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Title	On the Notion of “Vowel” and “Consonant” in Chinese Linguistic Tradition: On the Breakdown of Syllables in Chinese Historical Linguistics and the Four Grades of Rime Tables
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Citation	Monumenta Serica: Journal of Oriental Studies. 2022, 70(1), p. 209-235
Version Type	AM
URL	https://hdl.handle.net/11094/88647
rights	
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pre-publication draft. To appear in *Monumenta Serica*. Do not cite this version without author's permission.

ON THE NOTION OF 'VOWEL' AND 'CONSONANT' IN CHINESE LINGUISTIC TRADITION

On the Breakdown of Syllables in Chinese Historical Linguistics and the Four Grades of Rime Tables

The present article seeks to investigate the notion of vowels and consonants in the Chinese linguistic tradition, which developed independently of Western linguistic traditions, despite being influenced by the phonetic science of India. In particular, this study seeks to discuss how traditional phonologists in China had split the syllable into smaller units, what was their nature, and whether Chinese phonologists had really been aware of the existence of vowels and consonants. It is also discussed whether the four Grades of traditional rime tables were really related to the quality of vowels plus the presence of medial glides. It is concluded that vowels were probably understood as sounds that may have been pronounced alone, whereas consonants were interpreted as sounds which should be attached to another one. Occasionally, a comparison with Western linguistic tradition is also offered.

KEYWORDS: *Notion of vowels and consonants, Chinese linguistic tradition, four Grades; syllable segmentation, degree of stricture, articulatory Phonetics*.

"The filling of a very deepe flaggon with a constant streame of beere or water sounds ye vowells in this order w, u, o, o, a, e, i, y." Isaac Newton, 1665. Also quoted in Ladefoged and Johnson, 2013, p. 23.

INTRODUCTION

Qualified early descriptions of vowels and consonants in Western sources go back at least to the sixteenth century. For instance, in one of the major landmarks in the Western tradition of articulatory phonetic descriptions, viz. *De Literis* (1566) by Jacob Madsen (1538–1586), sounds were divided into vowels and consonants and determined in the most part according to the varying dimensions of the mouth. Consonants were further divided into two macro-sections, viz. linguals and labials. Linguals were, in turn, subdivided into a *linguopalatine* and a *linguodental* class. The former was further divided into 'movable' and 'fixed', whereas the latter was further divided into 'upper' and 'lower', depending on the shape of the tongue (e.g., convex in the case of lower linguodentals). Robert Robinson, in his *The Art of Pronuntiation* (1617), divided sounds into three categories, viz. vowels, consonants and 'vital sounds', a rather abstruse concept whose nature seemed to be unclear even to the author himself. These three categories were established on the basis of three places (i.e. outward, middle and inward the mouth) and four manners of articulation, viz. (i) 'mutes' (i.e. plosives); (ii) 'semi-mutes' (i.e. nasals); (iii) 'greater obstricts', which were sounds articulated with a stricture midway between stops and 'lesser obstricts'; (iv) 'lesser obstricts', whose structure edged between greater obstricts and vowels (cf. Kemp, 1995: 375). He also described two other sounds, viz. 'peculiar' (i.e. lateral) and 'breast' consonant, which seems to refer to the voiced glottal stop, albeit it was wrongly described as an aspirate consonant. John Wallis (1616–1703), in his famous phonetic essay *Tractatus de Loquela* (1653), also discussed vowels and consonants, which he classified on the basis of three places of articulation and two strictures, viz. 'closed', referred to plosives and nasals, and 'open' referred instead to so called

continuants (i.e. a speech produced without a completely closure of the oral and nasal cavities). Yet, in order to provide a further distinction of fricatives, he assigned two further categories based on the degree of the oral aperture. Phonemes such as [s, z, x] were described as 'thinner', whereas [θ, ð, h] were instead described as 'rounder'. Other discussions about vowels and consonants are found in the *De Spreeckonst* (The Art of Speech, 1635), an early treatise written by Petrus Montanus (1594–1638). Montanus divided the organ of mouth in two parts, an inner and an outer. The inner part included the palate, gums, teeth and tongue, whereas the outer part consisted of the lips and the front of the teeth (Kemp, 1995: 376). Furthermore, palate and tongue were further divided into back and front, in the same way lips were subdivided into edge and blade. Later, by the mid of nineteenth century, it gradually became fashionable to show the relationship which the vowel phonemes shared with each other by using a diagram (most commonly in the form of a triangle or of a trapezoid figure). One of the first representations of a vocalic triangle appeared in the *Dissertatio physiologico-medica de Formatione Loquelae* (1781: 41ff), a work by the German physicist Christoph Friedrich Hellwag (1754–1835). It is interesting to note that Hellwag observed that if [u, o, å, a, ä, e, i] were whispered, it would have been possible to detect them on a musical scale extending from a lower pitch to a higher one (corresponding roughly to the characteristic overtones commonly referred to as 'formants'):

> Susurrus iste, quo quaelibet vocalis suppressa voce pronunciata resonat, in singulis differt vocalibus quoad tonum ad scalam musicam relatum: si vocales secundum scalam naturalem supra designatam succes sive pronuncientur, etiam ordo susurrorum cum ordine tonorum in scala musica mire concordabit, ita ut /u/ respondeat tono gravissimo, a medio, i acutissimo : u, o, å, a, ä, e, i. (Hellwag, 1781: 45)

> Whisper that ones, which are pronounced with a low voice, [and we shall see that] the difference in the vowel tone can be related to a musical scale: if the vowels are pronounced in succession on the basis of the natural scale that we have designated, nay we whisper them in accordance with the tonal order and the musical scale, so that /u/ corresponds to the grave tone, a to a middle tone, i to an acute tone: [hence] u, o, å, a, ä, e, i.

Hellwag was surely a brilliant physicist and phonetician, but he worked in an intellectual environment where the science of language in general and speech in particular had been greatly advanced by an upsurge of scientific investigation in many other related areas. This upsurge of scientific investigation was probably started independently by Isaac Newton (1642–1726) in England and Gottfried Wilhelm Leibniz (1646–1716) in Germany. Soon after Isaac Newton published his epoch making work, *Principia Mathematica* (1687), it became customary to study and describe observable phenomena on the basis of precise observations, experiments, measurements and other mathematical instruments. Thus, the mathematical description of the systematic rules underpinning natural phenomena became the goal of all natural scientists. An apodictic Newtonian influence on Dutch etymologists such as Lambert ten Kate (1674–1731) has been observed and discussed by different authors such as Noordegraaf (1996: 226–231, 2001) and de Vries (2019). Hellwag himself envisaged the possibility of conceptualising a mathematical model for all the vowels that the human vocal apparatus may be able to produce:

> Nonne sic omnes, quas unquam edidit humana lingua, vocales ac diphthongi quasi mathematice secundum gradus poterunt determinari? (Hellwag, 1781: 41)
>
> Is it not so, that at any time in producing the human language, the vowels and diphthongs could be determined according to mathematical degrees?

