Ciphering Classical Chinese
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1. Some pre-modern texts dealing with **message secrecy**

1.1 The *Liù tāo* 六韜 [Six Sheath, or Secret Teachings], chap. 24 (late Warring States period, cf. STRÄTZ 1979: 1-32, TONG XIGANG 2000, XIE WENCHAO & CUI HONGYAN 2005) on **tally steganography** (*yīnfú* 陰符, a.k.a. "creditives", cf. FLESSEL 1982: 58-65)

武王問太公曰：'引兵深入諸侯之地，三軍猝有緩急，或利或害，吾將以近通遠，從中應外，以給三軍之用。為之奈何？'
太公曰：'主與將，有陰符。凡八等：有大勝克敵之符，長一尺；破軍殺將之符，長九寸；降城得邑之符，長八寸；却敵報遠之符，長七寸；誓眾堅守之符，長六寸；請梁益兵之符，長五寸；敗軍亡將之符，長四寸；失利亡士之符，長三寸。諸奉使行符稽留者，若符事泄，聞者告者，皆誅之。

八符者，主將秘聞，所以陰通言語，不泄中外相知之術。敵雖聖智，莫之通識。'武王曰：'善哉。'

"The Martial king asked Duke Tai: 'When, having lead our troops deep into the territory of some feudal lord, the army unexpectedly has an urgent need to report back, either positively or negatively, how should a general proceed to establish communication between the near and the distant, to respond to the outside from within, so that equipment for the army can be supplied?'

Duke Tai said: 'The sovereign and the lord avail themselves of **secret tallies**, of which there are eight types: the tally for a big victory and the annihilation of the enemy measures one *chi* in length; the tally for the destruction of an army and the killing of its general measures nine *cun* in length; the tally for the fall of a city wall and the capturing of the city measures eight *cun* in length; the tally for the defense against the enemy and his repulsion into distant territory measures seven *cun* in length; the tally for the alerting of the city dwellers and the strengthening of its guard measures six *cun* in length; the tally for a request for grain victuals and an increase in troops measures five *cun* in length; the tally for a defeat of the army or the loss of a general measures four *cun* in length; the tally for a desperate situation and the loss of soldiers measures three *cun* in length. All those in charge of delivering the tallies who are slovenly and slow, and, in case of a leakage of the tally's content matter, those who have heard of it and passed it on, are to be executed.

These eight tally types are the device, through which sovereign and general secretly communicate words and messages, and by which they notify one another without any leakage to the outside from within. Even if the enemies had the knowledge of a sage, there is none among them who could thoroughly penetrate into this.'

The Martial king said: Very well, indeed!" (cf. STRÄTZ 1979: 77-8, FLESSEL 1982: 63)

1.2 *Liù tāo* 六韜 25 on "secret writing" (*yīnshū* 陰書)

武王問太公曰：引兵深入諸侯之地，主將欲合兵，行無窮之變，圖不測之利，其事繁多，符不能明；相去遼遠，言語不通。為之奈何？

太公曰：諸有陰事大慮，當用書，不用符。主以書遺將，將以書問主。書皆一合而再離，三發而一知。再離者，分書為三部。三發而一知者，言三人，人操一分，相參而不知情也。此謂陰書。敵雖聖智，莫之能識。

武王曰：善哉。

"The Martial king asked Duke Tai: 'When, having lead our troops deep into the territory of some feudal lord, the sovereign and a general wish to reunify their troops, to realize all sorts of changes or to plan a previously unforseen advantage, and matters are too multifarious to be clarified by tallies, how — if they are at a great distance from each other and thus unable to communicate by words and messages — should they proceed?'

