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On the Four Grades / Four Calls of Chinese Rime Tables

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1. *Introduction*

In the whole horizon of Chinese historical linguistics there is perhaps no greater controversy to be found anywhere than in the notion of Grades, also referred to as Divisions, Levels or Ranks. Their interpretation has puzzled both Chinese and foreign (Western, Japanese) scholars for a long time, and a real consensus has yet to be reached about how they should be interpreted. It is generally agreed that the notion of Grades was used to distinguish medieval Chinese syllables on the basis of the presence (or absence) of certain medial glides, albeit there is disagreement on which were the Grades that were distinguished by those glides and how they should be phonemically reconstructed. Some authors reconstruct palatal glides for Grades III and IV (Karlgren 1915–1926, Baxter 1992, Baxter and Sagart 2014), whereas others for Grades II and III (Zhèngzhāng 2003, Pān 2000). Still others contend that the four Grades were related to vowel warping (Schuessler, 2006: 83–96), to physical description of tongue heights as visually observed from outside the mouth (Chan, 2006: 37–46), or to a difference in register and degree of velarization (Ferlus, 2009). Given that there is no consensus about which explanation is more plausible and which should be rejected, the presence of two or more conflicting models creates a preposterous situation that corresponds more or less as if in physics caloric theory and thermodynamics or Ptolemy's law of refraction and Snell's law coexisted on equal terms. Whilst it is not denied that some of these possible theories about the interpretation of the nature of Grades are fascinating and perhaps even partially correct, it is also demonstrated that they are probably mistaken from an epistemological point of view. An alternative, more epistemologically-grounded theory is also offered in the remainder of this paper. However, before recapitulating the intellectual history of the notion of Grades, some technical notions of the Chinese rime tables must be explained in greater detail.

2. *The* Chinese Rime Tables and the Notion of 'děng' (Grade)

Chinese philologists had historically classified syllables in various phonetic dictionaries such as the *Qièyùn* (601 CE). The *Qièyùn* is a rime book (*yùnshū*) that groups sinograms into *yùn* or rimes, divided by tones. Within each tone, *viz*. level,

rising, departing and entering (or checked), several rimes are listed, which further categorize the sinograms by homophonous rimes. Within each rime, words are further divided into rime groups. The *Qièyùn* contains a total of 195 rimes, more or less equally distributed for the level (54), rising (52), departing (57) and entering (32) tones.[1]

Starting from the end of the tenth century more effort was done to further analyse and classify syllable structures. It is at this point that the first rime tables were created. The format of the rime tables is quite straightforward, and does not require a great interpretative effort. To put it in a nutshell, medieval Chinese syllables (*nota bene:* not words) are separated into tables based on certain similarities in their nucleus plus coda-sequences. Then, in each table syllables are grouped according to their initials or *shēngmŭ* (or simply *shēng*), their finals, and their tones. This arrangement of syllables into initials and rimes partially calques the binary analysis of syllables of an older lexicographic technique known as *fănqiè* spellings.[2] Initials are classified according to place of articulation, albeit a further classification that takes into account in an approximate way manner of articulation and some other phonetic properties is also contemplated by the traditional classification of the initials.

Place of articulation:

- *chúnyīn* 'labial sounds': labials, labiodentals;
- *shéyīn* 'lingual sounds': alveolar and retroflex (or alveolo-palatals, depending on the system); later included also *bàn shéyīn* 'half lingual' sounds;
- *chǐyīn* 'dental sounds': dentals, alveolars; later included *bàn chǐyīn* 'half dental' sounds;
- *yáyīn* 'large tooth sounds': velars;
- *hóuyīn* 'throat sounds': glottals, velars (laryngeals);

Phonetic properties/Manner of articulation:

- *qīng* 'clear': tenues; clear sounds include stops, affricates, and fricatives;
- *cìqīng* 'secondary clear': voiceless aspirated, they include stops and affricates;
- *zhuó* 'murky': voiced sounds, including stops, affricates, and fricatives;
- *cìzhuó* (or *qīngzhuó*) 'secondary murky': nasals, laterals, approximants;

Place of articulation	clear	secondary clear	murky	secondary murky

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[1] The numbers between parentheses refer to the number of occurrences of each tone.

[2] By *fănqiè* spellings it is generally meant a lexicographic technique used to indicate the pronunciation of a given sinogram by using two other sinograms, one containing an identical onset and one an identical final (including the tone). In English publications, they are occasionally referred to as 'formulas', but this is a misnomer. For the term 'formula' may give us the wrong impression that they were a concise and unambiguous way of conveying quantitative relationships symbolically. In fact, they were never devised by a single author but rather collected from various pre-existing philological works, and as such they contain several inconsistencies that clearly reflect different historical and perhaps even geographical layers.

chúnyīn	幫[p]	滂[pʰ]	並[b]	明[m]
	非[f]	敷[fʰ]	奉[v]	微[ɱ]
shéyīn	端[t]	透[tʰ]	定[d]	泥[n]
	知[ʈ]	徹[ʈʰ]	澄[ɖ]	娘[ɳ]
bàn shéyīn				來[l]
chǐyīn	精[ts], 心[s]	清[tsʰ]	從[dz], 邪[z]	
	照[tɕ], 審[ɕ]	穿[tɕʰ]	牀[dʑ], 禪[ʑ]	
bàn chǐyīn				日[ɲ]
yáyīn	見[k]	溪[kʰ]	群[g]	疑[ŋ]
hóuyīn	曉[x], 影[ʔ]		匣[ɣ]	喻[j]

Tbl 1. The five places of articulation traditionally distinguished by Chinese philologists, and their respective sets of late medieval Chinese initials. Karlgren (and Edkins) reconstructed the 知-row set of initials (third set of initials from top to bottom) as palatals. Here I followed the older convention, originally championed by Joshua Marshman (1809), Stanislas Julien (1861: 34–35), Zenone Volpicelli (1896: 16, 19, 37), and Ogawa Naoyoshi (1907), to reconstruct retroflexes (note that they correspond to stops in both Càijiā and Mǐn).

