Rethinking the medials of Old Chinese: Where are the r's?

Zev Handel
University of Washington

Abstract

English: This paper re-examines the traditional reconstruction of Old Chinese medial ***-r-** from the viewpoint of Tibeto-Burman comparison. It concludes that it is more natural from a typological perspective and more compelling from a comparative perspective to reconstruct ***r-** as a prefix rather than a medial before acute consonants, and perhaps in some cases before grave consonants as well. Such a revision has important implications for our understanding of Old Chinese syllable structure and derivational morphology.

keywords: Chinese historical phonology, Sino-Tibetan, Old Chinese, medials, prefixes

French: Cet article et un nouvel examen de la reconstruction traditionnelle de la médiale ***-r-** du chinois archaïque du point de vue du comparatisme tibeto-bèrman. Il conclut qu'il est plus normal, dans une perspective typologique, et plus satisfaisant, dans une perspective comparatiste, de reconstruire ***r-** comme préfixe, plutôt que comme médiale, devant des consonnes aiguës et peut-être aussi dans certains cas devant les consonnes graves. Cette révision a des implications importantes pour notre compréhension de la structure syllabique et de la morphologie du chinois archaïque.

keywords: phonologie historique du chinois, Sino-Tibétain, chinois archaïque, médiales, préfixes

Rethinking the medials of Old Chinese: Where are the r's?
Une reconsidération des médiales du chinois archaïque: Où sont les r?

Zev Handel
University of Washington

Department of Asian Languages and Literature
Box 353521
University of Washington
Seattle, WA 98195-3521

zhandel@u.washington.edu
voice: +1 (206) 543-4863
fax: +1 (206) 685-4268

0. Introduction*

In the early 1960s, Yakhontov and Pulleyblank first proposed the reconstruction of medial ***-r-** for the class of Old Chinese syllables which developed into the so-called "second division" of Middle Chinese. The reconstruction of this medial element also conditioned the development of Middle Chinese retroflex initials out of Old Chinese dental stops. While this medial ***-r-** hypothesis neatly accounts for observed historical developments within Chinese, in the broader context of Sino-Tibetan comparison it has proven to be problematic.

Three objections may be raised. First, within the Sino-Tibetan family it is typologically unusual to find medial *-r-* clustering with dental initials (other than *s-*). Second, the presence in Old Chinese of etymologically related variants involving the presence or absence of medial ***-r-** has led to hypotheses that ***-r-** was a derivational infix. Infixation of this type is rare in Tibeto-Burman, and no wide-spread equivalent to the hypothesized ***-r-** infix is found in reconstructions of Proto-Tibeto-Burman. Third, in many proposed cognate sets involving Old Chinese words and Tibeto-Burman forms or reconstructions, a Tibeto-Burman feature corresponding to Old Chinese medial ***-r-** cannot be found, resulting in awkward Proto-Sino-Tibetan reconstructions.

While these objections are not, taken individually, fatal to the medial ***-r-** hypothesis, they do raise concerns. Drawing primarily on the work of Gong Hwang-cherng (1995) and W. South Coblin (1986), this paper, part of a larger study of Old Chinese medials, revisits the medial ***-r-** hypothesis in search of a solution which is compatible with comparative evidence while retaining the explanatory power of the original hypothesis. In light of recent scholarship suggesting that Old Chinese had a rich derivational system of morphological prefixes I conclude that, at least in the case of Old Chinese syllables with dental stops and affricates, medial ***-r-** should be revised to prefixal ***r-**. This revision is compatible with comparative evidence showing that Old Chinese medial ***-r-** often corresponds to Tibeto-Burman prefixal ***r-**, yet in many other cases has no Tibeto-Burman equivalent.

This is more than a formulaic revision, since it has implications for our understanding of Old Chinese syllable structure, typology, and morphology. The reconstruction of the Chinese syllable (or "sesqui-syllable") can be brought into closer alignment with Tibeto-Burman and at the same time made more internally consistent.

The proposal also allows us to reexamine our criteria for the evaluation of the validity and reliability of individual Chinese/Tibeto-Burman comparisons, and to posit more regular rules of correspondence between these two major branches of Sino-Tibetan.

1. Methodology

Because this paper makes use of Tibeto-Burman data to aid in the reconstruction of Old Chinese, a brief explanation and justification of the methodological approach involved is warranted.

Ideally, under the assumption of the branching model of linguistic divergence, the comparative method calls first for the rigorous comparison of closely related languages to achieve reconstructions of their "meso-level" ancestors. These reconstructed ancestor languages are then compared to each other, allowing the reconstruction of an older common ancestor ... and so forth, until the limits of the method are reached and the earliest possible proto-language has been reconstructed. According to a strict interpretation of this method, only languages descended from Old Chinese—in addition, of course, to contemporary textual evidence—should be used in the reconstruction of Old Chinese itself. The characteristics of its sister language Proto-Tibeto-Burman should not be used to draw conclusions about the nature of Old Chinese.

In actual practice, however, historical linguists have been more pragmatic in their work. Hypotheses concerning the nature of the proto-language are advanced based on preliminary

*An earlier version of this paper was presented to the 32nd International Conference on Sino-Tibetan Languages and Linguistics in Urbana-Champaign on October 28, 1999. I would like to thank William Baxter and Laurent Sagart for helpful comments on that version. I would also like to thank two anonymous reviewers for comments and suggestions. Naturally, all errors are my sole responsibility.

evidence from daughter languages; these hypotheses are then tested against additional data from daughter languages (or, ideally, newly discovered daughter languages), and are then accepted, modified or discarded. The process is bi-directional; at any given moment, the historical linguist is working with partial, hypothetical reconstructions at different time-depths, as well as with incomplete data for the daughter languages. The linguist develops the reconstructions incrementally, working forward and backward in time, bringing each stage of reconstruction into alignment as new evidence is amassed and processed.

If this practical approach is applied to the comparison of reconstructed Old Chinese with reconstructed Proto-Tibeto-Burman in the reconstruction of their parent language, Proto-Sino-Tibetan [PST], it makes perfect sense to modify a working reconstruction of Old Chinese to better accommodate a hypothesized Proto-Sino-Tibetan reconstruction, as long as one takes care that the Old Chinese reconstruction is at all times consistent with internal Chinese evidence. The revised Old Chinese reconstruction will in turn have ramifications for the Proto-Sino-Tibetan reconstruction; the process of revision continues in both directions until equilibrium is reached. At that point, with hindsight, the whole structure can be presented as if it were arrived at according to the strict interpretation of the comparative method.

There is another sense in which the use of Tibeto-Burman evidence may be helpful in reconstructing Old Chinese. It is sometimes the case that the simplest, most elegant solutions to problems in historical reconstruction can evade discovery for years, although once proposed they might appear perfectly obvious in hindsight. The insight leading to the solution is sometimes triggered by an example from another language or language family. One never knows which Tibeto-Burman language might possess the phonological feature which proves to be the key to solving a significant problem in Old Chinese reconstruction. This key insight might be independently verifiable with Chinese evidence alone; but it might never have seen the light of day without the example of Tibeto-Burman. Axel Schuessler's 1974 proposal, now widely accepted, regarding the reconstruction of Old Chinese ***r** and ***l** is an example of the benefits of this approach.