Another influence of Newton's mechanics on the language science of eighteenth century Europe is observable in De Brosses's *Traité de la formation méchanique des langues et des principes physiques de l'etymologie* (1765), as the title itself suggests. A critical evaluation of Hellwag is also given in Carl Richard Lepsius (1863: 52–55), who also made remarkable contributions to the study of Chinese linguistics.[1] Although Hellwag made some acute observations, a general framework which attempted to set out an articulatory theory of phonetics was still lacking. Perhaps, the first two works which sought to overcame this impasse were *Die Akustik* (1802) and, above all, *Über die Hervorbringung der menschlichen Sprache* (1824), both by another German physicist, Ernst Chladni (1756–1827). Nevertheless, experimental studies on vowels and consonants were done no earlier than the mid nineteenth century. Two representative examples of such studies are the works of two British physicists, such as Robert Willis (1800–1875) and Charles Wheatstone (1802–1875). Robert Willis attached small tubes to a cylindrical bigger tube fitted with a reed. This tool allowed him, on the one hand, to vary total length, and, on the other, to discover that the quality of vowels was derived from the reflections of the original wave at the extremity of the tube, quite independently of the reed. This theory, championed also by Helmholtz (1874) and Scripture (1904), came to be known as 'inharmonic theory' (also referred to as 'cavity tone theory', 'transient theory', or 'fixed-pitch theory'), which argues that the reinforcing vibrations produced in the superglottic cavities in vowel articulation are not multiples of the fundamental vocal-cord note (Fletcher, 1929: 47–48). In opposition to the 'transient' or 'inharmonic theory' stood the 'harmonic theory' (also known as 'overtone theory', 'resonance theory', or 'relative-pitch theory'), advocated by Charles Wheatstone (1837) and Hermann von Helmholtz (1821–1894), which argues that "the vocal cords generate a complex wave having a fundamental and a large number of harmonics" (Fletcher, 1929: 47), where the component frequencies are exact multiples of the fundamental. Mechanical apparata were also used at least since 1791, when the Hungarian inventor Johann Wolfgang Ritter von Kempelen de Pázmánd (1734–1804) developed a mechanical speaking machine. Helmholtz later developed an apparatus known as the Helmholtz resonator.[2] He had previously conducted his experiments with cylindrical resonators, like his predecessors. However, he later used a spherical one, to which he carved two openings. By using the resonators he had developed, he was able to analyse the components of German vowels. Thus, he separated the vocalic inventory into two classes, those specified by one resonance, such as [u, o, a], and those specified by two resonances, such as [ü, ö, ä, i, e]. He attributed these two resonances, respectively, to the pharynx and mouth cavity, a description which is incredibly close to the modern definitions of the first two formants (Kemp 1995, 2001). One of the most known phoneticians of nineteenth century is Alexander Melville Bell (1819–1905). Bell proposed a consonantal scheme based on five different places of articulation, viz. glottal (throat), velar (back), palatal (front), dentalveolar (point) and labial (lip). For

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[1] Lepsius (1860: 492–496) was the first scholar to propose, on he basis of correspondences between Chinese and Tibetan, that Chinese tones had arisen from the merger of initials and the loss of finals.

[2] See Fletcher (1929: 14–15) for a detailed description.

what regards manner of articulation, he divided consonants into primary (central), divided (lateral), nasal and shut (stop or plosive). Rev. Joseph Edkins (1888: 20) was later to use Bell's views on manner of articulation to reconstruct early Chinese vowels.[3] The system of Cardinal Vowels developed by Daniel Jones (1881–1967) and still used by the International Phonetic Association partly harks back to Melville Bell (1867), who notoriously classified vowels in terms of 'horizontal' and 'vertical' tongue positions, albeit this categorisation should be ascribed to Henry Sweet (1877), who further developed it. While the Bell—Sweet model of vowel production was later to be criticised on several aspects, most notably by Meyer (1911), Viëtor (1914, 1925), Russell (1928, 1936)[4] and more recently by phoneticians who relied on radiographic and other instrumental techniques to point out many discrepancies between traditional auditory–proprioceptive evaluation of tongue position and their instrumental data, the validity of the Bell—Sweet model was defended by Catford (1981).

In light of all this, the present writer has always wondered whether the Chinese linguistic tradition, which goes back a long time in history and developed independently of Western linguistic traditions, offers similar accounts on vowels and consonants. Although the Chinese language does possess terms for indicating vowels and consonants, they appeared no earlier than the nineteenth century, which would suggest that the notion of sub-syllabic segments such as vowels and consonants was not contemplated by the Chinese linguistic tradition, where it appears, instead, that vowels simply indicated sounds that might have been articulated alone, whereas consonants were mostly understood as sounds, probably derived from vowels, which should have been pronounced together with them. In the present article, traditional sources are perused and scrutinised in order to prove this point. As the article itself is concerned with the Chinese linguistic tradition, special emphasis is inevitably put on Chinese sources and first-hand material in general. It is also felt the Chinese linguistic tradition deserves to be discussed more thoroughly among typologists and general linguists. With the foregoing in mind, we proceed to analyse (i) how traditional phonologists in China had split the syllable into smaller units, and what is the nature of these "smaller units"; (ii) whether Chinese traditional phonologists were aware of the existence of vowels and consonants.

THE CHINESE WORDS FOR VOWEL AND CONSONANT

Of course, the Chinese language does possess two terms for indicating 'vowels' and 'consonants', namely *yuanyin* 元音 and *fuyin* 輔音. Nevertheless, the first Chinese translations for vowels and consonants appeared no earlier than mid nineteenth century. It is also possible that some of these translations arrived in China via Japan. For instance, in Hepburn's Japanese-English dictionary (1867: 37, 194) we find one of the first Japanese translations for 'consonant' and 'vowel', respectively *shi-in* (lit. 'filial sound') and *bo-in* (lit. 'mother sound'), which are still used in present-day

[3] For two studies on Edkins's contributions to the field of historical Chinese phonology, see Orlandi (2019, 2020).

[4] Their main criticism was addressed to the tongue configurations postulated by the Bell—Sweet model. In fact, they quarrelled that their instrumental analyses, mostly in the form of radiography and plastography, either failed to confirm or even contradicted the observations purported by the model (cf. Russell, 1936). Other critics, such as Stevens (1972) and Wood (1975, 1977), argue that the continuum (i.e. front-to-back, high-to-low) predicated by the Bell—Sweet model is less relevant than the location of the narrowest constriction, as well as than other types of vowel articulation, such as, e.g., hard-palate, soft-palate, upper-pharynx, lower pharynx (cf. Catford 1981: 20). This is certainly true, but, as Catford (1981: 20 et passim) rightly observes, the location of the highest point of the tongue goes back to Jespersen (1889) or presumably to some other scholar of his time, not to Bell or Sweet.

standard Japanese. In Chinese, the first mentions to vowels and consonants are found in Lobscheid's *English and Chinese Dictionary* (1866: 479, 1107), where they are translated in the following way:

(i) Consonant: "in grammar a letter sounded with a vowel", *tongyin zimu* 同音字母.
(ii) Vowel: *zi yin zhi zi* 自音之字 (lit. 'a graph with its own sound').