It is clear from the above scheme that traditional Chinese philologists chiefly classified syllables on the basis of place of articulation. Although they seemed to be aware of the notion of manner of articulation (occlusives, fricatives, affricates, nasals, etc.), they further classified sounds on the basis of certain phonetic parameters, such as aspiration, voicing, clearness, etc., albeit an implicit distinction along a cline which ranges from greatest to least stricture might also be observed. For instance, there seems to be a separation of obstruent sounds with blocked or partially blocked airflow from resonants, with slight turbulence or full unimpeded airflow. That Chinese philologists classified sounds on the basis of phonetic properties and not properly on the basis of manner of articulation, besides manner of articulation, is proved by the fact that they could not easily collocate rhotics such as the voiced retroflex approximant /ɻ/ (*rì* initial). Indeed, whilst this consonant may be characterized by a lowered F3, this class of sounds is difficult to specify from the phonetic standpoint, all the more without the help of a spectrogram.[3]

In rime tables, different types of finals are classified on the basis of *děng* (Grades). Early rime dictionaries such as the *Qièyùn* and the *Guǎngyùn* do not contain this methodology, and do not even employ the notion of 'Grades', which make their appearance in the *Yùnjìng* and in the *Qī'yīnlüè*, two rime tables that analysed earlier rime books and classified syllables therefrom into one of the four Grades. The criteria for the assignment of syllables into each Grade are not completely clear, but now most scholars believe that medieval Chinese finals with the same ending and similar nuclei

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[3] Most specialists reconstruct a palatalized nasal /ɲ/ for this initial. However, I utterly reject the widely diffused yet largely unfounded prescriptivist practice of assigning one and only phonemic value to all the *Qièyùn* categories, in spite of the fact that it is generally acknowledged that the *Qièyùn* itself was based on a *mixtum compositum* of various phonological systems from different geographic areas.

were arranged into four Grades on the basis of the presence of certain medials as well as on the quality of their main vowels (Baxter, 1992: 43ff).

Whilst it seems true that Grades assignments appear to be a reflection of the *fănqiè* spellings of rime dictionaries, the relationship between the four Grades of rime tables and the rimes of the *Qièyùn* is not without problems for obvious reasons, not last the huge historical discontinuity between the time of the *Qièyùn* and that of the earliest rime tables (no earlier than 1161). Therefore, it goes without saying that due to the accumulation of multiple sound changes, the original phonetic values of the *Qièyùn* rimes were no longer known to the compilers of rime tables.[4]

3. *The Phonetic Interpretation of Grades*

Qualified state-of-the-art accounts on the notion of four Grades can be found in Branner (2006), Coblin (2006) and Shen (2017) in English, and in Li Xinkui (1983) in Chinese. An early though still valuable general account is also available in a Japanese publication such as Mitsuta (1915: 10–12, 115ff).

Grades were originally observed by John Chalmers (1825–1899) who proposed to interpret them in phonetic terms, and argued that they were referred to vowel quality plus the presence of a semivocalic glide (Chalmers, 1873: 338)—a position which was reinforced by a study by Franz Kühnert in 1890. Some years later, Zenone Volpicelli (1896, 1898) proposed another solution. Finding abstractions based on rime tables unpersuasive, Volpicelli (1896) analysed an impressive number of dialectal forms, and proposed a reconstruction based on a sort of 'comparative method'. He interpreted the phonetic value of the four Grades in terms of vowel height alone, suggesting that each Grade corresponded to a different main vowel. His reconstruction was very similar to Cantonese, except for the fact that in Cantonese /i/ and /e/ (Volpicelli's Grades III and IV) have merged. Of course this theory was quite speculative, but he also tried to offer an explanation to its anomalies. For instance,

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[4] So far as I know, several inconsistencies between rime books (e.g., *Qièyùn* and *Guăngyùn*) and rime tables (e.g., *Yùnjìng*) arise with the finals associated to the so called laryngeal initials. Just to make a concrete example, the word *xióng* 雄 'male' is a well-known example of such inconsistency. According to the *Guăngyùn*, the initial of this word should belong to the *yù-sān* 喻三 class (Grade III), together with *róng* 融 'melt' and *róng* 肜 'slap', all three belonging to *dōng* rimes. However, the *Yùnjìng* places *xióng* under *yù-sì* 喻四 initials (Grade IV), *róng* 'melt' under *yù-sān* 喻三 initials, and *róng* 'slap' under *xiá-sān* 匣三 initials. In fact, based on modern day reflexes, I suspect that the initial of *xióng* should also belong to *xiá* initials /ɣ/. As we can see, the *Guăngyùn* recognizes only two syllables, whereas the *Yùnjìng* splits them into three. This might well be due to sound change, but it is not the only plausible explanation. In fact, the entire edifice of rime books and rime tables seems artificial, and the number of medieval Chinese syllables (around 3847, according to the *Guăngyùn*) is disproportionally larger than that of any other received variety of Sinitic. The problem is that, like Old Chinese, medieval Chinese too refers to a historical stage of development of an unclear variety of Chinese that lasts hundred of years. It is unthinkable that during this time span syllable mergers and splits did not occur, or that some regional varieties that rime tables incorporated into their meta-system did not go extinct, or that new varieties that the older rime tables did not mention (because they did not exist yet) arouse at a later stage. We do not know how real medieval Chinese sounded, and how many syllables it contained; what we call medieval or Middle Chinese is in fact the artificial medieval Chinese that we know from the phonological meta-system of rime tables. Whilst it may be true that the phonological system of 'real medieval Chinese' might be reflected in the all-encompassing phonological system of rime tables, and that real medieval Chinese and its tabular reflection may have partly moved along parallel lines, this superficial and extrinsic kind of parallelism is of no real interest to the linguist, except in so far as the sound classes or the sound changes recorded by the rime tables incidentally throw light on the formal trends of the real Sinitic languages, and act as a device to broaden our horizon. But, again, we should not make the fatal mistake of identifying a language (real medieval Chinese) with its tabular reflection.

according to his theory, the main vowel of Grade IV rimes in the first termination (*shè*) should have been *e, yet *i was instead found in the majority of cases. Volpicelli (1896: 24) explained that *-ia*, *-iau* and *-ie* were derived respectively from *-a, *-au and *-e, with *e being the vowel represented in the majority of the forms he had analysed. One year later, however, Simon Hartwich Schaank (1897-1902) revitalized the palatal glide theory of Chalmers and especially Kühnert. Schaank envisioned two forms of palatalization, mostly as they were found in the Lùfēng dialect spoken by an oversea community of Hakka speakers in Indonesia, one in the initial and one in the final. He also argued that the four Grades indicated different forms of medial glides before the same vowel.