2. The Sino-Tibetan Hypothesis

The comparative work in my study takes as its starting point the Sino-Tibetan hypothesis, which states that the Sinitic languages (that is, the Chinese dialects) are genetically related to the language family which includes Tibetan and Burmese. This hypothesis has been around in one form or another for over a hundred years (for a concise history of the development of the hypothesis, see van Driem 1997). A number of competing hypotheses about the genetic affinity of Chinese have been proposed (e.g. Sagart 1993a, 1994), which are not necessarily wholly incompatible with the Sino-Tibetan hypothesis. It is fair to say, however, that most scholars today subscribe to the hypothesis in some form, although there remains a good deal of disagreement as to the membership and subgrouping of the Sino-Tibetan language family. I follow James Matisoff's assessment (1991 and to appear) that it comprises two major subgroups, Tibeto-Burman and Sinitic, which are siblings within the Sino-Tibetan family. Tibeto-Burman is itself highly ramified, as shown in Figure 1.

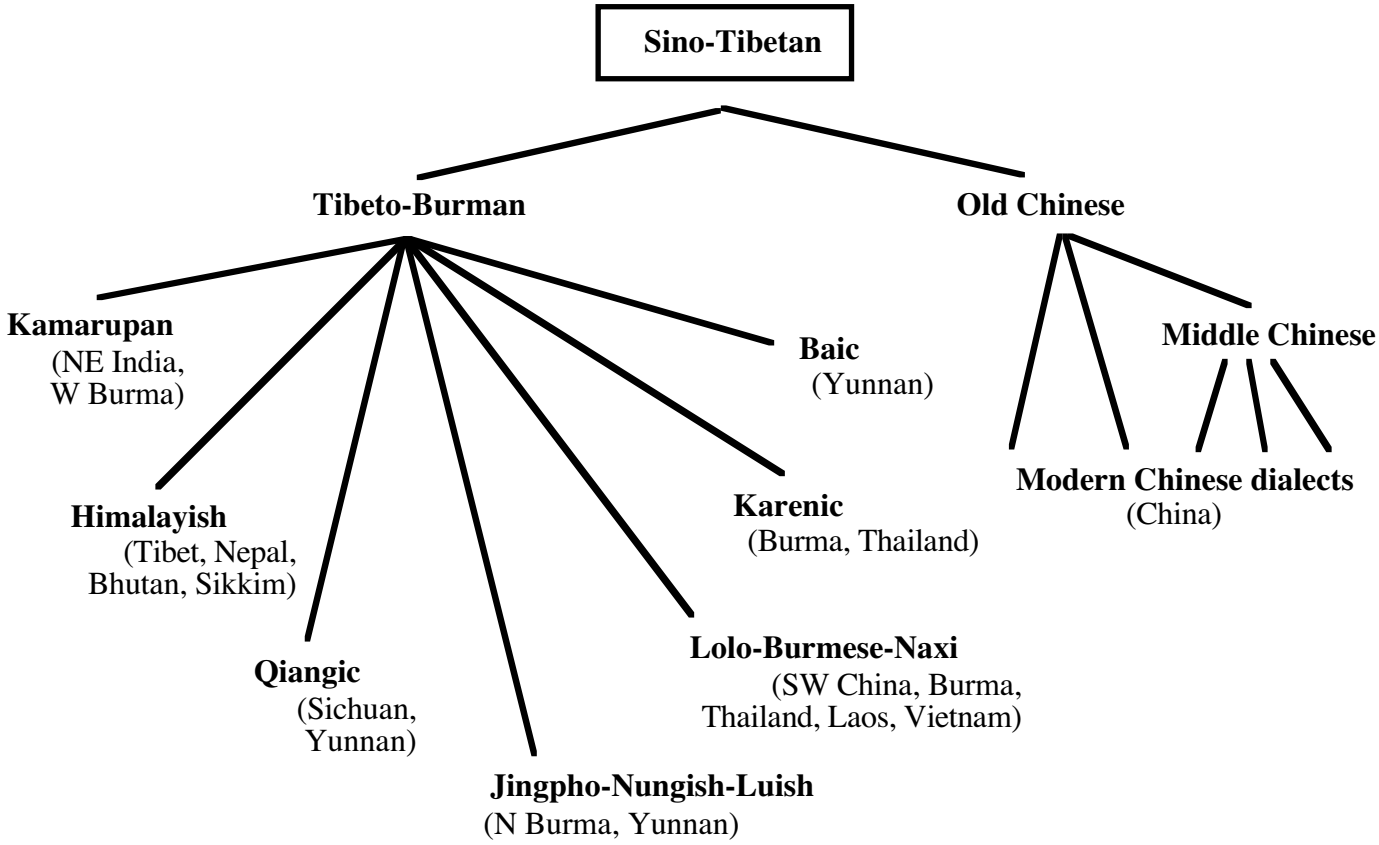

Figure 1. The Sino-Tibetan family (adapted from Matisoff 1991)

According to this model, Proto-Sino-Tibetan [PST] is best reconstructed by direct comparison of Old Chinese [OC] with reconstructed Proto-Tibeto-Burman [PTB]. Comparisons between Old Chinese and Proto-Tibeto-Burman should provide more meaningful patterns of correspondence than those between Chinese and any single Tibeto-Burman [TB] language (e.g. Tibetan) or subgroup (e.g. Lolo-Burmese-Naxi).

3. Proto-variation in Tibeto-Burman

The neogrammarian ideal of perfect correspondences, even in the most pristine linguistic conditions, will always be contaminated to some degree by quirks and irregularities. There are inevitably in any language family cognate sets which point to conflicting reconstructed roots. Sometimes these discrepancies will appear entirely random, and sometimes they will be part of a regular pattern of variation peculiar to the language family in question.

Benedict and Matisoff (see Benedict 1972), in working on Tibeto-Burman, deal with these discrepancies by hypothesizing a degree of variation at the proto-level, that is to say, within the roots of the reconstructed language. For example, the PTB root ***mik ~ *myak** 'eye' exhibits a root vowel alternation pattern commonly found in this language family. Some languages reflect the first variant (e.g. WT *mig*), and others the second (e.g. WB *myak*). This variation might be attributed to a number of causes: (1) free variation inherited from an earlier stage; (2) morphological derivation; (3) dialect or language mixture; (4) analogy; etc. In a sense, then, the term 'proto-variation' may be seen as a convenient term for summarizing observed variation whose causes are not yet fully understood.