Translations of consonant and vowel are not found in Stent's *Chinese and English Pocket Dictionary* (1874), Condit's *English and Chinese Dictionary* (1882), Medhurst's *English and Chinese Dictionary* (1848), and Williams's *A Syllabic Dictionary of the Chinese language* (1896 [1874]), but they are found in Kwong Ki-chiu's *An English and Chinese Dictionary* (1887: 76, 432), where they are respectively translated as *wu yin zhi zimu* 無音之字母 (lit. 'initials/graphs without sound') and *zi yin zhi zi* 自音之字 (in Lobscheid fashion).

Only at the beginning of the twentieth century we find Chinese translations more similar to the terms which are now used for indicating vowels and consonants. One of the first Chinese mentions of them in is found in Zhang Shilu (1978 [1929]: 49), who mentions multiple Chinese translations for the concept of 'vowel' and 'consonant', two from European sources and two from Japanese. This has been confirmed also by a recent study by Satoru (2018: 127), where it is stated that

> ...ここでは、「声母」に当たる語には、ヨーロッパ語からの翻訳語の「輔音」と「僕音」と、日本語からの「子音」と「熟音」とがあり、「韻母」に当たる語には、ヨーロッパ語からの翻訳語の「元音」と，日本語からの「母音」とがあることが述べられている。
>
> ...here [in Zhang's work], the words corresponding to 'consonant' (*shengmu*) include *fuyin* 輔音 and *puyin* 僕音 from European sources, and the terms *shi-in* 子音 and *joku-in* 熟音 from Japanese; for 'vowel' (*yunmu*), it is said that two translations existed, viz. *yuanyin* 元音 from European sources and *bo-in* 母音 from Japanese.

It is worth noting that 'consonant' was originally translated as *shengmu* 聲母 and 'vowel' as *yunmu* 韻母, which were two technical terms for indicating instead 'initial' and 'final' in Chinese traditional phonology. As semantic confusion might have arisen with such translations, Chinese sources resorted to other kinds of translation both from European and Japanese sources, with the former gradually prevailing over the latter. Again, this fact seems to suggest that it was very unlikely that the notion of vowel and consonant was ever known to Chinese linguists before they came in contact with Japanese and Western sources. Furthermore, the first translations of vowels and consonants seem to indicate that Chinese classical scholarship, as other linguistic traditions, regarded vowels as "autopoietic", primary sounds, whereas consonants were understood as sounds which had to be accompanied by a vowel, whence it was thought they were derived. Now the question which may arise is: how did Chinese traditional phonologists decompose the syllable, if not into vowels and consonants? A detailed answer is given in the following section.

THE BREAKDOWN OF SYLLABLES IN CHINESE HISTORICAL PHONOLOGY

"Historical Chinese Phonology" is known in Chinese as *yinyunxue* 音韻學 or *shengyunxue* 聲韻學, which literally means "the study of initials and finals". It is self-evident that the medieval Chinese (MC henceforth) syllable had been traditionally divided into two macro-segments, viz. an initial (*sheng* 聲 or *niu* 紐 or even *shengniu* 聲紐, but originally called *zimu* 字母) and a final (*yun* 韻). The latter was further split into smaller segments, such as a prenuclear glide (*jieyin* 介音, also called *jiemu* 介母), and a rime or *yunmu* 韻母, which should not be confused with the concept of 'rhyme' (or *yunjiao* 韻腳). The rime may also contain a nucleus or *yunfu* 韻腹 (made up of the main vowel plus an onglide) and an *auslaut* or *yunwei* 韻尾. The sum of glide, nucleus and coda is also called *yùntóu* 韻頭. In an anonymnous work appeared in the twelfth century, the *Sisheng dengzi* 四聲等子, finals were grouped into sixteen *yunshe* 韻攝 (or simply *she* 攝), that is a particular arrangement of rimes which does not take into account glides and tones, but only the nucleus and the coda. Volpicelli (1896: 14) translated *yunshe* 韻攝 as 'termination', albeit it is better referred to as 'rime group'. *She* 攝 were also occasionally referred to as *zhuan* 轉 'turn'. Yuan Zirang 袁子讓 (1603: 18), a Ming scholar from the late sixteenth and early seventeenth century, has once remarked:

> 等子內外各八攝為十六攝。攝隨韻更，故一攝謂之一轉，轉兼數韻，故一轉又謂之一攝。
>
> Each of the inner and outer grades contains eight terminations for a total of sixteen. The termination follows the final, so one termination is also known as one turn, and the turn has double finals, so one turn is also called one termination.

Although it is unclear to what extent Indian monks contributed to shaping this segmentation of the syllable, many authors agree on the fact that several of these notions, such as the 'initial' or *zimu* were imported in China by Buddhist monks (cf. Chen Li 1984 [1842]: 2, Zheng 1925 [1161]: 511) around the beginning of Sui Dynasty (581–618), when the *dengyunxue* 等韻學 tradition started flourishing in the Middle Kingdom. However, the Chinese themselves had previously developed a technique aimed at indicating the reading of a word by assigning two graphs which indicated respectively the pronunciation of the initial and the final. This method is known as *fanqie* 反切. Yet, even the authorship of the *fanqie* spellings is more debated than modern scholarship, both Western and Chinese, has presented. Zheng Qiao (1925 [1161]: 511) and Zhang Hao (1888 [?]: 17), two Southern Song scholars (twelfth century), believed that *fanqie* spellings were a foreign importation, but this claim was rejected by leading authorities such as Dai Zhen (1980: 103), Chen Li (1984 [1842]: 1, 4) and Qian Daxin (1983 [1876]: 89) among many others. Whilst Pan Lei, an early Qing scholar of the late seventeenth century, credited Zhou Yong for the invention of *fanqie* spellings, most Chinese scholars attributed this invention to a Cao Wei (220–266) gentleman known as Sun Yan (Yan 1986 [6th century]: 40, Lu 1985 [583]: 5, Qian 1983 [1876]: 89). The meaning of the word *fanqie*, sometimes mistranslated as "reverse cuts" in English, is still obscure. We know, however, that since the times of the Northern and Southern dynasties (386–589) the technique which we now call *fanqie* was simply known as *fan* 反, and that it was later replaced by *qie* 切, because the graph *fan* became a taboo during Tang Dynasty (618–907) (cf. Gu, 1982 [1667]: 531). The Qing polymath Dai Zhen (1957 [1762]: 3) held the opinion

that *fanqie* spellings were an extended and revised form of the so called *shuangsheng dieyun* 雙聲疊韻. In traditional historical phonology, two graphs with different initials but identical (or near identical) rime are called *dieyun* 疊韻, e.g. ***tanglang*** 螳螂 (mantis), whereas two graphs with different rimes but with homophonic initials are called *shuangsheng* 雙聲, e.g. ***fangfu*** 仿佛 (as if).

To sum up, traditional Chinese philologists had historically decomposed syllables into two macro-segments, viz. initials and finals. It is reasonable to assume, as Dai Zhen did, that this technique, known as *fanqie*, is a refined version of the previous *shuangsheng dieyun* practice. Whilst the origin of *fanqie* is debated, most Chinese scholars assumed that it emerged around the Cao Wei period. As *fanqie* spellings did not provide further information about other segmental elements or features such as place of articulation, Chinese phonologists of the *dengyunxue* tradition, probably with the help of Buddhist monks from India, developed other descriptive and technical terms to describe sounds or to indicate the pronunciation of sinographs. One of these descriptive labels which appeared around the seventh century is *deng* 等 'Grade'.