The great Swedish sinologist Bernhard Karlgren (1915–1926) favoured a theory which lay between Volpicelli's and Schaank's proposals, namely that the four Grades represented both a quality in the front-back dimension of different vowels *and* the presence (or absence) of at least two (but originally no less than five) forms of palatalization. Karlgren's theory was of course revised and corrected, most notably by Chao Yuen-ren (1892–1982) and Arisaka Hideyo (1908–1952), but it still continues to enjoy a widespread acceptance among specialists, albeit in an improved form.

An extensive treatment of medieval Chinese Grades can be found in Baxter's 1992 monograph on Old Chinese. Whilst this author has changed his ideas on several aspects of Old Chinese, this monograph still remains a milestone of Chinese historical phonology. Baxter (1992: chapt. 7) has shown that, contrary to what Karlgren believed, there was no "strong vocalic" medial *-i- (for Grades III rimes) contrasting with medial *-j- (for Grades IV rimes). He argued, instead, that Grade I finals can be identified by the presence of back vowels *-a-*, *-o-*, and *-u-* without a preceding palatal glide; Grade II finals can be identified by the presence of front vowels *-æ-*, and *-ɛ-*, without preceding glides. They only occur with labial, velar, "laryngeal", and retroflex obstruents; Grade III rimes are the palatalized finals; Grade IV finals all have the main vowel *-e-* not preceded by palatalization. Although Baxter's treatment of Grades is far more refined than that of any other work before (and perhaps even after), there are still certain aspects of it which are not immune from potential flaws. For instance, Baxter (1992: 278) had to assume the presence of a contrast between medieval Chinese *-jen* and *-jien* finals, in spite of the fact that sequences such as [ji] are not found in Sinitic languages and are typologically widely disfavoured in phonological systems due to lack of perceptual difference between the two segments. Baxter himself (1992: 282) had to admit that *chóngniǔ* distinctions, including the one mentioned above, have left no traces in living Sinitic languages, and as such in his system they are not intended as a serious synchronic analysis.

Other scholars (cf. Pān 2000; Shěn 2020: 20, 39) have gone even farther, postulating not only a [-ji]-type sequence (for so called *qíchǐ* finals) but even the existence of tautosyllabic clusters such as [ɰj] (cf. Tab. 1), which are not observed cross-linguistically due to phonetically-motivated restrictions against the co-occurrence of two conflicting phonetic features.

medials	*kāikǒu*	*hékǒu*	*sìhū* (four calls)
Grade I	-Ø-	-w-	*kāi* -Ø-
Grade II	-ɰ-	-wɰ-	*qí* -j-
Grade III	-j-, -ɰj-	-wj-, -wɰj-	*hé* -w-
Grade IV	-Ø-	-w-	*cuō* -ɥ-

Tbl. 2. The medial system of medieval Chinese and the 'four calls'. Redrawn with minor revisions from Shěn (2020: 39). By 'four calls' it is intended a classification for finals in Mandarin phonology. The system visibly calques the structure of the 'four Grades', and indeed the 'four calls' seem to be the Mandarin equivalent of the medieval Chinese 'four Grades' (see below for more details).

A different interpretation was proposed by Abraham Chan (2006), and posits that the four Grades refer to the *physical* tongue heights of vowels as visually observed from outside the mouth. Chan's theory has the additional advantage of solving a puzzling problem related to palatalization in Sino-Vietnamese, and may also explain the absence of Grade II rimes in the 'inner' tables. Although I do not agree with this author's conclusions,[5] it is also felt that the hypothesis that the Grades of rime tables were somehow related to a sort of articulatory phonetics may not be on the wrong track.

Another hypothesis regarding the four Grades claim that they began as mere descriptions of vowel quality gradations, but that after Northern Chinese came into contact with the Altaic languages spoken by their northern neighbours, the main vowel of Grade III finals was re-analysed, and came to incorporate the main vowel of Grade II rimes plus a novel palatal glide (Li, 2006).

Another prominent viewpoint is the one proposed by Ferlus (2009), which edges between the palatalization viewpoint and an aerodynamic approach. While it is recognized that this approach is certainly stimulating and worthy of attention, there are some aspects of it that may warrant a more elaborated discussion before it can be accepted. For Ferlus's explanation of Grades implies that they were created to capture the phonetic parameters of tenseness, breathiness and velarization, albeit we do not have evidence that early compilers of rime dictionaries were aware of such phonetic properties. Furthermore, we are forced to accept the fact that "Chinese analysts were linguists avant la lettre", as well as "the first to describe a voice type register language" (p. 210) without the aid of tools, machines, spectrograms, etc., and without even possessing an adequate vocabulary to indicate such notions. With all due respect to Ferlus, a competent scholar in his own right, the implications of his theory are hardly acceptable. Therefore, although the merits of his theory must certainly be acknowledged (e.g., the distribution of *Qièyùn* rimes in three classes, in Norman,

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[5] Without lateral x-ray cineradiograph tracings, or MRI technologies it is hardly understandable how Chinese philologist could theorize an embryonic form of factor-analysed tongue shapes. Descriptions of tongue shapes in vocalic phonemes have normally relied on a mathematical and geometrical knowledge which Chinese philologists could never have possessed at that time. For instance, Liljencrants (1971) has shown that a curve representing the shape of the tongue can be described in terms of its Fourier components, and that it is also possible to describe the profile of the tongue in terms of magnitude and phase of a fundamental frequency by means of a partly Cartesian and partly polar coordinate system.

1994, fashion, is a workable hypothesis), and although his view which posits that the voiced *vs* voiceless opposition was derived from a prior tense *vs* lax distinction is extremely stimulating,[6] the evidence in favour of this theory is still too fragmentary and circumstantial.

4. *The descriptions of Grades in Chinese philological sources*

The present writer is afraid that the structural-segmental explanation of the four Grades represents more a fabrication of nineteenth/twentieth centuries Sinological linguistics than a real fact. This is not to imply that medial glides are not found across Sinitic languages in many words which were traditionally assigned to Grade III rimes (albeit not in the mechanic way predicated by this approach). The core of the present paragraph is a discussion about how the Grades were understood by Chinese classical scholarship (i.e. labels for indicating degrees of stricture), and not about what was their nature.

Nevertheless, the reader should be alerted to the historical discontinuity which elapses between the appearance of Grades and their interpretation by *xiǎoxué* (small learning) scholars. I do not believe that the pronunciation of the varieties of Sinitic spoken in the seventeenth through nineteenth centuries can somehow shed light on that of several centuries ago. This must be clarified at the outset, because, in contradistinction to the intricate Indic influenced syllable initial nomenclature of the rime books, there are no statements in the oldest rime tables indicating how the Grades were intended to represent specific sounds, nor there is any indication about their pronunciation. This, however, does not invalidate the point elaborated below, which argues that the Grades were mostly perceived to represent the degrees of stricture of the speech organs, with progressive narrowing of the articulatory aperture, from wide and open to narrow and close.