In terms of the topic of the present paper, variation involving PTB *prefixes* is particularly relevant. Many prefixed roots have variants lacking the prefix. Often, it is hard to predict whether a given daughter language will reflect a prefixed or non-prefixed variant. For example, PTB ***g-sum** 'three' has descendents which reflect a prefixed variant (Tibetan *gsum*, Garo *githam*) and descendents which reflect an unprefixed variant (Burmese *sûm*, Lushai *thum*). If we assume the same to be true of Proto-Sino-Tibetan, then the presence or absence

of a prefix in a Tibeto-Burman cognate to a Chinese word need not say anything definitive about whether Chinese inherited a prefixed variant or not.

4. The "traditional" reconstruction of OC *-r-

As a first step in examining the problem of medial ***r** in Old Chinese, it will be helpful to review what I will here call the "traditional view" of Old Chinese medial ***-r-**. The outlines of this view were first proposed by Yakhontov in 1960. Further variations and refinements have been made by Pulleyblank (1962), Li Fang-kuei (1971), and others.

The key tenet of the traditional view holds that medial ***-r-** is reconstructed in Old Chinese to account for Middle Chinese second-division vocalism and for the development of Middle Chinese retroflex initials from Old Chinese dentals.[1] At the same time, it leads to an Old Chinese system in which all words within the same rhyme group can be reconstructed with a single vowel, and all words whose characters share a phonetic elements can be reconstructed with homorganic initial consonants. Consider examples (1)-(3) below. Old Chinese reconstructions are given in the system of Baxter 1992; Middle Chinese forms follow Li (1971)'s revision of Karlgren's Ancient Chinese reconstruction.[2] Karlgren's Archaic Chinese reconstructions (from Karlgren 1957), which predate the medial ***-r-** hypothesis, are provided for comparison with Baxter's OC.

(1a)	工	OC ***kong** >	MC **kung** >	Mand. *gōng* 'work'	(Karlgren ***kung**)
(1b)	江	OC ***krong** >	MC **kång** >	Mand. *jiāng* 'Yangtze river'	(Karlgren ***kŭng**)
(2a)	童	OC ***dong** >	MC **dung** >	Mand. *tóng* 'boy, young man'	(Karlgren ***d'ung**)
(2b)	撞	OC ***drongs** >	MC **ḍång** >	Mand. *zhuàng* 'strike'	(Karlgren ***d'ŭng**)
(3a)	至	OC ***tjits** >	MC **tśi** >	Mand. *zhì* 'arrive'	(Karlgren ***t̂i̯ĕd**)
(3b)	致	OC ***trjits** >	MC **ṭi** >	Mand. *zhì* 'cause to arrive'	(Karlgren ***t̂i̯ĕd**)

This is a straightforward solution which appears to deal adequately with the Chinese evidence: it enables the reconstruction of Old Chinese rhyme groups with a single main vowel, explains patterns of use of phonetic elements in Chinese characters, and provides a conditioning factor for regular sound changes involving both consonants and vowels.

The sweeping explanatory power of the traditional ***-r-** hypothesis has led to its near-universal acceptance among Chinese historical phonologists. However, a difficulty arises when attempts are made to compare OC and PTB roots. Stated simply, the problem is that in apparent cognates, Chinese medial ***-r-** often does not match up with Proto-Tibeto-Burman medial ***-r-**, and vice-versa.

The situation is illustrated in examples (4)-(6). In some cases, OC medial ***-r-** corresponds perfectly with PTB medial ***-r-**, as in (4). However, sometimes OC medial ***-r-** seems not to correspond to anything in PTB, as in example (5). In other cases, OC medial ***-r-** corresponds to prefixal ***r-** in PTB, as in (6).

- (4) OC medial ***-r-** sometimes corresponds to PTB medial ***-r-**
  - (4a) OC 胞 ***pru** 'womb' and PTB ***pru** > Written Tibetan *phru-ma* 'uterus'
  - (4b) OC 生 ***srjeng** 'live, be born' and PTB ***s-ring** 'live, alive'

- (5) OC medial ***-r-** sometimes does not correspond to any PTB element
  - (5a) OC 笆 ***bra** 'type of bamboo' and PTB ***g-pwa** 'bamboo'
  - (5b) OC 殺 ***sret** 'kill' and PTB ***sat** > Written Burmese *sat* 'kill'

---

[1]Medial ***-r-** is also reconstructed to account for the development of MC retroflex initials in third-division syllables. Pulleyblank (1962) also proposed reconstructing medial ***-r-** to account for the development of third-division *chóngniŭ* syllables. The culmination of the traditional view, incorporating all these proposals, can be found in the ***r-** and ***rj-**hypotheses of Baxter 1992.

[2]This practice is followed throughout the paper unless otherwise indicatd.

• (6) OC medial ***-r-** sometimes corresponds to PTB prefix ***r-**
(6a) OC 塵 ***drjɨn** 'dust' and PTB ***r-dul** > Written Tibetan *rdul* 'dust'

In their Sino-Tibetan reconstructions, both W. South Coblin (1986) and Gong Hwang-cherng (1995, 1997) have tried to deal with these discrepancies. Coblin proposed the following developments to account for the different correspondence patterns he observed (forms cited are as given in Coblin 1986; Baxter's OC reconstructions follow Coblin's in parentheses):

(7) OC ***-r-** : PTB ***-r-** < PST ****-r-**
['live/bear' PST ****sring** > OC 生 ***sring** (***srjeng**), PTB ***s-ring**]

(8) OC ***-r-** : PTB zero < PST ****-~~r~~-**
['board/plank' PST ****p~~r~~ar** > OC 板 ***pranx** (***pran?**), WT *phar*]

(9) OC ***dr-** : PTB ***rd-** < PST ****rd-**
['dust' PST ***rdjul** > OC 塵 ***drjən** (***drjɨn**), WT *rdul*][3]

(10) OC ***trj-** : PTB ***rd-** < PST ****rtj-**
['spread/unfold' PST ***rtjal** > OC 展 ***trjanx** (***trjan?**), WT *rdal-*]

Note that in (7) and (8) Coblin proposed two types of rhotic medial for Proto-Sino-Tibetan. Elsewhere in his reconstruction he also proposed two liquids, **l** and **~~l~~**. In (9) and (10) he proposed wide-spread metathesis in OC of PST ***rT-** clusters. Both of these proposals are problematic. First, it supposes a parent language in which four clusters ***pr-**, **p~~r~~-**, ***pl-**, and ***p~~l~~-** all contrast; Coblin does not attempt to explain the phonetic value of his **~~l~~** and **~~r~~**. While there is nothing inherently wrong with this sort of formulaic reconstruction based on observed correspondence patterns, it does seem implausible for a language to have so many contrasting liquids in clusters, especially since, to my knowledge, nothing similar is attested in any actual Sino-Tibetan language. Second, it presumes widescale metathesis in the history of OC of the type PST ****rd-** > OC ***dr-**. Metathesis is usually a sporadic process in language development, not a regular change.[4] Moreover, Coblin also establishes rules like PST ****rt-** > OC ***t-**, where there is no metathesis at all. It is difficult to see why clusters ****rd-** and ****rt-** should not develop in parallel.

