this passage include Arisaka Hideyo 有土反秀世<悉曇藏所传的四声####>, <国语音韵史的研究>(2nd edition, Tokyo, 1957), pp. 591-599; Iida Toshiyuki 饭田利行<日本##残存##中国近世音的研究>(Tokyo, 1955), pp. 69-76; Mabuchi Kazuo 马渊利夫<日本韵学史的研究>(Tokyo, 1962), p. 335ff., which lists other Japanese studies; Chou Tsu-mo 周法谟<关于唐代方言中四声读法的一些资料>, <问学集>, I (Peking, 1966), pp. 494-500. The text, a translation and exegetical notes are presented in a later section of this article. It will be apparent that I have benefited much from the Japanese scholars.
 15. S. Levi, J. Takakusu, and P. Demiéville, eds., *Hobogirin*, fascicule I-II (Tokyo, 1929-1930), p. 107.
 16. H. Maspero, op. cit., p. 95.
 17. Haudricourt, "De l'origine des tons en Vietnamien," JA 242 (1954). 80-81.
 18. This was pointed out to me by Dr. La Raw Maran of M.I.T., a native speaker of Kachin,
 19. James Matisoff, "Glottal dissimilation and the Lahu high-rising tone: a tonogenetic case-study," JAOS 90 (1970). 13-44.
 20. Chang Jih-sheng, the article cited in note 2.
 21. Identification is based upon the works cited in note 14, especially Iida's study.
 22. Arisaka, the article cited in note 14.
 23. The example of Po Chü-i's "Ch'ang-hen ko" has been discussed in Chou Tsu-mo, op. cit., p. 495 and in Wang Li 王力<汉语史稿>I (Peking, 1957), p. 21. Hs Shihying recently raised the question, rather inconclusively I think, whether such cases represent linguistic change or prosodic laxity. See 许世瑛<论长恨歌与琵琶行用韵>, <淡江学报>4(1965). 1-12; <论元稹连昌宫词用韵>, <台湾大学文史哲学报> 15 (1966). 397-406.
 24. 李涪<切韵刊误>, quoted in Chou Tsu-mo, op. cit., p. 496.
 25. 周法高, <论切韵音>, The Journal of the Institute of Chinese studies of the Chinese University of Hong Kong, 1 (1968). 89-112.
 26. Li Shan's commentary to the Wen-hsüan cites 沈约<宋书>"控" [Morohashi, No. 12418] (vertical harp) 宫引第一, 商引等二, 征引第三, 羽引等四, 古有六引, 其宫引本第二, 角引本第四也。并无歌有弦笛存声不足故阙二曲。(Wen-hsan, ch. 28, commentary under 谢灵运<会吟行>). Here chiao yin is clearly the name of a melody or tune. Chou Fa-kao, who cited this passage for a different purpose, also showed that a number of phonological or prosodic terms (such as 平调 and 侧调, later Level and Oblique) were first used in musical contexts (CYYY 13 [1948]. 154-155).
 27. Some promising work in developing feature analysis for tones and applying it to synchronic phonology has been done by William S. Y. Wang, "Phonological features of tones," International Journal of American Linguistics 33. 2(1967). 93-105, and by Cheng Chin-chan 郑锦全<官话方言的声调征性跟连调的变化>, <大陆杂志> 33 (1966). 102-108.
 28. The first is by Ch'u Chung in <元和韵谱> (806-827), now lost, and the second by a monk of the Ming dynasty, Chen-k'ung 真空 in <玉钥匙歌诀>, both cited, among other places, in Wang Li, Chung-kuo yin-yün hsüeh, p. 100.
 29. B. Karlgren, "Tones in Archaic Chinese," BMFEA 32(1960). 113-142.
 30. The earliest instance is probably a fan-ch'ieh spelling in the <经典释文> (583-589) where under 象曰云上于天(<易经·需卦>), we find 上时掌反, 于宝云升也. The lower fan-ch'ieh character, 掌, is in the rising tone. The date for Ching-tien shih-wen is based upon Lin T'ao 林焘<陆德明的<经典释文>, <中国语文>113(February, 1962). 132-136.
 31. 赖惟勤<汉音的声明####声调>, <言语研究>17-18 (1951). 1-46.
 32. For high-low, I have in mind the famous statement in Shen Yeh's 沈约<谢灵运传>: 欲使宫羽相变, 低昂互节, 若前有浮声, 则后须切响 (Sung shu 67.43a). As Arisaka has suggested, ch'ing and chung in the following statement probably also mean the high and low allotones: 欲广文路, 自可清浊皆通, 若赏知音, 即须轻重有异(<切韵>序). What I have said about the absence of clear statements on long-short is of course subject to modification.
 33. This hypothesis is in part motivated by the observation by Chou Fa-kao and others that the text of 维摩经讲经文, discovered at Tun-huang, bears the notations 平, 侧, 断, which could mean "Level (low)," "Oblique (high)," and "Cut-off (entering.)" See Chou, CYYY 13(1948). 154.
 34. This paper was begun during 1967-1968, when I was with the Chinese Linguistics Project of Princeton University. I am especially indebted to Jerry Norman, Mantaro Hashimoto, and Bruce Brooks for their suggestions and encouragement.

中古汉语的声调，声律与上声的来源

这篇(1)介绍日僧安然<悉曇藏>所记唐代长安等地四声的调值。(2)因为<悉曇藏>说：“我日本国元传二音，表则平声直低……，上声直昂”等等，所以推测声律里平声的音征是低，仄声是高。(3)说明上声来自喉塞音韵尾，理由是浙江温州，福建建阳，海南文昌等方言上声有喉塞音韵尾-□，中古上声调值短促。

关于平声和仄声在调值上有什么不同，文章里所说的平低仄高却不能成立。平仄的对立最早出现于齐梁时代的健康，而本文用的却是唐代长安的调值。

上声来自喉塞音韵尾原来是罗杰瑞的创见，本文作了论证。我们知道去声来自-s，入声韵尾带-p, -t, -k。如果本文关于上声来源的说法能够成立，这就说明远古汉语没有由高低升降组成的声调。但是至今在藏缅语里还没有找到能跟汉语上声***-□对应的音征，所以上声来自**目前还是个尚未证实的假设。

* 本文原载 Harvard Journal of Asiatic Studies, Volume 30, 1970年。