First of all, we must start from the etymology of *děng* (rank, level or grades). It is not very clear why Chinese philologists assigned a name that somehow recalls the idea of a graduation if they were supposed to indicate mostly the presence of vocoid approximants. All the more, as it seems to have existed a long tradition of assigning names to linguistic concepts that clearly recall their physical properties. For instance, it is self-evident that concepts such as *kāikǒu* (lit. 'open mouth', clearly denoting a position where the lips are far apart and unrounded) and *hékǒu* (lit. 'gathered mouth'), or *hóng-xì* 'wide, narrow [aperture]', by definition, are descriptive terms which indicate the way a sound class should have been pronounced. This dichotomy between *kāikǒu* and *hékǒu*, which is commonly interpreted as indicating the absence or presence of *-w- or simply the feature of labialization, was in fact used to indicate the

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[6] By the way, Ferlus (2009: 195) is probably mistaken when he affirms that the term *zhuó* 'murky' indicated the phonetic feature of 'breathy' in addition to 'voicing' (which instead was normally indicated by the *nù shēng* 'lit. angry sounds'), and Pulleyblank was not necessarily mistaken when he thought that this term meant an acoustic quality other than 'voiced'. Indeed, the *qīng zhuó* distinction appeared first in early Chinese musicology, where notes were often described as being *qīng* (clear) or *zhuó* (murky). It is not very clear what these two terms meant when referred to musicology, and no universally accepted solution has weathered the years free from difficulties. Scholars have proposed a panoply of theories, ranging from high notes and low notes to tonic and flattened tones, from notes played on an open string or stopped notes to notes in tempered or untempered scales.

position of the lips when articulating a sound, as a lesser-known statement by Jiāng Yǒng (1863: 18) makes abundantly clear. Jiāng was a philologist, astronomer and mathematician of Qing epoch. He is better known for his contribution to the study of early Chinese finals, which he arranged into a total of thirteen rime categories (against, e.g., the only ten recognised by Gù Yánwǔ).[7] Regarding the 'open' 'gathered' distinction, Jiāng wrote:

音呼有開口、合口；合口者吻聚；開口者吻不聚也

Sounds and calls distinguish between open mouth and gathered mouth; in gathered mouth sounds the lips are sticking together; in open mouth sounds the lips get loose.

Of course, when we pronounce a phoneme with the lips rounded, we obtain a labialized sound (albeit, from an articulatory point of view, labialization is often accompanied also by a raising of the back of the tongue), and thus we may think that what the term *hékǒu* indicated was the presence of a labial glide *-w-, while in fact it was only a practical label for instructing the readers of rime tables that the sound in question was or should have been pronounced with the lips rounded. We may also mention another interesting dichotomy between 'inner' (*nèiyán*) and 'outer' (*wàiyán*) sounds. Zhōu Zǔmó (1957) has pointed out that the *nèi/wàiyán* dichotomy indicated the same dyad as *hóng-xì*. More precisely, he indicated that Grades I and II were glossed as 'inner' and 'wide', whereas Grades III and IV, those which according to my opinion are pronounced with a narrower aperture of the mouth, were glossed as 'outer' and 'narrow'. Furthermore, 'narrow' sounds were also called *jíyán* 'fast speech', or were described as being *jíqìzhě* (fast-breathed), whereas 'wide' sounds were called *xúyán* 'slow speech' or *huánqìzhě* (moderate-breathed). These 'fast-breathed sounds' are often described as *bìkǒuyán* (speech pronounced with closed mouth), which may either refer to a narrowness of the oral closure or to the fact that the place of articulation was in the throat (hence "outside" the mouth).

Partly in accordance with Indian phonetics, Chinese historical phonology also based the description of the sound classes of rime tables on the articulation involved in their production. Later, they assessed and categorised those sound classes according to proto-phonetic criteria which bear strong similarities with the modern notions of 'place of articulation' and 'degree of articulatory stricture'. As it is demonstrated below, many notions contained in various rime tables and other related philological works are explicit indications of how the sound classes in question were intended to be pronounced. In the Ming–Qing period (1368–1912), the distribution of Grades became quite similar to the 'four calls' (*sìhū*), and they practically overlap (Pān & Zhāng, 2015: 86). For instance, Lán Mào (1397–1476), in his *Yùnlüè yìtōng* (*Intelligible outline of rimes*, 1442), distributed early Mandarin rimes into four different categories, *viz. kāikǒu* (open mouth), *héchún* (gathered lips), *lòuchǐ* (exposed teeth), and *yǐnchǐ* (hidden teeth). Contrary to common belief, palatal or labial glides

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[7] For a comprehensive evaluation of Jiāng Yǒng's contribution to historical phonology, see Wáng Lì (1990: 313–347).

had nothing to do with this distribution of rimes, as it is clear from the names stitched to these labels that it was a quaternary classification of rimes based on the degree of aperture of the mouth, all the more as at least one of these "four calls" is thought to have indicated the absence of glides.

Another work that moved in a similar direction is the *Qīngjiāo zázhù* (*Compilation from Qīngjiāo*, 1581) by Sāng Shàoliáng (fl. 1543–1581). This work provides an impressive and very detailed analysis of the syllable, which is described in terms of *bù* (group or unit), *kē* (section, seems to be an alternative name for Grade), *wèi* (place, referred to the place of articulation of the initials),[8] *pǐn* (quality, corresponding to phonetic properties and/or manner of articulation of the initials),[9] and *jí* (class, corresponding to tones). Sāng's classified rimes based on four Grades, such as *zhòng* (heavy), *cì zhòng* (secondary heavy), *qīng* (light), and *jí qīng* (extremely light). It has been argued that they corresponded respectively to four different medials, viz. *u, *y, *ø (before *a or *e), and *i (Simmons, 2016: 262–263), but this does not seem to be the most plausible interpretation. For they are explicitly related to the concept of *qīng* (light) and *zhòng* (heavy), two impressionistic labels that roughly indicated the degree of frontness of a given rime, with 'light' being used to indicate that the tongue position was front, and 'heavy' being used to indicate it was back (Pān & Zhāng, 2015: 84).[10]