Gong Hwang-cherng takes a different approach to the problem of ***-r-** in OC/PTB correspondences. First, he rejects Coblin's correspondence labeled example (8), where OC has medial ***-r-** but TB doesn't. He only permits cognates with the correspondence pattern labeled example (7). (This eliminates some cognate sets that otherwise look excellent, for example OC 殺 ***sret** 'kill' and PTB ***sat** 'kill'.) Second, he reconstructs ***rT-** rather than ***Tr-** for almost all words with Middle Chinese retroflex initials, including Coblin's correspondences in (9) and (10).[5] (But there are exceptions: Gong reconstructs one word with initial ***tr-**[6], and also reconstructs Old Chinese ***nr-** and ***sr-** clusters.) However, he does not explicitly explain his motivation for this reconstruction, or indicate exactly how these clusters developed into Middle Chinese. (Gong 1995 contains mostly lists of cognate sets, and many aspects of his reconstructions are not clarified in the text.) Furthermore, it is unclear whether Gong considers ***r-** in these forms to be a prefix or not, and if so, he does not explain

[3]I have here revised Coblin's reconstruction from PST ****rdjiul** > OC ***drjin**. The word 塵 is in the OC WÉN 文 group (main vowel ***ə** in Li's system), not the OC ZHĒN 真 group (main vowel ***i**). See Baxter 1992:427 #1112 and Gong 1995 #158. The character occurs in the *Shījīng* at 206.1, but apparently not in a rhyming position. This change allows us to do away entirely with Coblin's PST diphthong ****iu**, which was attested only in this one example (1986 : 21).

[4]As in the Latin variants *cocodrillus* and *crocodīlus* for "crocodile", or the development of English *alligator* from Spanish *el lagarto*. (The semantic similarity of these two examples is entirely coincidental.)

[5]I use **T** as a cover symbol for all dental initials.

[6]See set #350 where Old Chinese 肘 ***trjəg^{w}x** > **ṭjǔu** 'wrist, elbow' is compared to WT *gru-mo* 'elbow'

why it only appears before dental initials and never before velars or labials, or how it fits into his overall conception of OC syllable structure.

5. Prefixes in Proto-Tibeto-Burman and Old Chinese

The problem can be addressed more comprehensively by undertaking a broader review of the syllable structures of PTB and OC, and evaluating proposed reconstructions in the light of this information.

In PTB (as reconstructed by Benedict 1972, Matisoff 1978, to appear), medial ***-r-**, like medial ***-l-**, occurs only after grave initials (velars and labials), with the single exception of initial ***s-**. This is in fact a very common co-occurrence restriction among the languages of the world. The vestiges of this restriction can be seen in Written Tibetan, where *tr-* and *thr-* are extremely rare, and *dr-* is to be derived from earlier ***d-r-** (that is, initial ***r-** prefixed by ***d-**).

PTB can be viewed as what Matisoff (1973) has called a sesquisyllabic language, many words commonly consisting of a monosyllabic stem and a prefixed consonant, which was probably articulated with a following shwa. Thus we have PTB forms like ***r-kot** [rəkot] 'dig, scoop' and ***g-sum** [gəsum] 'three'. The prefixes which have been reconstructed for PTB are ***g-**, ***b-**, ***d-**, ***m-**, ***s-, *r-** (see Benedict 1972:103-123). Some have well-defined morphological functions (for example ***m-** has a stativizing function, ***s-** is a causative), while the function of others, if they had any morphological function at all, is unclear.

A number of similar prefixes have been proposed by various scholars for Old Chinese, based on internal evidence. These correspond well to what is known of the Proto-Tibeto-Burman prefixes, both semantically and phonologically.

The causative and denominative ***s-** prefix in Old Chinese was proposed some time ago (see Mei Tsu-lin 1989), and can be identified with Proto-Tibeto-Burman ***s-**. A "voicing prefix", reconstructed as ***ɦ-** by Pulleyblank (1973) and Baxter (1992), and as underspecified nasal ***N-** by Sagart (1993b) (see also Baxter and Sagart (1998)), is probably cognate with Proto-Tibeto-Burman ***m-**.[7] Sagart (1999) has proposed additional prefixes ***k-** and ***t-**, which may well turn out to be directly cognate to Proto-Tibeto-Burman ***g-** and ***d-**. Bodman 1980 (followed by Baxter) proposed "r-clusters" written ***b-r-** and ***g-r-**, distinct from "ordinary" clusters ***br-** and ***gr-**, and while they do not speculate on the phonetic difference between these two of clustert ypes, one interpretation is that ***b-** and ***g-** prefixes are involved. These OC prefixes correlate well with the five PTB prefixes ***s-**, ***m-**, ***b-**, ***d-**, ***g-**. (Note that PTB prefix ***r-** is absent from this list. This will be dealt with below.)

These OC prefixes were for the most part established based only on internal evidence, not on TB comparisons, and some of them were not even specifically identified as "prefixes" by the scholars who proposed them. Yet they match up remarkably well with the Proto-Tibeto-Burman prefixes. This hardly seems coincidental; in fact, it provides strong evidence for an Old Chinese prefixal system inherited from PST, and suggests that these disparate proposals should all be viewed as prefixes with similar structural properties.

In other words, I believe that independent sources of evidence provide support for the idea that Old Chinese words had a similar structure to Tibeto-Burman. Old Chinese should also be viewed as a sesquisyllabic language characterized by a set of morphological prefixes.

This naturally raises the possibility that Old Chinese might have an ***r-** prefix corresponding to the Proto-Tibeto-Burman ***r-** prefix.[8] This is the only one of the six PTB prefixes for which no OC equivalent has been proposed. Comparison with PTB also raises the question of whether OC medial ***-r-** had co-occurrence restrictions similar to PTB medial ***-r-** in terms of which classes of initial consonants it could combine with.

The implications of the discussion so far can be summarized in three hypotheses: First, that Old Chinese was sesquisyllabic. Second, that Old Chinese had a prefix ***r-** related to PTB prefix ***r-**. Third, that Old Chinese medial ***-r-** did not combine with dental stops and

---

[7]This prefix is proposed for morphological pairs like 敗 ***prats** > **pwai** > *bài* 'to defeat' vs. ***N-prats** > **bwai** > *bài* 'to be defeated' (in the system of Baxter 1992).

[8]For evidence that prefix ***r-** is to be reconstructed for PTB, and is not confined to WT, see Benedict 1972:109-110.

affricates. To accomodate the second and third hypotheses, the traditional medial ***-r-** of Old Chinese should be revised to prefixal ***r-** in certain classes of words.

A review of the comparative data will show that these three hypotheses neatly resolve the problems in OC/PTB comparison which were discussed above in Section 4, while at the same time retaining all the explanatory power of the "traditional" medial ***r-** hypothesis.