THE CONCEPT OF FOUR GRADES: DID THEY INDICATE A QUALITY OF THE VOWEL?

It appears that in the whole horizon of historical Chinese phonology there is no greater controversy to be found anywhere than in the four Grades of traditional rime tables, whose nature still continues to puzzle both Western and Chinese scholarships. 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).

In brief, the concept of Grades is a "liquid" one, which has been continuously modified and re-adapted in the history of historical Chinese phonology. Since they appeared together with the notion of *zimu* 'initial',[5] it has been proposed that Grades may have originated from *zimu* (Li Xinkui, 1983: 50). This may well be true, albeit Chen Li (1984 [1842]: 1) disfavoured the idea. According to Shen (2017: 15), it was Jiang Yong the first to relate "the term *děng* to the rimes in the rime book". However, it seems to the present writer that this association represented a received wisdom of the *xiaoxue* 小學 (small learning) tradition, based on the 'evidential research' (*kaozheng* 考證) of Qing epoch (but started already in late Ming), and not the intuition of only one scholar. For instance, Xia Xie (1920 [1855]: 5), Pan Lei[6] and Xiong Shibo[7] (cf. Li Xinkui 1983: 60) held opinions similar to those of Jiang. The same thought had been formulated also by Lǔ Weiqi (1633: 8) long before Jiang Yong.

The concept of Grade did not appear with *Qieyun.* Rather, this methodology for classifying different types of finals was used for the first time in two early rime tables such as *Yunjing* and *Qiyin Lüe*, which analysed *Qieyun.* Since *Qieyun* is separated from the notion of Grades by several centuries, some authors (cf. Shen, 2020: 30) are accustomed to refer to *deng* as described in rime tables as Division (or Grade), whereas to the notion of *deng* projected onto works which did not originally

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[5] *Zimu* (lit. 'mother word, initial') is the most archaic term for indicating the concept of 'initial', and it is probably derived from Sanskrit *mātṛkā* (mother). This term was in all likelihood coined by a Buddhist monk named Shouwen 受溫, although a set of thirty initials was arranged before him by an anonymous Tang scholar.

[6] https://ctext.org/wiki.pl?if=gb&res=991356&searchu=音之由中達外.

[7] https://www.waseda.jp/flas/glas/assets/uploads/2019/04/Vol64_11_chinese-studies_smt.pdf.

contemplate them as Rank. Whilst this distinction certainly makes sense, in the present article the label of Grade is used to refer indistinctly to both Divisions and Ranks.

Although the criteria for assigning Grades to finals are still not clear, and though over the past century there have been many efforts to use the Grades to reconstruct medieval Chinese sounds, with nearly as many results as there have been investigators, it is now generally assumed that finals with the same ending and similar vowels were arranged according to both vowel quality and presence or absence of medials (Baxter, 1992). For instance, one of the current dominant views argue that

> After the Tang Dynasty, the concept of deng 等 'division' came up in the rhyme tables, that is, the four degrees of frontness, from qing 轻 'light' to zhong 重 'heavy.' Qing means the tongue position is front; zhong means back. This notion applies both to consonants and vowels. For example, if we compare the main vowels of tang 唐 [ɑŋ] rhyme with yang 阳 [iaŋ] rhyme, since [ɑ] is "backer" than [a] , 唐 rhyme is listed in the first division ("the backest") while 阳 rhyme is listed in the third division. In 阳 rhyme group, according to the backness of the initials' tongue positions, the characters with the initials jing 精 ʦ-, zhang 章 ʨ-, and zhuang 庄 ʧ- are classified into the fourth, third, and second division, respectively. (Pan & Zhang, 2015: 84).
>
> Such a distribution is quite similar to the sihu 四呼 (namely four types of finals, i.e. kai 开 'finals without medials', qi 齐 'finals with the medial [i] ', he 合 'finals with the medial [u]', and cuo 撮 'finals with the medial [y]') and the initials in Modern Mandarin. (*ibid*. p. 86)

While some pioneers such as Karlgren (1915–1926) did not reconstruct glides for Grade II rimes,[8] other authors have reconstructed no medials for Grades I and IV or only for Grade I rimes (albeit medieval Chinese glides must be distinguished from the affixation system reconstructed for early Chinese). Despite these minor divergences, the "segmentationalist" approach still largely dominates the scene of historical Chinese phonology. This approach is not new, but actually goes back a long time in history. Due to space reasons, this history cannot be fully illustrated in the present section. Thus, only a brief *résumé* of the intellectual conceptualisation of the four Grades is offered below. Of course, the present article is *not* willing to take advantage of a discussion on the notion of vowels and consonants in Chinese linguistic tradition as a straw man argument to increase the attractiveness of the endless discussion about the bewildering notion of four Grades, but since the four Grades are mostly regarded as pertaining to vowel quality plus presence of medial glides (or lack thereof), an exploration of such concepts seems to be unavoidable. The following lines, however, should not be interpreted as an attack to the various reconstructionist approaches championed by the received Western Sinological tradition, as it is not the scope of the present article to discuss medieval and early Chinese reconstructions, let alone to offer a comprehensive rebuttal of them.

Grades were originally overlooked by two pioneers such as Marshman (1809) and Edkins (1871), but they were observed by Rev. John Chalmers (1825–1899). Chalmers (1873: 338) proposed to interpret the four Grades in phonetic terms, and argued that they were referred to vowel quality plus the presence of a semivocalic glide—a position which was reinforced by a study by Franz Kühnert in 1890. Some

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[8] However, Weldon South Coblin (1991) has once pointed out that there is no automatic palatal glide in Grade III rimes, since in labial initials there seems to be only a labial glide, not a palatal one.

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 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. In fact, he used a simplified version of the Bernoullian *lois des grands nombres* to explain all oddities and irregularities: when in a given Grade the primary vowel was not the expected one, Volpicelli observed that the second most dominant vowel was the one he had hypothesised. For instance, according to his theory, Grade IV rimes in the first *she* should give the vowel *e* as the dominant one, 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 revitalised the palatal glide *Leitmotiv* of Chalmers and Kühnert. Schaank envisioned two forms of palatalisation, mostly as they were found in the Lufeng dialect spoken by an oversea community of Hakka speakers in Indonesia where he conducted a fieldwork: one in the initial and one in the final. He also rejected Volpicelli's theory that the four Grades corresponded to four different vowels,[9] and argued that they indicated, instead, 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!) different forms of palatalisation. Karlgren's theory was of course revised and corrected, especially by structuralists such as Chao Yuen-ren (1892–1982) and Arisaka Hideyo (1908–1952), but it still continues to enjoy a widespread acceptance among specialists, albeit in modified and altered forms.