Another arrangement of finals based on categories that recall degrees of stricture and/or other articulatory details is the one made by Yè Bǐngjìng (1605), who classified rimes into 'four branches' (*sì pài*). He explicitly conceived early Mandarin finals as being distinguished by certain articulatory details such as "coarseness", "narrowness", "fullness", "roundness", and "sharpness". Yè's classification of finals was as follows:

(i) First branch (practically corresponding to Grade I) was *cū ér mǎn* (coarse and full);
(ii) Second branch (Grade II) was *xì ér jiān* (narrow and sharp, or fine and sharp);
(iii) Third branch (Grade III) was *yuán ér mǎn* (round and full);
(iv) Fourth branch (Grade IV) was *yuán ér jiān* (round and sharp);

Like Sāng's classification of rimes, which puts two different degrees of frontness in contrast with two different degrees of backness, more than a scale from the first to the fourth branch, Yè's arrangement of finals seems to reflect a double dyad between Grades I and II from one side (one being coarse, the other being narrow), and Grades

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[8] They are as follows: *gōnghóu* (glottal), *wéishé* (linguals, for dentalveolar stops), *jiǎo'è* (palatal, for retroflexes), *shāngchǐ* (large dentals, for dental sibilants), and *yǔchún* (labials). It is self-evident that Sāng's distribution of initials according to five places of articulation was still imbued with traditional musicology. For *gōng*, *wéi*, *jiǎo*, and *shāng* are the traditional names assigned to the *wǔ yīn* or 'five notes' of Chinese musicology. They roughly correspond respectively to do, re, mi, fa, and sol.
[9] They are as follows: *qǐ* (open) for tenuis, *chéng* (inherit, bear) for voiceless aspirated, *jìn* (advance, enter) for resonants, *yǎn* (evolve, perform) for "weak fricatives" such as /f/, and *zhǐ* (stop) for laterals. Sāng's terminology is obscure, and not in line with the general trend of assigning names that clearly evoke the physical properties of sounds.
[10] In fact, they have no less than six different meanings, but due to space reasons they are not discussed here.

III and IV from the other (both being round, but one being full, and the other being sharp).

A very interesting—albeit somewhat idiosyncratic—classification of late-Ming Mandarin rimes is the one made by Qiáo Zhōnghé (1611). He was one of the first scholars to label each rime group *hū* (call), and divided them on the basis of *kāi* (open) and *hé* (gathered) in *Yùnjìng* fashion, to which he also added four further categories, all being related to the suprasegmental features of the rimes. First, he distinguished between *lǜ* (melody), a term probably indicating 'contour tone', and *lǚ* (note), by which it was probably intended 'pitch'. Second, he also arranged rimes on the basis of "hardness" or *gāng*, and "softness" or *róu*. Qiáo's arrangement of rimes into four calls was as follows:

(i) *kāi zhī kāi hū* (open of the open call), roughly corresponding to Grade I rimes, which he also called "hard tone" (*gāng lǜ*) finals;

(ii) *kāi zhī hé hū* (open of the gathered call), which he also defined as possessing a *gāng lǚ* or "hard pitch";

(iii) *hé zhī kāi hū* (gathered of the open call), which were characterized by the presence of a "soft tone" (*róu lǜ*);

(iv) *hé zhī hé hū* (gathered of the gathered call), which were instead characterized by the presence of a "soft pitch" (*róu lǚ*);

A more explicit classification of rimes along the grid of the four calls was made by Pú Yǐnzǐ in his *Shīcí tōngyùn* (Comprehending the rimes of poetries and verses), a work completed in 1685. He described the four calls in articulatory terms giving a fairly accurate description of their physical articulation. He described the four calls in the following way:

(i) 開口呼，舒頰引喉，音疏以達

[When pronouncing] open-mouthed calls, open up/extend your cheeks and   stretch your throat, the sound [will] disperse in order to reach;

(ii) 合口呼，聚唇開吻，音深以宏

[When pronouncing] gathered calls, gather the lips and leave the embouchure open, the sound is profound and wide (or profound in order to be long-lasting);

(iii) 齊齒呼，交牙戛齒，音窒以斂

[When pronouncing] teeth-aligned calls, cross the large tooth and tap the incisors, the sound is constrained in order to be restrained/contracted;

(iv) 撮口呼，斂頤蹙唇，音奄而藏

[When pronouncing] calls with a puckered mouth, restrain the jaw and narrow/contract the lips, the sound is feeble and hidden.

Although these works contain descriptions and terminologies that are not always easy to interpret, we may affirm, not without a dose of caution, that far from being explicitly related to the presence or absence of vocoid approximants in medial position, the four calls/four Grades were conceived as indicators of manner of articulation and/or degrees of stricture of the articulatory organs. Other works from the Qing period (1636–1912) were even explicit about this relationship. For instance, one of the first associations between the four Grades and narrowness was made by Lǚ Wéiqí (1587–1641), a late Ming scholar of the late sixteenth and early seventeenth centuries. In 1633, Lǚ Wéiqí (2002 [1633]: 8) wrote that

一二等聲粗而洪，三四等聲細而斂

The sounds of Grades I and II are thick and wide, those of Grades III and IV are thin and constrained.

A more explicit indication, however, is given in a work written at the beginning of the eighteenth century by Pān Lěi (1646–1708), a renowned scholar from Qing dynasty who wrote the prefaces of several influential works on philology:

音之由中達外。在牙腭間則為開口；歷舌端則為齊齒；畜於頤中，則為合口；聚於唇端，則為撮口

The sound reaches the outside from the centre [of the mouth]. In the velar tract it is wide and open; in the blade of the tongue it is *qíchǐ* [lit. 'tooth-aligned']; constrained in the middle of the chin it is gathered [i.e. rounded]; gathered in the lips it is *cuōkǒu* [lit. 'puckered']. Pān Lěi (p. 5).

Pān Lěi related the four calls/Grades (the two concepts clearly overlap in his description, and in those of the scholars from this period) to two of the five places of articulation traditionally known to Chinese scholars. Indeed from the statements above, it emerges clearly that they were supposed to indicate a progressive narrowing of the lips or of the interior cavity of the mouth (or both), and not the presence of some segmental feature.

Something similar was notoriously expressed also by Jiāng Yǒng (1681–1762). Jiāng also seemed to favour the idea that there must have been some kind of physical relationship between the four Grades and the progressive narrowing of the oral closure:

一等洪大，二等次大，三四皆細，而四尤細

Grade I is the widest, Grade II is less wide, Grades III and IV are narrow, with Grade IV being the narrowest. Jiāng (1863: 18).