6. Reconsideration of Old Chinese/PTB cognate sets

The comparative data is best categorized and analyzed by place of articulation of the initial consonant: grave (i.e. velar and labial) initials; dentals; and initial ***s-** as a special case.

6.1. Velar and labial initials

Among cognate sets with grave initials, there seem to be good solid correspondences between PTB medial ***-r-** and OC medial ***-r-** as traditionally reconstructed. Some supporting examples of cognate sets proposed by Gong (1995) are listed in Table 1. The first column is the set number from Gong 1995. The next three columns give the OC, WT, and WB cognate forms given by Gong. (The WT column also includes some Proto-Tibetan forms as reconstructed by Gong.) Gong's OC reconstructions are based on a revision of Li 1971 (I have provided Baxter's reconstruction in parentheses for comparison); his MC reconstructions follow the system of Karlgren as modified by Li 1971. Gong does not reconstruct PTB; rather, his PST is based on direct comparison between OC, WT, WB and Tangut (Xixia).

Set	Old Chinese	Written Tibetan	Written Burmese
34	話 *g^{w}rads (*g^{w}rats) > ɣwai ‘speak, word, good words’	*gros* ‘speech, talk, advice, counsel’	
61	胞 *prəg^{w} (*pru) > pau ‘womb’	*phru-ma*, *'phru-ma* ‘uterus, matrix of animals, placenta’, *phrug* ‘child, a young one (of animals)’	
66	覺 *krək^{w} (*kruk) > kak ‘to awake, to rouse somebody into understanding’; 攪 *krəg^{w}x (*kru(k)ʔ) > kau ‘disturb’	*dkrug* ‘to stir, agitate, to disturb’	
163	加 *kral (*kraj) > ka ‘add, apply, attain’	*khral* ‘punishment, tax, tribute, duty’	
174	板 *pranx (*pranʔ) > pwan ‘a plank, board’	*'phar* < *'phrar ‘board, flat board’	*prâ* ‘flat, level’
212	八 *priat (*pret) > pwăt ‘eight’	*brgyad* < *br-·yad ‘eight’	*hrac* ‘eight’
224	蝱 *mrang (*mrang) > mɐng ‘gadfly, horsefly’	*sbrang* < *smrang ‘fly, and similar insects’	
299	遐 *grag (*gra) > ɣa ‘far, distant’		*kra* ‘to be long in doing, to be long in time’
302	迓 *ngrags (*ngras) > nga ‘meet’		*ŋrâ* ‘meet with’
304	樺 *g^{w}rags (*wras) > ɣwa ‘a kind of birch’	*gro-ga* ‘birch tree or its bark’	
333	駁 *prak^{w} (*prak^{w}) > påk ‘horse with mixed colours, mixed’		*prauk* ‘be speckled, spotted’
373	甲 *krap (*krap) > kap ‘shell’	*khrab* ‘shield, scales’	
379	洽 *grəp (*grop) > ɣăp ‘unite, accomplish’	*'grub* ‘to be finished, accomplished’	

Table 1. Sets from Gong 1995 involving initial velars and labials with PST medial ****-r-***

These sets require no further comment. However, there are also a number of sets involving grave initials which Coblin (1986) has proposed in which PTB has no ***-r-** while OC does. These sets exemplify the correspondence pattern listed above in example (8), which Gong does not accept. Among them are those in Table 2 (again, Baxter’s reconstructions are in parentheses following Coblin’s):

Gloss	PST	OC (modified from Li 1971/76)	PTB (from Benedict)
bamboo	**p/br̶way	笆 *bragx (*braʔ) ‘type of bamboo’	*g-pwa ‘bamboo’
big/elder/much	**mr̶ang	孟 *mrangh (*mrangs) ‘elder (of brothers)’	*mang ‘big; older (brother, uncle)’
board/plank	**pr̶ar	板, 版 *pranx (*pranʔ) ‘board, plank’	WT *'phar* ‘panel, small plank’
corner/angle	**kr̶uk	角 *kruk (*krok) ‘horn; angle, corner’	WT *khug(s)* ‘corner, angle, nook’
flower	**br̶ian	瓣 *brianh (*brens) ‘petals of a flower’	WB *pàn* ‘flower’
goose	**ngr̶an	雁 *ngranh (*ngrans) ‘wild goose’	WB *ngàn* ‘goose’
great/elevated	**pr̶ar	昄 *pranx (*pranʔ) ‘great’	WT *'phar-ba* ‘raised, elevated’
people	**mr̶ang	氓, 甿 *mrang (*mrang) ‘population, people’	WT *dmangs* ‘common people’
pig	**pr̶wag	豝 *prag (*pra) ‘sow, pig’	*pwak ‘pig’
spread/sow	**p/bwr̶ar	班 *pran (*pran) ‘spread out, scatter’ (cf. 播 *parh (*pajs) ‘spread, sow’)	*bwâr ‘throw away, cast, sow, toss’
ten	**gr̶ip	十 *grjəp (*gjip) > *djəp ‘ten’	*gip ‘ten’

*Table 2. Sets from Coblin 1986 reconstructed with PST medial ****-r̶-***

The sets for ‘goose’ and ‘ten’ can safely be eliminated from this list.[9] Of the remaining nine sets, all but ‘corner/angle’ have **labial** initials rather than **velar** initials.[10] I believe this is no

---

[9]Coblin follows Li in reconstructing ***-rj-** in the OC form for ‘ten’ to account for the palatal initial in MC. However, as Pulleyblank (1962) has shown, this palatalization can for the most part be accounted for in other ways, and ***-rj-** should instead be reconstructed to account for the development of MC *chóngniǔ* third-division words. For more details, see Baxter (1992 : 211), who reconstructs OC ‘ten’ as ***gjip**.
As for ‘goose’, the WB form is an isolate in TB, which can perhaps be equally well compared with 鵝 *é* ‘goose’ (OC ***ngaj** in Baxter’s system, ***ngar** in Gong’s), which has no medial ***r**. The WB form is treated by Benedict as an **-n**-suffixed form of a hypothetical basic TB root ***ŋa** ‘goose’ for which there is no direct evidence (Benedict 1972 : 99 note 284). A more likely explanation is that the two Chinese words for ‘goose’ belong to that class of words which Baxter (1995) now follows Starostin in reconstructing with final ***-r**. These words normally merge with final ***-n** like ***-j** in some ancient dialects, leading sometimes to doublets.
[10]While the WT form for ‘corner/angle’ indeed shows no evidence for medial ***-r-**, the PTB root ***krəw** ‘horn’ (STC #37) does. And, despite the lack of a final stop, this root is closer in meaning to the basic sense of the Chinese word. Note the words for ‘horn’ in these other TB languages:

Dulong (Dulonghe) *tɕi*^{31}***xɹɯ***^{55}, Dulong (Nujiang) *aŋ*^{31}*tɯ*^{31}***xɹɯ***^{55}, Darang ***ɹau***^{55}, Geman ***kɹăŋ***^{35}, Cuona ***ru***:^{13}