An extensive treatment of medieval Chinese Grades can be found in Baxter's 1992 monograph on early Chinese. Whilst its author has changed his ideas on several aspects of early Chinese (especially for what concerns initials), this book 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- contrasting with medial *-j-. Baxter's treatment of Grades and of medieval and early Chinese glides is far more refined than any other attempt before him (and perhaps

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[9] For a revised version of Volpicelli's theory which tries to accommodate also palatalisation in Grade III rimes, see Frank Hsüeh (1985: 42; 1990: 20). For an evaluation of Volpicelli's work in English, see Orlandi (2018). Another objective evaluation of his work is given in Mitsuta (1915: 115, 545): "ウォルピセリ氏支那古音考では一等は o、二等は a、三等は e、四等は i と定めて居る、此說は三等の e 外餘り間違つては居らく氏は四等の發音を先に定めな各韻の發音が極めて杜撰であり。According to Volpicelli's study of ancient Chinese sounds, Grade I [rimes] are defined as o, Grade II as a, Grade III as e, Grade IV as i. The way according to which the value of e for Grade III rimes is assigned as well as the sounds of each rime are determined a priori is extremely jumbled. (...) ウォルピセリの功績は特に認めらるべきものである、彼は古音研究に際し輕率に十二の方音を選ぶてとなく、全方音 (les dialectes en masse)を利用した、言ふ迄もなく是は絕對に正しい、唯算數的方法に據つた點が正しくない、隨て其結果は誤つて居る。Volpicelli's achievements are to be acknowledged. He has investigated 12 dialects for the study of ancient sounds without hesitation, and the use of *les dialectes en masse* is certainly correct. Only the reliance on mathematical methods is incorrect, and [as such] the results are also wrong."

even after). Yet, there are still certain aspects of it which are not immune from potential flaws. For instance, Baxter (1992: 278) assumed 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 *chongniu* 重紐 distinctions, including the one mentioned above, have left no traces in living Sinitic languages, and in his system are not intended as a serious synchronic analysis.

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

medials	***kaikou***	***hekou***	***sihu* (four calls)**
Grade I	-Ø-	-w-	kai -Ø-
Grade II	-ɯ-	-wɯ-	qi -j-
Grade III	-j-, -ɯj-	-wj-, -wɯj-	he -w-
Grade IV	-Ø-	-w-	cuo -ɥ-

Tab. 1. The medial system of medieval Chinese and the 'four calls'. Redrawn with minor revisions from Shen (2020: 39).

Another prominent viewpoint is the one proposed by Ferlus (2009), which edges between the segmentationalist *Leitmotiv* and an aerodynamic approach. While it is recognised that this approach is certainly stimulating and worthy of attention, the present writer still remains unconvinced. First, the discussion is *sui generis*, and modern Sinitic languages are never taken into consideration. This is an unacceptable lacuna for a reconstruction of the four Grades on the basis of acoustic and aerodynamic features. Second, Ferlus's reconstruction of Grades implies that they were created to capture the phonetic parameters of tenseness, breathiness and velarisation. There are, nonetheless, *zero* indications which may compel us to hypothesise that early compilers of rime dictionaries were aware of such phonetic properties. Third, according to his theory, 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, and his personal consideration for Chinese classical scholarship does not reflect the historical reality. Therefore, although the merits of his theory must certainly be acknowledged (e.g., the distribution of *Qieyun* rimes in three classes, in Norman [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,[10]

[10] By the way, Ferlus (2009: 195) is probably mistaken when he affirms that the term *zhuo* 'muddy' indicated the phonetic feature of 'breathy' in addition to 'voicing', and Pulleyblank was not necessarily mistaken when he thought that this term meant an acoustic quality other than 'voiced'. Indeed, the *qing zhuo* distinction appeared first in early Chinese musicology, where notes were often described as being *qing* (clear) or *zhuo* (muddy). 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, from tonic and flattened tones to notes played on an open string or stopped notes, with some authors going as far as

the present writer utterly rejects the Orientalist practice, still widely diffused among Sinologists, which regards ancient China as a mystical depositary of a profound and inscrutable *ante-tempus* wisdom. As it is shown below, the Chinese tradition was neither more nor less, but *as advanced as* other traditions, and the difference it shows with other scholarships are the result of "cultural allopatry".[11]

To sum up, the acceptance of the segmentationalist approach would require us to believe that traditional Chinese philologists were aware of the existence of 'segmental phonology' before it was even formalised. It would also require us to take for granted the fact that they were aware of the existence of null phonemes (e.g. Grade I had no medial). The present writer may not be alone in thinking that this would be neither a plausible nor a parsimonious conclusion (Ockham's razor). Hence, although there have been as many interpretations of the Grades as the number of scholars involved in it,[12] in the opinion of the present writer only few of them are on a more reasonable and realistic track. One of these "new" interpretations 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 palatalisation in Sino-Vietnamese, and may also explain the absence of Grade II rimes in the 'inner' tables. Whilst the present writer thinks that Chan's article would probably benefit from a relaxation of the expository style, especially for what regards its conclusions,[13] it is also felt that to hypothesise that Grades, as well as other components of rime tables, were based on the principle of phonetic articulation might be essentially correct. In the following section it is argued that the four Grades were impressionistic labels to indicate what we are accustomed to refer to as 'degree of stricture', and that, thus, they have nothing to do with vowels, of which Chinese traditional scholarship were not aware.

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hypothesising that the two terms might have indicated a distinction between notes in tempered or untempered scales.

[11] By 'allopatry' (lit. 'another place') is meant a species that is physically isolated from other species by an extrinsic barrier (Marko 1998, 2008). Here the term is used as a cultural metaphor. There is a long tradition in Sinology to interpret the difference between Chinese and (mostly) Western sciences in a vertical scale which goes from backwardness to forwardness, but this is a nineteenth-century oversimplification. Experimental phonetics could advance in Europe not because European phoneticians were more intelligent or more competent than Chinese phoneticians, but because they were supported by a progressive advancement in many other areas of science, from physics to medicine, from palatography to dentistry. 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, there would hardly have existed derived quantities such as displacement, acceleration, force, pressure and velocity, which also figure out in the study of sound.

[12] See, for instance, the Grades as vowel bending (cf. Schuessler, 2006).

[13] e.g., quoting verbatim (p. 46), "the implication is enormous", "the history of linguistics needs to be rewritten". The parallel with the study, by Harshman et al. (1997), on the measurement of the vocal-tract width along dorsoventral gridlines is interesting but a bit ill-considered, to say the least: without lateral x-ray cineradiograph tracings, or MRI technologies it is hardly understandable how could Chinese philologist theorise an embryonic form of factor-analysed tongue shapes. Other descriptions of tongue shapes in vocalic phonemes have also 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. For a representation of the tongue shape with a quadratic curve model, see instead Hashimoto & Tanimoto (1978, in Japanese with English abstract). It is felt that, without these minor infelicities, the conclusions of this otherwise important article by Chan (2006) could have been even more convincing.

THE FOUR GRADES AS INDICATORS OF DEGREES OF STRICTURE

The present writer is afraid that the segmentationalist approach adopted to explain the nature 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, perhaps, not in the mechanic way predicated by this approach). The core of the present paragraph is a discussion about how the Grades were understood in Chinese classical scholarship (i.e. labels for indicating degree of stricture), and not about what possibly was their nature, or what they predicated (e.g., presence/absence of vocoid approximants in medial position).