More useful to our case are the remarks of Xià Xiè (1800–1875), a Qing civil servant, historian and scholar. His work on phonology was published in 1855, and contains many remarkable discussions on several topics of Chinese historical phonology. In the seventh roll, we find two precious pieces of information about the four Grades and their relationship both with the notion of *hóng-xì* 'wideness and narrowness' and with the *wǔyīn*, or 'five places of articulation.'

音之洪細，謂之等

The wideness and narrowness of sounds, this is [what it is] called Grade. (Xià Xiè, 1920 [1855]: 5)

牙喉二音，四等皆具。而細審之，牙之一等洪於喉之一等，喉之四等細於牙之四等。舌頭、齒頭有一等、四等，而舌上、正齒僅得二、三兩等。又細審之，則舌上、正齒之三等，仍細於舌頭，齒頭之四等。故牙與喉對，則牙洪而喉細；舌頭與舌上對，則舌頭洪而舌上細也；齒頭與正齒對，則齒頭洪而正齒細也；重唇與輕唇對，則重唇洪而輕唇細也。此五音之大洪大細

Both velars and gutturals have four grades. By carefully examining them, [we can see that] Grade I velars are wider than Grade I gutturals, whereas Grade IV gutturals are sharper than Grade IV velars. Both alveolars and dentals have Grades I and IV, whereas alveolo-palatals and palatals have Grade II and III. By looking carefully at them, again [we can observe that] Grade III alveolo-palatals and palatals are sharper than Grade IV alveolars and dentals. Hence, by comparing velars and gutturals, velars are wide, whereas gutturals are sharp; if alveolars are compared with alveolo-palatals, alveolars are wide, whereas alveolo-palatals are sharp; if dentals and palatals are compared, dentals are wide whilst palatals are sharp. If bilabials are compared with labiodentals, bilabials are wide whilst labiodentals are sharp. This is called the wideness and sharpness of the five sounds (1920 [1855]: 10–11).

This, again, seems to confirm that many notions which appear in the traditional rime tables were understood according to their articulatory properties, and not in a segmental way.

5. *The Plausibility of the Stricture Interpretation*

As argued in the previous sections, traditional Chinese phonologists classified sounds mostly on the basis of articulation and phonation. Articulation was concerned with the contribution made by the organs along the phonatory apparatus to shaping the airflow in ways that were acoustically different. The five (later seven) places of articulation were distributed along a longitudinal dimension, which intuitively represents the location of articulation at any point from the lips to the larynx. Phonation was instead concerned with the generation of acoustic energy, such as, e.g., aspiration, voicing, etc. Based on the available philological evidence, and in accordance with other epistemological observations, it has been suggested that Chinese scholars from the seventeenth century to the late nineteenth century interpreted the four Grades (and the four calls) as being related to the degree of opening of the speech organs (degree of stricture). By observing the linguistic facts, there are several aspects that seem to corroborate the philological evidence.

Yùnjìng rime class	Qièyùn rime class	Grade	rounding	Pulleyblank		Baxter	Chan	
				EMC	LMC		Jīnlíng	Luòyáng
	寒	I	open	an	an	an	ɑn	ɐn
	桓	I	closed	wan	uan	wan	wɑn	wɐn
	刪	II	open	aɨn	aːn, jaːn	æn	æn	ɛn

山 (outer)	刪	II	closed	waɨn	waːn	wæn	wæn	wɛn
	山	II	open	əɨn	aːn, jaːn	ɛn	ɛn	ɛn
	山	II	closed	wəɨn	waːn	wɛn	wɛn	wɛn
	仙	III/3	open	ian	ian	jen	en	en
	仙	III/4	open	jian	jian	jien	jen	jen
	仙	III/3	closed	wian	ian	jwen	wen	wen
	仙	III/4	closed	jwian	yan	jwien	wjen	wjen
	元	III-ind	open	ɨan	jian, ian	jon	øn	øn
	元	III-ind	closed	uan	jyan	jwon	wøn	wøn
	先	IV	open	ɛn	jian, ian	en	ɪn	ɪn
	先	IV	closed	wɛn	jyan	wen	wɪn	wɪn

Tbl. 3. Medieval Chinese dental finals (*shān* 山 rime group, outer rimes).

From the table above it can be seen that most authors agree that the vowel quality of the reconstructed nuclei varies from "wide vowels" (Grade I) to "less wide" (Grade II), to "close vowels" to yet "closer vowels". Sometimes, the reconstructed main vowel for Grades III and IV rimes is the same, as in Baxter (1992), where the only difference is between the presence of a palatal segment. However, in Chan's (2006) narrower reconstruction, the near-close near-front unrounded vowel /ɪ/, that clearly has a narrower constriction, is reconstructed only for Grade IV rimes. Nearly the same can be said for rimes ending with a labiovelar coda:

Yùnjìng rime class	Qièyùn rime class	Grade	rounding	Pulleyblank		Baxter	Chan	
				E MC	L MC		Jīnlíng	Luòyáng
效	豪	I	open	aw	(u)aw	aw	ɑw	ɐw
	肴	II	open	aɨw	aːw, jaːw	æn	ɛw	ɛw
	宵	III/3	open	iaw	iaw	jew	ew	ew
	宵	III/4	open	jiaw	jiaw	jiew	jew	jew

蕭	IV	open	ɛw	jiaw, iaw	ew	ɪw	ɪw

Tbl. 4. Medieval Chinese finals with a labiovelar glide coda (*xiào* 效 rime group, outer).

Again, as we can see, there is a clear progressive narrowing of the articulatory organs associated to the four Grades. This solution would also solve the problem of *chóngniǔ* finals in Grade III rimes. If we follow the standard reconstruction, we are forced to admit the presence of a *-j- vs *-ji- contrast which is phonologically disfavoured in phonemic systems. Even if we follow reconstructing systems that do not postulate this type of contrast, such as, e.g., Zhèngzhāng (2003), we find ourselves in the same *cul de sac*, as we are forced to accept a contrast between *ɣau* (Grade II), *ɣiɛu* (Grade III), and *iɛu* (Grade IV) that can hardly be described with the acoustic-articulatory attributes observed among the Sinitic languages. Chan's solution appears to be more practicable, as it postulates a difference between *-ew* (Grade III/3) and *-jew* (Grade III/4), with the palatal glide *-j-* which reduces the widening of the phonatory apparatus (hence, making it more similar to Grade IV rimes). Note also that there are finals (e.g., *gěng* 梗) which do not include Grade I and that, as such, are never reconstructed with the main vowel /a/, the widest one. Similarly, there are cases where there is not Grade IV in certain finals (e.g., *tōng* 通), and indeed these finals are not thought to have possessed a vowel /i/ (the narrowest one) as their nuclei.