Dulong *xɹ-* is a regular reflex of PTB ***kr-**. The Dulong morphemes are unmistakably descended from ***krəw**. The Geman form appears to be related, but here we have the unexpected appearance of a final velar. (Perhaps there is some connection between this final and the final ***-k** of the Chinese form.) In Cuona the initial ***k-** has dropped, leaving an *r*-initial word.
These same variations are discernible in various meso-level reconstructions for ‘horn’:

Proto-Loloish ***kro**^{1}, Proto-Lolo-Burmese ***kruw**^{1}, Proto-Tamangic *****^{Ah}**ru**, Proto-Northern-Naga ***ruŋ**

In this context, note that the Tibetan word for ‘horn’ is *rwa ~ ru* and that there is another Tibetan word for ‘corner, angle’ *grwa ~ gru* (Benedict 1972 : 113), neither of which show evidence of a final stop.
It is possible that all of these words are part of a larger word family, and that the Chinese form is to be related to a PTB root which does contain a medial ***-r-**.

accident. These Old Chinese forms can be reconstructed with ***Pw-** rather than ***Pr-** clusters (there is in fact evidence for a ***-w-** medial in Tibeto-Burman for most of these words); it seems likely that after labials medial ***-w-** often developed into medial ***-r-** as a result of dissimilation, merging with original ***Pr-** and leading to MC second-division syllables.

6.2. Dental initials

As noted earlier, PTB does not permit clusters of initial dentals with medial ***-r-**, with the exception of initial ***s-**. It is therefore not surprising that medial ***-r-** in traditionally reconstructed OC clusters like ***Tr-** and ***TSr-** has no corresponding medial element in PTB cognates. What is interesting, as Coblin, Gong, and others have noted, is that quite often there seems to be a corresponding prefix ***r-** in PTB. (Evidence for PTB ***r-** is found mostly in Tibetan reflexes.) For example, Gong lists the seven cognate sets in Table 3:

Set	Old Chinese	Written Tibetan	Written Burmese
44	綴 *rtjuat (*trjot) > tjwät 'sew, tie, connect'; 贅 *tjuats (*tjots) > tśjwäi 'unite, together'	*rtod, gtod, btod* 'to tether, fasten, secure'	
72	椓 *rtuk (*trok) > ṭåk 'beat, strike'	*rdug* 'to strike against	
76	冢 *rtjungx (*trjongʔ) > tjwong 'mound, peak'	*rdung* 'a small mound, hillock'	*taung* 'a hill, mountain'
148	展 *rtjanx (*trjenʔ[11]) > tjän 'roll over, unfold'	*rdal* 'to spread, extend'	
158	塵 *rdjən (*drjɨn) > ḍjěn 'dust'	*rdul* 'dust'	
262	撞 *rdung(s) (*drong(s)) > ḍång 'to strike'	*rdung* 'to beat, to strike'	
329	事 *rdzjəgs (*ɦsrjɨʔ(s)) > dẓï 'serve, affair'	*rdzas* 'thing, matter, object'	*ca* 'a thing'

Table 3. Sets from Gong 1995 involving dental initials with WT prefix ***r-***

All these Old Chinese words are traditionally reconstructed with medial ***-r-**. Gong has moved the **r** to the front, but without explanation.

If we reconstruct a prefixal ***r-**, rather than a medial, we can explain these correspondences in a more natural way than by proposing widespread metathesis, as Coblin does.

There are, to be sure, plenty of instances where the ***r-** that must be reconstructed for Old Chinese does not correspond to an **r-** prefix in Written Tibetan or Proto-Tibeto-Burman, as in Table 4:

[11]This reconstruction, found at Baxter 1992:221, may be in error. The appendix (p. 808) lists the *qù*-tone variant of this character with a reconstruction ***trjan(?)s**, and in *Shījīng* 47.3A (p. 600) the word does indeed rhyme with ***-an** words. It appears then that the correct reconstruction for the *shǎng*-tone variant should be ***trjan?**. (If so, then the reconstruction of 碾 on page 221 should be revised to ***Ntrjan?**.) This of course matches better with the proposed TB cognates. I have given the form ***trjan?** in example (10) earlier in the paper.

Set	Old Chinese	Written Tibetan	Written Burmese
7	爭 *rtsing (*tsr(j)eng) > tṣɛng ‘strife, quarrel’	*'dzing* ‘to quarrel, contend, fight’, *zing-cha* ‘quarrel, dispute’	*cac* ‘war, battle’
15	住 *rdjuks (*drjos) > ḍju ‘to stop’	*'dug* ‘to remain, to stay, to live, to be, to exist’	
241	張 *rtjang (*trjang) > ʈjang ‘give tension to a bow, stretch, extend’	*thang-po* ‘tense, tight, firm’	*tâng* ‘to tighten, become tense’
283	晝 *rtjuks (*trjoks) > ʈjǎu ‘time of daylight, day’	*gdugs* ‘mid-day, noon’	
359	沈 *rdjəm (*drji/um) > ḍjəm ‘to sink, submerged, deep’	*thim 'thim, gtim, stim* ‘to disappear by being imbibed, absorbed; to be melted, dissolved in water, to sink’	*tim* ‘shallow’

*Table 4. Sets from Gong 1995 involving dental initials with OC prefix ***r-** but no WT prefix*

However, as noted in Section 3, Tibeto-Burman prefixal elements may or may not be reflected in individual forms in daughter languages. The fact that prefixal ***r-** does correspond in approximately half of the proposed cognates is persuasive evidence for a correspondence; the fact that it does not correspond in the other half is only to be expected. Prefixal elements were probably morphological in function. The ‘cognates’ we are looking at may in fact reflect different derivations from the same root. It’s also possible that ***r-** remained productive in Chinese after the split from Tibeto-Burman, accounting for a large number of Chinese forms with ***r-** prefixes that have no PTB equivalent.