Nevertheless, the readers who wish to follow the novel approach championed in this paragraph should be alerted to the historical discontinuity which elapses between the appearance of Grades and their interpretation by *xiaoxue* scholars. The present writer does 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 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. A reviewer defined the following exploitation of primary sources "little less than absurd", since traditional philologists were almost in the same position to judge the four Grades as we are, but without the modern apparatus and without knowing anything about the comparative method and its results obtained since Karlgren's times. However, whether perusing the works left to posterity by Chinese classical scholarship in order to demonstrate how Grades were understood by traditional scholars is more absurd than believing that the earliest compilers of rime tables were implicitly aware of the same "modern apparatus" which he/she believes that Ming-Qing scholars instead lacked, or that they were able to arrange finals according to an overly-complicated system of glides which even distinguished between [-ji-] and [-j-] or [-ɯj-] from [-wɯj-], and that this amazing *ante litteram* knowledge practically disappeared in later times (there is nothing whatsoever similar in any philological treatise of the Ming-Qing period) before popping up again and curiously enough after Western scholars armed with their knowledge of vowels and consonants began to contribute to the field of Chinese historical phonology, we shall leave it to the readers to judge.

Partly in accordance with Indian phonetics, Chinese *shengyunxue* 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'. For example, it is self-evident that concepts such as *kaikou* 開口 (lit. 'open mouth') and *hekou* 合口 (lit. 'closed mouth'), or *hong xi* 洪細 'wide, narrow [aperture]', by definition, are descriptive terms which indicate the way a sound class should be pronounced. This dichotomy between *kaikou* and *hekou*, which is commonly interpreted as indicating the absence or presence of *-w- or simply the feature of labialisation, was in fact used

to indicate the position of the lips when articulating a sound, as a lesser-known statement by Jiang Yong (1863: 18) makes abundantly clear:

> 音呼有開口、合口；合口者吻聚；開口者吻不聚也
>
> There are openings and closings in the sounds; in closed sounds the lips are together; in open sounds the lips get loose.

Of course, when we pronounce a phoneme with the lips rounded, we obtain a labialised sound (albeit, from an articulatory point of view, labialisation is often accompanied also by a raising of the back of the tongue), and thus we may think that what the term *hekou* 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. Further evidence of this type can be found by perusing and scrutinising first hand sources from the late seventeenth century to the late nineteenth century. For example, we may also mention another interesting dichotomy between 'inner' (*neiyan* 内言) and 'outer' (*waiyan* 外言) sounds. Zhou Zumo (1957) has pointed out that the *nei/waiyan* dichotomy indicated the same dyad as *hong xi*. More precisely, he indicated that Grades I and II were glossed as 'inner' and 'wide', whereas Grades III and IV, those which according to our opinion are pronounced with a narrower aperture of the mouth, were glossed as 'outer' and 'narrow'. Furthermore, 'narrow' sounds were also called *jiyan* 急言 'fast speech', or were described as being *jiqizhe* 急氣者 (fast-breathed), whereas 'wide' sounds were called *xuyan* 徐言 'slow speech' or *huanqizhe* 緩氣者 (lessen, moderate-breathed). These 'fast-breathed sounds' are often described as *bikouyan* 閉口言 (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).

One of the first associations between the four Grades and narrowness was made by Lǔ Weiqi (1587–1641), a late Ming scholar of the late sixteenth and early seventeenth centuries, who obtained the degree of *jinshi* (imperial scholar) in 1613. In 1633, Lǔ Weiqi (1633: 8) wrote an essay on historical phonology, where in a passage it is stated 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 Pan Lei (1646–1708), a renowned scholar from Qing dynasty (1636–1912) 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 goes from the centre [of the mouth] to the outside. In the velar tract it is wide and open; in the blade of the tongue it is *qichi* [lit. 'tooth-aligned', thought to refer to a class of finals pronounced with /i/]; constrained in the middle of the chin it is opened [i.e. rounded]; gathered in the lips it is *cuokou* [lit. 'shovel', thought refer to a final which has /y/ as its medial]. Pan Lei (p. 5)

As mentioned in the previous section, the technical terms which compose the 'four calls' (*sihu*) have been interpreted from a segmental point of view. Pan Lei, instead, related them 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 Jiang Yong (1681–1762). Jiang 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 Gu Yanwu).[14] However, Jiang 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. Jiang (1863: 18)

Volpicelli (1896) took this statement as an indicative proof of the validity of his theory which assigned at least four different vocalic phonemes (on the basis of their height) to the four Grades.

More useful to our case are the remarks of Xia Xie (1800–1875), a Qing civil servant, historian and scholar of the nineteenth century. His work on phonology was published in 1855, and contains many remarkable discussions on several topics of traditional *shengyunxue*. In the seventh roll, we find two precious pieces of information about the four Grades and their relationship both with the notion of *hong xi* 'wideness and narrowness' and with the *wuyin*, or 'five places of articulation.'

音之洪細，謂之等

The wideness and narrowness of sounds, this is [what is] called Grade. (Xia Xie, 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 (i.e. glottals) 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

[14] For a comprehensive evaluation of Jiang Yong's contribution to historical phonology, see Wang Li (1990: 313–347).

> 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 (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. Hence, from a scrutiny of first hand material, it emerges that the primary rationale for the many obscure notions which traditional rime tables are spiced with, such as Grade, 'wideness', 'narrowness', etc. was the articulatory/phonatory nature of initials and finals. Since the late nineteenth century, Western authors, armed with their knowledge of sub-syllabic units such as vowels and consonants, have suggested that many of those abstruse concepts were tied, instead, to the presence of medial glides. This, for instance, was one of the major features of Karlgren's reconstruction of 'Ancient' and 'Archaic Chinese'. Unfortunately, the complexity of Karlgren's approach was such that he turned the four Grades into one of the most abstruse and debated arguments in the whole field of historical Chinese phonology. While many authors have tried to adjust the anomalies which his system presented, the "segmentationalist" approach still reigns supreme. Yet no one has ever presented textual evidence which may prove beyond doubt that Chinese philologists were aware of the existence of vowels, consonants and semivowels. If they were not aware of the existence of vowels, it is hardly credible that they might have tied the interpretation of Grades to certain qualities of them.

Whilst it is not claimed that all other viewpoints are invalid, it is also felt that in a time of reassessment in this field of historical linguistics, the phonatory/articulatory approach proposed in the present article might also be worth considering. For it predicates a much more credible scenario, which does not require us to assume, without no concrete evidence, that early philologists were aware of notions, such as null phoneme, or, even more implausibly, that they were able to describe the tongue shape in vowels without the formulation of a mathematical model or the utilisation of x-ray and MRI technologies. Second, the articulatory description of speech is a phenomenon which is widely observed also in other linguistic traditions. For instance, in Europe, too, it was customary to identify and describe sounds (especially vowels) by reference to the aperture of the oral cavity or to the position of lips, or to attach impressionistic labels such as 'thin', 'clean', 'dark', etc., in order to characterise the qualities of phonation (cf. Kemp, 2001: 1470).