Of course, exceptions to this general trend are also found. For instance, there are cases where to a Grade I correspond finals with the following endings: *-uwŋ*, or *-oŋ*, which would not exactly correspond to our understanding of "wide opening" of the articulatory organs, but they are quite rare, mostly occurring within the inner group of finals ending with velar codas, and above all they might be derived from EMC *-əwŋ*, or *-awŋ*) (cf. Pulleyblank, 1984). Furthermore, given that the concept of "degree of narrowing" is rather vague and subjective, and that traditional Chinese scholars could only rely on their own proprioceptive assessment, it would be more surprising if no controversy at all existed.

To conclude, whilst I may agree on the fact that the Grades were originally conceived as a compact way to represent all the phonological contrasts of medieval Chinese while taking complementary distributions between onsets and rimes into account (this, however, would leave the distinction between Grade I and IV rimes partly unexplained), it seems that, at a later stage, they were instead regarded as indicators of the degrees of stricture of the phonatory apparatus. Of course, concepts such as 'stricture' or 'constriction' are quite vague, as they might involve (i) 'constriction location' (normally divided into four areas of the mouth, viz. palatal, palatovelar, pharyngovelar and low pharyngeal); (ii) 'degree of narrowing' (/a, ɛ/, and also /ɐ, æ/) have normally wider constrictions, whereas /i, u, o/ have narrower constrictions; (iii) 'mouth opening' (e.g., /a, ɑ/ have wide openings, whereas the openings of /æ, ɛ, ɔ/ are less wide, but stil wider than that of /i, u/); (iv) 'lip rounding'

(e.g., /o, u/ are rounded).[11] In other words, it seems that *xiǎoxué* scholars classified sounds mostly according to the parameters of 'constriction', intended as the narrowing of the vocal tract at some point of the articulatory process, and of 'degree of stricture', by which it is intended the extent to which the vocal tract is obstructed during an articulation. Nevertheless, it is probable that these two concepts were not applied to the main vowel of a given final, but to the whole rime.

6. *Conclusions*

All the evidence cited in the previous section seems to suggest that the segmental interpretation of the four Grades, though perhaps not wrong per se, is more likely to be a scholastic artefact as well as a Western allopathization of traditional Chinese historical phonology. First, it implies that Chinese philologists were not only aware of the distinction between vowels and consonants (let alone semivowels), but that they even possessed the refined and segmental linguistic knowledge of our time. In fact, it is not merely possible but very probable that traditional scholars lacked the notion of vowels and consonants. The disposition of medieval Chinese initials clearly recalls the scheme of the Siddhaṃ script which, nonetheless, was a medieval Brahmic abugida, which by definition is not properly an alphabet but a segmental writing system that takes as unit both vowels and consonant-vowel sequences. Indeed, the first Chinese translations of 'vowel' and 'consonant' appeared only recently, more precisely in Lobscheid's *English and Chinese Dictionary* (1866: 479, 1107). For instance, Peter Ladefoged (1925–2006), one of the most eminent phoneticians of his time, believed it a plain myth that the breakdown of syllables into smaller units such as vowels and consonants is a natural one that has occurred in every world's linguistic tradition (Ladefoged & Disner, 2012: 189–190). Second, the segmental interpretation of Grades requires a whole lot of special pleading. For the reconstruction of vocoid approximants in medial position creates contrasts that not only cannot be explained with the articulatory-acoustic attributes drawn from living Sinitic languages, but also creates contrasts that are not observed cross-linguistically. Just to make a concrete example, when explaining the concept of *chóngniǔ*, Shěn Zhōngwěi (2020: 37) believes that the difference between *yāo* 邀 and *yāo* 妖 must be found in their medial, the former being *ʔjɛw*, and the latter *ʔɥjɛw*. This *-j-* vs *-ɥj-* contrast is certainly mistaken from a phonological point of view (and even from a phonetic one, since it requires the co-occurrence of two conflicting phonetic features).

Contrary to what might seem, the present paper does not argue that all the interpretations hitherto given of the four Grades are wrong. Much to the contrary, it contends that they may well be all correct. The difference between the various interpretations is simply explained by the fact that scholars used different methods and analysed the problem from different perspectives. In fact, Volpicelli was probably correct in saying that Grade III rimes had no palatal glides, because he mostly relied on Cantonese materials, where these specific glides have mostly disappeared. On the other hand, Schaank was also probably correct in saying that Grade III rimes were

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[11] See Wood (1975, 1979) for more details.

palatalized, because he observed palatalization in the Lùfēng Hakka dialect he was familiar with. Note that claiming that the four Grades were mostly conceived as indicators of the degrees of stricture of the speech organs is not at odds with the segmental approach.

Without delving into the murky waters of the nonsensical East-West debate, it is suspected that Westerners have partly forgotten their own linguistic traditions. As a result, when they encounter Chinese historical phonology, with its *yīn-yáng* dichotomies, its focus on graduations (e.g., the *děng*), and its interplay of philosophical, musical and physical elements, they imagine something mysteriously colourful and utterly different. Contrariwise, the system of belief underpinning the Chinese linguistic tradition is remarkably close to linguistic concepts long held in the Indian (and perhaps also Muslim) as well as in the European traditions. Phonetic categories were either articulatorily or perceptually (i.e., acoustically) based in almost any pre-modern linguistic traditions of the world, with the difference that in some parts of the world phonetics was in conjunction with certain aspects of morphophonemics, whereas in China it was mostly related to lexicography, since the Chinese language had a fairly simple morphological system. Nevertheless, the principles underpinning the phonetic descriptions of sound classes/segments were fairly close to each other. Chinese distinguished between 'clear', 'secondary clear', 'murky', and so on, just like the Ancient Greeks distinguished between φωνήεντα (voiced, referred to vowels; the complete expression was τὰ φωνήεντα γράμματα), ἡμίφωνα (half-voiced, referred to liquids and other related consonants), and ἄφωνα (voiceless, or also ἄφθογγα), Old Syrian grammarians distinguished between *qalaniyātā* (voiced), *lā qalaniyātā* (voiceless, referred to consonants), whereas an old Arabic theory distinguished between *muṣawwit* (voiced, referred to fricatives), and *'aḫras* (voiceless, referred to plosives) (Talmon, 2000: 250). Similarly, in the Sanskrit linguistic tradition there is a similar classifications of segments. In a prescriptive passage of the *Chāndogya Upaniṣad*, a text compiled between the 8th and the 6th centuries BCE, we are presented with a distinction between vowels and certain types of "consonants" with some indicative explanations of how they should have been pronounced. According to the *Chāndogya Upaniṣad*, *svara-* (vowels) were pronounced with *ghoṣa-* (resonance), whereas *ūṣman-* (lit. 'aspiration-sounds', referred to sibilants) should be pronounced "open" and not "constricted" (does it sound familiar?). On the other hand, *sparśa-* (lit. 'contact sounds', stops) should be pronounced as if they were slightly incomplete. Later Indic sources also distinguished 'semivowels' (*antaḥsthā-*), albeit it is not clear whether they were analytically understood, and whether they were clearly differentiated from vowels.