6.3. The special case of *sr-

Since PTB does have ***sr-** clusters, we might therefore hypothesize that OC also inherited such clusters from PST. How then to explain the uneven correspondences in Coblin’s sets listed in Tables 5 and 6? In Table 5 OC ***-r-** corresponds to PTB ***-r-**, but in Table 6 it does not:

Gloss	PST	OC (modified from Li 1971/76)	PTB (from Benedict)
bear, rear	**srel	產 *srianx (*sngrjanʔ) ‘to breed, bear, produce’	WT *srel-ba* ‘bring up, rear’
live, bear	**sring	生 *sring (*srjeng) ‘live, life; bear, be born’	*s-ring ‘live, alive, green, raw’
louse	**sryik	蝨 *srjik (*srjik) > *srjit ‘louse’	*śrik ‘louse’
rule/lead	**srjiət	帥, 率 *srjiət > *srjət (*srjut) ‘to lead, direct’ (Mand. *shuài*)	WT *srid* ‘government; ruler, commander’
sister	**sring	甥 *sring (*srjeng) ‘sister’s son or daughter; son-in-law’	WT *sring-mo* ‘sister (of a male)’

*Table 5. Sets from Coblin 1986 reconstructed with PST initial ****sr-***

gloss	PST	OC (modified from Li 1971/76)	PTB (from Benedict)
hair	**s-r-am	彡 *sram (*sram) ‘long hair’	*sâm ‘head hair’
kill	**s-r-iat	殺 *sriat (*srjat) ‘kill’	*sat ‘kill’
pair	**z-r-ung	雙 *srung (*sCr(j)ong) ‘pair’	WT *zung* ‘pair, couple’
sand/earth	**s-r-ar	沙 *srar (*sCraj) ‘sand’	WT *sa* ‘earth’
suck/drink	**s-r-uk	欶 *sruk (*srok) ‘suck, inhale’	WB *sok* ‘to drink’

*Table 6. Sets from Coblin 1986 reconstructed with PST initial ****sr-***

A look at the vowels reveals an obvious solution: that original Proto-Sino-Tibetan ***sr-** changed to ***s-** in Proto-Tibeto-Burman before non-front vowels. This explains the lack of medial ***-r-** in the Tibeto-Burman forms in Table 6.

7. Conclusion

Taking all the evidence presented above into account, several conclusions can be drawn. In the case of dental stops and affricates, there is no need to propose both ***r-T-** and ***Tr-** clusters for OC. Given that PTB seems to have had ***r-T-** but not ***Tr-**, it is simpler to suppose that OC also had ***r-T-** rather than ***Tr-** than it is to suppose widespread regular metathesis from PST ***r-T-** to OC ***Tr-**.[12]

One may well ask how the development of Middle Chinese second-division vocalism could be conditioned by a prefixal, rather than medial, ***r**, as in examples (1b) and (2b). This is in fact not a surprising development. Once the dental initials became articulated as retroflexes through assimilation to prefixal ***r-**, this feature could in turn have spread to the vowel: ***r-T-** > ***rT-** > ***rṬ-** > **Ṭ-** + second-division vocalism. In other words, the vocalic development which Baxter (1992) terms ***r-color** can instead be attributed to ***retroflex-color**.

Conclusions about medial, prefix, and initial ***r** are listed in Table 7, along with the parallel developments of ***l**, which are beyond the scope of this paper. In this table the cover symbol **C** represents grave initials (velars and labials). Having established an OC prefix ***r-**, it seems probable that prefix-initial combinations like ***r-K-** and ***r-P-** existed in OC, but these combinations would presumably have developed identically to unprefixed ***K-** and ***P-**, making it difficult to say in which words they should be reconstructed.[13]

---

[12] As for the morphological function of prefixal ***r-**, if any, it is difficult to speculate based on the data which appears in this paper. Sagart (1999) proposes a number of morphological functions for his infix ***-r-** covering a broad semantic range, some of which could be attributed to the prefix reconstructed here. However, I do not feel that there is sufficient evidence at this point to draw firm conclusions.

[13] A related issue is the question of whether (and where) we should reconstruct OC ***r-s-**. It is interesting to note in this respect that as part of his OC system, Baxter (1992 : 203-205) proposed ***sr-** > **tsh-** (but ***srj-** > **sr-**). For example, he reconstructs 青 as ***sreng** > **tsheng** > *qīng* ‘the color of living things’ based on the presumption that it is etymologically related to 生 ***srjeng** > **sr(j)æng** > *shēng* ‘live, be born’.
This is a peculiar proposal in phonological terms, since medial ***-r-** in this case has none of the effects which would normally be associated with it (i.e. retroflexion of the initial or **r**-coloring of the vowel). I would argue instead that this 青 reflects ***r-s-** > **tsh-**. This type of change looks quite natural when viewed in terms of the effects prefixes have in Tibetan on initial *s-*. Li (1933) proposes the following developments for Tibetan: ***'-ś-** > **'tśh-**, ***'-s-** > **'tsh-**, ***'-ź-** > **'dź-**, ***'-z-** > **'dz-**, ***r-ź-** > **rdź-**. Though he gives no examples demonstrating the fate of ***r-s-**, by analogy we might suppose it would become **rts-** or **rtsh-** or possibly **rdz-**. Such a development is implicit, for example, in Benedict’s reconstruction of PTB ***r-saŋ** ‘lizard’ based on WT *rtsangs-pa* and Jingpho *nsaŋ* (1972 : 109).

PST		PTB	OC		MC (A)	MC (B)
*Cr-	>	*Cr-	*Cr-	>	C- (II)	C- (III)
*Pw-	>	*P(w)-	*Pw- > *Pr-	>	P- (II)	P-
*r-T(S)-	>	*r-T(S)-	*r-T(S)-	>	ṬS- (II)	ṬS- (III)
*sr-	>	*sr-/*s-	*sr-	>	ṣ (II)	ṣ (III)
*r-C-	>	*r-C-	*r-C-	>	[unclear]	C- (III)
*r-	>	*r-	*r-	>	l-	l-
*C-r-	>	*C-r-	*C-r-	>	l-	l-
*l-	>	*l-	*l-	>	d-	ji-
*C-l-	>	*C-l-	*C-l-	>	d-	ji-
*Cl-	>	*Cl-	*Cl-	>	T-	Tś-

*Table 7. Proposed developments involving ***r** and ***l** from PST into OC and PTB*

I hope to deal with the other results listed here in a future publication. They are part of a broader pattern of hypotheses which mutually reinforce each other. Understanding the sesquisyllabic nature of Old Chinese allows us to make sense of notationally different initials like ***C-r-**, ***Cr-**, and ***r-C-**.

In conclusion, I want to emphasize that my proposals for the reconstruction of medial and prefixal ***r** in Old Chinese and Proto-Sino-Tibetan are grounded in a broader thesis about the phonological structure of Old Chinese as a whole. I do not mean to argue that *because* Proto-Tibeto-Burman is a sesquisyllabic language characterized by a prevalence of prefixes, that Old Chinese must be a similar type of language, or that because Proto-Tibeto-Burman does not have ***Tr-** clusters that such clusters could not have existed in Old Chinese. There is no grounds for argument along these lines.

What I am suggesting, however, is that when we look to these features of Proto-Tibeto-Burman as a possible model for our reconstruction of Old Chinese, we can solve a number of internal and external problems neatly and consistently. It is this fact that lends support to such an interpretation of Old Chinese syllable structure.

The proposition that Middle Chinese retroflexes are uniformly derived from ***r-T-** rather than from ***Tr-** solves the immediate problem of regularizing Old Chinese/Proto-Tibeto-Burman correspondences. More important, this proposition is not made in a vacuum; it is part of a broader proposal that Old Chinese was a language with a large number of prefixed forms. By specifically identifying Old Chinese as a sesquisyllabic language, the various proposals made by a number of scholars, explicit and implicit, for the existence of prefixes in Old Chinese can all be regularized and incorporated into a general schema for the language. In this context, proposing a prefix ***r-** for Old Chinese is a natural solution.