As we can see from the statements above, it appears that the Four Grades, just like previous impressionistic labels such as *qingzhong* etc., were a practical way to describe and classify sound classes in articulatory terms or to better dispose them within the framework of the 'five sounds', which should actually be interpreted as 'five places of articulation'. In traditional Chinese phonology, sounds were divided into five major groups (*wuyin* 五音 'five sounds'), viz. *chunyin* 唇音 'labial sounds', *sheyin* 舌音 'lingual sounds', *yayin* 牙音 'velar sounds', *chiyin* 齒音 'dental sounds', *houyin* 喉音 'guttural sounds' (*ban sheyin* 半舌音 'half lingual sounds' and *ban chiyin* 半齒音 'half dental sounds' were added later). *Sheyin* 舌音 'lingual sounds' were further divided into *shetouyin* 舌頭音 (also called *shejianyin* 舌尖音) 'laminal

sounds' and *sheshangyin* 舌上音 (also called *shemian qianyin* 舌面前音 or *sheguanyin* 舌冠音) 'coronal sounds'.[15]

Five/seven sounds		Place of articulation	Manner of articulation	Medieval Chinese 36 Initials[16]
唇音 (labials)	重唇音 (strong labials)	bilabials	Plosives, nasals	幫[p]・滂[pʰ]・並[b]・明[m]
	輕唇音 (weak labials)	labiodentals	Fricatives, nasal	非[f]・敷[fʰ]・奉[v]・微[ɱ]
舌音 (linguals)	舌頭音 (laminals)	alveolars	Plosives, nasals	端[t]・透[tʰ]・定[d]・泥[n]
	舌上音 (alveolo-palatals)	Alveolo-palatals		知[ʈ]・徹[ʈʰ]・澄[ɖ]・娘[ɳ]
齒音 (dentals)	齒頭音 (alveolar sounds)	alveolars	Fricatives, affricates	精[ts]・清[tsʰ]・從[dz]心[s]・邪[z]
	正齒音 (palatals)	Alveolo-palatals, palatals		照[tɕ]・穿[tɕʰ]・牀[dʑ]審[ɕ]・禪[ʑ]
牙音 (velars)		velars	Plosives, nasal	見[k]・溪[kʰ]・群[g]・疑[ŋ]
喉音 (glottals)		velars	Affricates, fricatives	曉[x]・匣[ɣ]
		Glottals, zero	Plosives	影[ʔ]・喻[j]
半舌音 (half linguals)		alveolar	Lateral approximant	来[l]
半齒音 (half dentals)		Alveolo-palatal	Nasal, fricative	日[n]

Tab. 2. The seven sounds with English translations and their respective sets of medieval Chinese initials.

As we can see, from the statements above it becomes quite clear that the four Grades were independent of the notion of vowels and consonants, but were practical tools used to indicate a progressive narrowing of the vocal tract. Of course to a progressive narrowing of the oral cavity (or of the vocal tract) corresponds a difference in the quality of vowels, so that one may get the impression that the four Grades were technical terms for indicating vowel quality in the front-back and/or high-low dimensions together with the presence or absence of vocoid approximants. In fact, although it might really appear that certain technical notions employed by traditional Chinese phonologists really indicated the presence of certain vocalic or semi-vocalic phonemes, from a scrutiny of first hand sources it appears that these terms were aimed

[15] Of course, 'coronal sounds' is a broad and ambiguous term. For instance 'laminal sounds' are also supposed to be 'coronal'. Hence, we might wonder what kind of phoneme was it supposed to indicate. Whilst no solution exists today, it seems to the present writer that 'alveolo-palatal' consonants are the best candidate. Qian Daxin (1728–1804) once remarked that *gu wu sheshangyin* 古無舌上音 (Old Chinese had no coronal sounds), but for this class of sounds he meant *zhi* 知 /*ʈ/ or /*ʈ/, *che* 徹 /*ʈʰ/ or */ʈʰ/, *cheng* 澄 /*ɖ/ or /*ɖ/ and *niang* 娘 /*ɳ/ or /*ɳ/ initials, which are normally reconstructed as alveolo-palatal consonants or as retroflex consonants.

[16] The phonemic values given in the present table reflect, more or less, the older values given by Bernhard Karlgren. However, these representations are irrelevant to the discussion and do not invalidate the argument made in this section. A reviewer pointed out, however, that the 知-row should contain retroflex consonants, as demonstrated a long time ago by Pulleyblank. This is correct but this, too, is a quite old view, mostly championed by Stanislas Julien (1861: 34–35), Zenone Volpicelli (1896: 16, 19, 37) and Ogawa Naoyoshi (1907). Karlgren, instead, followed Edkins (1888) in treating them as palatals. I have followed Karlgren for a mere convention, not because I favour his reconstruction over that of Volpicelli, Ogawa and Pulleyblank.

at roughly describing or indicating only manner of articulation. Incongruence is certainly found between alleged MC reconstructions and the degree of stricture which the reconstructed should belong to, but I would rather be surprised if no incongruence at all were found. For instance, the above mentioned Madsen, surely a brilliant scholar, did not correctly distinguish so called 'oral sounds' from 'nasal sounds' in all occasions, and failed to mention three phonemes which occur fairly frequently in Danish, of which he was a native speaker, such as [ʔ], [ɣ] and [ð].

To sum up, although Chinese phonologists had certainly some familiarity with the Siddhaṃ script, as the MC thirty-six initials clearly indicate, they were not aware that syllables could have been split into sub-syllabic units such as vowels and consonants. It should also be pointed out that the Siddhaṃ script was an abugida, which is something between a syllabic alphabet and an alphasyllabary, and not properly an alphabet with a neat separation between vowels and consonants. Hence, Chinese classical scholarship divided the syllable primarily in initials and finals, and they were typified by five (and later seven) places of articulation. Later, Chinese scholars had to adopt or develop *ex novo* new concepts to describe and indicate how these sounds should have been pronounced more precisely, and/or what was their degree of stricture.

ON THE UNIVERSALITY OF VOWELS AND CONSONANTS

One might reasonably wonder how is it possible that a linguistic tradition could lack the notion of vowel and consonant. In fact, it seems that the distinction of vowels and consonants is not as natural as the Western reader might hypothesise. In his book *Vowels and Consonants* (2005, 2012), one of the world's leading phoneticians of his time, Peter Ladefoged (1925–2006), wrote that the breakdown of syllables into smaller units such as vowels and consonants is not a natural one and that "the original notion that syllables could be split into vowels and consonants occurred only once in human history" (Ladefoged & Disner, 2012: 189–190):

> The symbols of the alphabet represent segments of speech, and it is probably from thinking in terms of these symbolized segments that we get the idea that there are separate sounds.
>
> Therefore, the history of alphabetic writing should be viewed as a unique invention: Breaking syllables up into vowels and consonants was an enormous scientific achievement. Speakers of other languages saw what could be done and started using alphabetic characters. But the original notion that syllables could be split into vowels and consonants occurred only once in human history. [...] We also lose out in that our thinking about words and sounds is strongly influenced by writing. We imagine that the letters of the alphabet represent separate sounds instead of being just clever ways of artificially breaking up syllables. Alphabetic writing has almost certainly been invented only once, whereas there are many independent inventions of systems for writing down syllables.