All this evidence clearly indicates that segments were classified chiefly on the basis of place of articulation, and that further indications about their pronunciation were stitched up to them on the basis of auditory and proprioceptive evaluations. Articulatory effort and increased or decreased (sub-)glottal activity were also taken into consideration. It is not surprising that the Chinese used the term *zhòng* (heavy) for bilabial stops, whereas they called labial and labiodental fricatives *qīng* (light). In

Europe, sounds articulated in a manner that involved more energetic tensing of the articulatory organs were traditionally called *fortis*; on the other hand, in many philological treatises we occasionally find the term *levis* (from Latin, 'light') as an antonym of *fortis*. For example, Spanish *fortis* /b d g/ became *levis* (i.e., [β ð ɣ]) when realized intervocalically. In early European treatises on language we can also find several impressionistic labels, such as 'dark' and 'clear' (or 'bright'). The former was normally applied to back vowels, such as [u] applied, while the latter was applied to front, acute and unrounded vowels, such as [i] or [e]. For instance, in Germanic philology, the fronting of back vowels, like, e.g., Old English dæġ (< proto-West Germanic *dag) was occasionally referred to as 'brightening'. The Chinese had improperly used the term *hóuyīn* to indicate any sound produced in the back of the mouth, including glottals and velars, but so did many European treatises which assigned "laryngeals" (velars, uvulars, pharyngeals and glottals) to the class of "gutturals" (lit. 'throaty'). Alexander Melville Bell divided vowels into "primary" and "wide", two terms that seem to be the equivalent to the notion of "tense" and "lax." In his work *Visible Speech* (1867: 15–16), Bell divided the mouth into nine cardinal regions, viz., front, mixed (i.e., central), and back along the hard and soft palates, versus the high, mid, and low degrees of tongue height. Furthermore, each region could be subdivided by an 'inner' and an 'outer' shift (i.e., retracted *vs* advanced), as well as by an higher and a lower shift (i.e., raised *vs* lowered) into smaller regions. Note also that 'aperture', intended as the English translation of *Schallfülle* (sonority), was also synonym for 'vowel height'. Of course, European phonetics was more "orthographic", but this difference was of course due to the writing system employed in Europe. Furthermore, it is true that experimental phonetics was a Western conquest, but the reason is not because European phoneticians were more intelligent. In fact, in Europe most phoneticians from the eighteenth century brought their physiological, anatomical and physic training to bear on phonetic description and notation. Experimental phonetics in Europe was backed by a whole body of scientific knowledge which proved to be extremely beneficial to the development of phonetics as a scientific discipline. Without Hooke's Law, which states that the force (F) needed to extend or compress a spring by some distance (x) scales linearly with respect to that distance, there would have been no notion of sinusoidal motion (i.e. simple harmonic motion) in the speech and hearing sciences. Similarly, without Newton's law of motion, it is difficult to believe that the study of sound in Europe would have contemplated the existence of derived quantities such as displacement, acceleration, force, pressure and velocity.

In conclusion, it seems more plausible to believe that, in accordance with the widely-observed tradition of classifying sound classes on the basis of place of articulation and other articulatory-acoustic attributes, the four Grades of rime tables were conceived, or at least later understood as indicators of the degrees of stricture of the phonatory apparatus. The segmental interpretation of the four Grades whilst not mistaken per se, is epistemologically implausible, and hard to defend in light of all the philological evidence available to us. Perhaps, the new view advocated in this paper

will not be welcomed with universal acclaim. Nevertheless, I do hope that it will stimulate new approaches towards a field that has been historically dominated by a rigid orthodoxy. Otherwise our expectancy toward new breakthroughs in this field of historical linguistics may remain a titbit of hope that perhaps may never materialize.

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SUMMARY

The present paper seeks to discuss and clarify the notions of 'Grades' and 'Calls' of traditional Chinese rime tables, which are commonly related to the presence or absence of glides, and continue to be taken as a basis for reconstructing vocalic and semi-vocalic portions of the post-initial elements in medieval and pre-medieval Chinese syllables. It is argued that, based on the discussions of Grades/Calls by Chinese scholars of the sixteenth through the nineteenth centuries, they were probably conceived as degrees of stricture of the phonatory apparatus, with progressive narrowing of the articulatory aperture, from wide and open to narrow and close. It is concluded that the linguistic system underpinning the classification of "sounds" in the linguistic tradition of China appears to be remarkably close to concepts long held in other linguistic traditions.

RÉSUMÉ

Le présent article entend discuter et clarifier les notions de «Quatre divisions» (*sì dĕng*) et «Quatre appels» (*sì hū*) des tables de rimes traditionnelles chinoises, qui sont généralement considérées comme liées à la présence ou à l'absence de parties vocaliques des éléments post-initiaux dans les syllabes chinoises médiévales et pré-médiévales. En nous fondant sur les discussions des divisions / appels par les érudits chinois du XVIᵉ au XIXᵉ siècle, nous sommes conduits à la thèse qu'ils ont probablement été conçus comme des degrés de rétrécissement de l'appareil phonatoire, avec un rétrécissement progressif de l'aperture articulatoire, de large et ouverte à étroite et fermée. Il est conclu que le système linguistique qui sous-tend la classification des «sons» dans la tradition linguistique de la Chine semble être remarquablement proche des concepts longtemps en vigueur dans d'autres traditions linguistiques.

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