As part of an integrated approach to reconstructing Old Chinese, individual lexical comparisons and overall structural comparisons with Tibeto-Burman can be extremely useful. While they can never take precedence over internal evidence for Old Chinese reconstruction, they may provide useful insights allowing us to choose wisely between different interpretations of internal evidence and to construct a reasonable framework for understanding that internal evidence. In some cases they may even spark entirely new insights about the structure of Old Chinese.

References:

BAXTER, William H. (1992). *A handbook of Old Chinese phonology*. Berlin and New York : Mouton de Gruyter. (Trends in linguistics: Studies and monographs ; 64).

—. (1995). Old Chinese, Version 1.1 (beta test version). Paper presented at 28th International Conference on Sino-Tibetan Languages and Linguistics, Charlottesville, Virginia.

BAXTER, William H. and Laurent SAGART (1998). Word formation in Old Chinese. In : PACKARD, Jerome L. (ed.). *New approaches to Chinese word formation: morphology, phonology and the lexicon in modern and ancient Chinese*. Berlin and New York: Mouton de Gruyter. Pp. 35-76.

BENEDICT, Paul K. (1972). *Sino-Tibetan: a conspectus*. Contributing editor James A. Matisoff. New York : Cambridge University Press.

BEYER, Stephan V. (1992). *The classical Tibetan language*. Albany : State University of New York Press. (SUNY series in Buddhist studies).

BODMAN, Nicholas C. (1980). Proto-Chinese and Sino-Tibetan: data towards establishing the nature of the relationship. In : van COETSEM, Frans and WAUGH, Linda R. (eds.). *Contributions to historical linguistics: issues and materials*. Leiden : E.J. Brill. Pp. 34-199.

COBLIN, W. South (1986). *A sinologist's handlist of Sino-Tibetan lexical comparisons*. Nettetal : Steyler Verlag. (Monumenta Serica monograph series ; 18.)

van DRIEM, George (1997). Sino-Bodic. *Bulletin of the School of Oriental and African Studies* (London), vol. 60, no. 3, pp. 455-488.

GONG, Hwang-cherng 龔煌城 (1990 [1994]). Cong Han-Zangyu de bijiao kan Shanggu Hanyu ruogan shengmu de nice 從漢藏語的比較看上古漢語若干的擬測 [Reconstruction of some initials in Archaic Chinese from the viewpoint of comparative Sino-Tibetan]. In : Republic of China Phonology Conference, Taiwan Normal University Chinese Department and Academia Sinica Institute of History and Philology (eds.). *Shengyun luncong* 聲韻論叢 [Collected essays in Chinese phonology], vol. I. Taipei : Taiwan Xuesheng Shuju. Pp. 73-96.

—. (1995). The system of finals in Proto-Sino-Tibetan. In : WANG, William S.-Y. (ed.). The ancestry of the Chinese language. (Journal of Chinese Linguistics Monograph Series ; 8). Berkeley : Project on Linguistic Analysis. Pp. 41-92.

—. (1997). Cong Han-Zangyu de bijiao kan chongniu wenti (jian lun Shanggu *-rj- jieyin dui Zhonggu yunmu yanbian de yingxiang) 從漢藏語的比較看重紐問題 (兼論上古介音對中古韻母演變的影響) [The *chongniu* problem from the viewpoint of comparative Sino-Tibetan (with discussion of the effect of the Old Chinese medial *-rj- on the development of Middle Chinese rhymes)]. In : Republic of China Phonology Conference, Taiwan Normal University Chinese Department and Academia Sinica Institute of History and Philology (eds.). *Shengyun luncong* 聲韻論叢 [Collected essays in Chinese phonology], vol. VI. Taipei : Taiwan Xuesheng Shuju. Pp. 195-243.

KARLGREN, Bernhard (1957). Grammatica serica recensa. *Bulletin of the Museum of Far Eastern Antiquities* (Stockholm), vol. 29, pp. 1-332.

LI, Fang-kuei 李方桂 (1933). Certain phonetic influences of the Tibetan prefixes upon the root initial. *Bulletin of the Institute of History and Philology*, Academia Sinica (Beijing), vol. 4, pp. 135-157.

—. (1971 [1980]). *Shanggu yin yanjiu* 上古音研究 [Studies on Old Chinese phonology]. In : *Shanggu yin yanjiu* 上古音研究 [Studies on Old Chinese phonology]. Beijing : Shangwu. Pp. 1-83.

MATISOFF, James A. (1973). Tonogenesis in Southeast Asia. In : HYMAN, Larry M. (ed.). *Consonant types and tone*. Los Angeles : University of California. Pp. 71-95

—. (1978). *Variational semantics in Tibeto-Burman : the 'organic' approach to linguistic comparison*. Philadelphia : Publications of the Institute for the Study of the Humanities.

—. (1991). Sino-Tibetan linguistics : present state and future prospects. *Annual Review of Anthropology* (Palo Alto), vol. 20, pp. 469-504.

—. (1998). An extrusional approach to *p-/w- variation in Sino-Tibetan. Paper presented at Sixth International Symposium on Chinese Languages and Linguistics, Academia Sinica, Taipei, July 14-16.

—. (to appear). *Sino-Tibetan etymological dictionary and thesaurus*. Berkeley : University of California Press.
MEI, Tsu-lin (1989). The causative and denominative functions of the *s- prefix in Old Chinese. Proceedings of the Second International Conference on Sinology : section on linguistics and paleography. Taipei : Academia Sinica.
PULLEYBLANK, Edwin G. (1962). The consonantal system of Old Chinese. *Asia Major* (London), vol. 9, pp. 58-144, 206-265.
—. (1973). Some new hypotheses concerning word families in Chinese. *Journal of Chinese Linguistics* (Berkeley), vol. 1, pp. 111-125.
SAGART, Laurent (1993a). Chinese and Austronesian : evidence for a genetic relationship. *Journal of Chinese Linguistics* (Berkeley), vol. 21, no. 1, pp. 1-62.
—. (1993b). New views on Old Chinese phonology. *Diachronica* (Amsterdam), vol. X, no. 2, pp. 237-260.
—. (1994). Old Chinese and Proto-Austronesian evidence for Sino-Austronesian. *Oceanic Linguistics* (Honolulu), vol. 33, no. 2, pp. 271-308.
—. (1999). *The roots of Old Chinese*. Amsterdam : John Benjamins. (Amsterdam studies in the theory and history of linguistic science ; IV.184).
SCHUESSLER, Axel (1974). R and L in Archaic Chinese. *Journal of Chinese Linguistics* (Berkeley), vol. 2, no. 2, pp. 186-199.
YAKHONTOV, S. E. (1960). Consonant combinations in Archaic Chinese. 25th International Congress of Orientalists, Moscow, Oriental Literature Publishing House.