So, aren't vowels and consonants supposed to be an universal? While the Chinese linguistic tradition alone cannot be used as an argument or counterargument to the universality claim of the existence of vowels and consonants, the present writer wholeheartedly agrees with Ladefoged and those phoneticians who think that the distinction of vowels and consonants is not a natural one and they do not constitute a universal. In this specific case, however, by universal is not meant 'typological universal', intended as the study of a pattern which occurs systematically across spoken languages (cf. Comrie, 1989), but "cultural universal", i.e. a practical

convention which is adopted independently among different cultures and traditions. A language universal, by definition, is the belief that "there exist linguistic properties beyond the essential definitional properties of language that hold for all languages" (Croft, 1990: 4).[17] Here, it is not contested the universality of those sub-syllabic units which we now call vowels and consonants, as they are clearly observed in all languages of the world.[18] Rather, what is denied is the universal practice of breaking the syllable into two categories such as vowels and consonants in all linguistic traditions. This is not to imply that basing our framework directly on the vowel–consonant distinction, as most historical and general linguists do, is incorrect, but that we should not be surprised if several linguistic traditions, besides the Western one, did not divide the syllable into vowels and consonants. Chinese linguistic tradition offers a clear-cut example of a scholarship who knew how to break the syllable into smaller units, but did not adhere to the Western practice of dividing them into vowels and consonants.

CLOSING REMARKS

In this article it has been argued that the linguistic tradition of China, which—with the help of Indian phoneticians—was able to break the syllables into several smaller units, did not contemplate the the vowel–consonant distinction, which they were not aware of. When these two concepts entered into the Chinese vocabulary, perhaps via Japan, they were respectively understood as sounds which could have been pronounced alone and sounds which needed to be attached to another one. Indeed, the disposition of the thirty-six initials of medieval Chinese clearly reflects the practice of putting what we refer to as 'vowels' alone, and consonants together with a vocalic phoneme. Vowels were also presumably understood as "primary sounds", whereas consonants as sounds derived from them.

Although there is a long tradition, going back as far as to the second half of the nineteenth century, to interpret the bemusing concept of 'four Grades' in terms of vowel quality and presence of vocoid approximants in medial position or lack thereof, suggesting, thus, that Chinese classical scholarship was at least aware of the existence of vowels and consonants, it has been argued that this, in all probability, is an incorrect assumption. Whilst it is not denied that medial glides are effectively found in many varieties of Sinitic, confirming what is predicated by the segmentationalist approach (albeit the whole scheme of medial glides reconstructed for medieval Chinese is nowhere observable in living Sinitic languages), it has been pointed out that, after a perusal of indigenous sources from the early seventeenth to the late nineteenth century, it is more credible to assume that the Chinese linguistic tradition

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[17] However, not everyone agrees on the universality of certain patterns of language. The behaviourist approach, for instance, posits that no innate scheme or universal feature exist.

[18] However, the previous assumption that every word must at least possess a vowel phoneme has been proven false (cf. Hockett, 1955: 57). A quite popular anecdote says that when Franz Boas (1858–1942) reported this hitherto unknown fact, his paper was rejected by the editor of a journal, because it was impossible for a word to consist of entirely voiceless consonants, as Boas reported (he discovered that in Nuxalk, the word for 'stone' is said t'xɬ). Other evidence of vowelless words in Wakashan are also adduced in Kortlandt (1995), and, so far as is it possible to know, some words such as the word for 'monastery' do not contain vowels in certain varieties of Southern Min: in Xiamen it is pronounced *tŋ24* with a *yangping* tone in the literary reading (*tɔŋ24* in the colloquial stratum), the same is true in the Zhangpu dialect (*tŋ213*, *yangping* tone) and in the Qianlu dialect spoken at Datian (tŋ̃24, *yangping* tone), but the situation is the other way round in Nan'an, where the literary reading gives *tɔŋ24* in the *yinping* tone, whereas the colloquial reading is tŋ̍24, with a moraic nasal ending. In the varieties of Southern Min spoken near Chaozhou and in the Hong Kong New Territories, this word is pronounced *tŋ55/24* (respectively, in Haifeng and Lufeng) and *tŋ44* (cf. Lin & Chen 1996, Ch'en 2008).

was primarily concerned with articulatory phonetics, especially for what regards the notions of 'place of articulation' and 'degree of stricture'. Indeed, it appears that the four Grades were fundamentally based on subjective (i.e. not based on instrumental techniques, such as radiography, plastography, etc.) and *proprioceptive* observations. In other words, what the compilers of rime tables described were overall and perceptive estimates of degrees of strictures, and not the presence of segmental features. Proponents of other theories have probably overstated their case or have, occasionally, grossly exaggerated what classical scholarship were able to do without instrumental techniques, with the result of a segmental/phonemic representation of the sound classes they were studying. In other words, sound classes, already disposed according to a quinary/septimal articulatory scheme (so called *wuyin*), were further analysed and described on the basis of a progressive narrowing of the phonatory organs. Thus, according to the *xiaoxue* scholarship of Ming-Qing times, Grade I sounds were pronounced with a wide aperture of the mouth, whereas Grade IV sounds were pronounced with a narrow one. Of course, to a narrower opening of the mouth it might correspond a high-front vowel or a set of high-front vowels (and perhaps even a vocoid approximant), and vice versa, but this should not induce us to think that the four Grades were designated to indicate a precise set of vocalic and semi-vocalic phonemes.

Furthermore, it is hoped that this study will succeed in encouraging typologists and general linguists to pay more attention to Chinese linguistic tradition. At the same time, it is also hoped that the study of historical Chinese phonology will soon be disentangled by its *sui generis* nature and by this *dengyunxue*/*xiaoxue* straitjacket in which it has been languishing for far too long.

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論漢語聲韻學中"元音"與"輔音"的概念

論聲韻學中音階分解法及等韻圖中四等的性質

儘管漢語聲韻學受到印度語音科學的影響，但漢語聲韻學是獨立於西方語言傳統而發展起來的。本文試圖分析漢語聲韻學中有無元音與輔音概念。除此之外，本文還旨在討論中國傳統語音韻學中的音節分解法及等韻圖中等呼的性質。等呼的概念最先應用在韻圖上。眾所周知，韻圖把韻書中相類似的韻目歸為一大類，稱為攝，每一攝內部，又主要根據元音的前後度和介音（既，半元音）的差異，分為四等，每等又分為開口和合口兩呼。由此可見，傳統等韻學家用圖表來分析語音的最佳原理和類別。古今學者關於等呼的起源與性質眾說紛紜。本文試圖對這些說法進行分析總結，認為不僅並非無外乎兩三種說法，還認為等呼的概念很有可能是用來指示聲道的縮小度，故此四等的概念與元音和半元音無關。

關鍵詞：元音和輔音的概念；漢語聲韻學；四等；音階分解法；聲道之縮小度；調音語音學