Duke Tai said: 'Whenever dealing with secret affairs or great plots, writing has to be used, not tallies. The sovereign transmits [commands] in writing to the general, and the general inquires in writing with the sovereign. All writings are assembled once and then divided again, issued thrice but known only by one. *Divided again* means that the writing is divided into three pieces, *issued thrice but known only by one* means that three persons handle one part each, mutually establishing a trinity without knowing the intelligence. This is called *secret writing*. Even if the enemies had the knowledge of a sage, there is none among them who could penetrate into this.' The Martial king said: Very well, indeed!" (cf. STRÄTZ 1979: 78-9)

Piece 1		Piece 2		Piece 3	
敵	ENEMY	雖	EVEN	聖	SAGE
智	KNOWLEDGE	莫	NONE	之	IT
能	BE CAPABLE	識	PENETRATE		

"Even if the enemies had the knowledge of a sage,
there is none among them who could penetrate into this."

Piece 1	Piece 2	Piece 3
Even	if	the
enemies	had	the
knowledge	of	a
sage	there	is
none	among	them
who	could	penetrate
into	this	

1.3   The **character verification** (*zìyàn* 字驗) command roster of the *Wǔjīng zǒngyāo* 武經總要 [*Essential Compendium of the Five (Military) Classics*] (6.15: 8-9) of 1044 by Zēng Gōngliàng 曾公亮

1	請弓	request bows	21	賊多	enemies numerous
2	請箭	request arrows	22	賊少	enemies few
3	請刀	request halberds	23	賊相敵	enemies at odds among themselves
4	請甲	request suits of armour	24	賊添兵	enemy reinforces troops
5	請槍旗	request javelin flags	25	賊移營	enemy relocates camp
6	請鍋幕	request dixie and tents	26	賊進兵	enemy advances army
7	請馬	request horses	27	賊退兵	enemy withdraws army

8	請衣	request accoutrement	28	賊固守	enemy defense persistent
9	請粱料	request victuals	29	圍得賊城	besieged and captured enemy city
10	請草料	request forage	30	解圍城	dissolved siege of enemy city
11	請車牛	request carts and oxen	31	被賊圍	besieged by enemy
12	請船	request ships	32	賊圍解	enemy siege dissolved
13	請功城守縣	request defensive gear against attack on city walls	33	戰不勝	combat not victorious
14	請添兵	request troop reinforcement	34	戰大勝	combat greatly victorious
15	請移營	request camp relocation	35	戰大捷	combat with great booty
16	請進軍	request army advance	36	將士投降	officers and soldiers surrender

17	請退軍	request army fallback	37	將士叛	officers and soldiers mutiny
18	請固守	request persistent defense	38	士卒兵	soldiers and sergeants sick
19	未見軍	no intervisibility with (adversarial) army	39	都將病	company commander sick
20	見賊訖	intervisibility with enemy clear	40	戰小勝	combat with minor victory

1.3.1 encryption method: **substitution code**

- ➢ establish a sequence of the comnmand roster and align it to the 40 characters of a randomly chosen, mutually agreed pentasyllabic regulated poem (*lǜshī* 律詩), known by heart, which does not include any character repetitions

- ➢ send the poem with a mutually agreed seal stamped next to the poem character corresponding to the intended command(s)

- ➢ signal positive response by sending back the poem character with a stamp next to it, negative response by replacing the blank position of the code character with a stamp.

1.3.2　杜甫　《春望》

國破山河在，春城草木深　　⇒ 9-31: "request victuals, besieged by enemy"
感時花濺淚，恨別鳥惊心
烽火連三月，家書抵萬金
白頭搔更短，渾欲不勝簪

2.   **Literary encryption** techniques (cf. Führer 2003/4, Behr 2005)

2.1   a "**synthanalytic**" poem (líhéshī 離合詩) found on a stone slab from the "Peach Blossom Spring" (Táohuāyuán 桃花源) Daoist sanctuary in Northwestern Húnán (late Táng): text from Zhōu & Zhōu (1987: 76-77)

a. text:

	a	b	c	d	e	f	g
1	機	時	得	到	桃	源	洞
2	忘	鐘	鼓	響	停	始	彼
3	盡	聞	會	佳	期	覺	仙
4	作	惟	女	牛	下	星	人
5	而	静	織	郎	弹	斗	下
6	機	詩	賦	又	琴	移	象
7	觀	道	歸	冠	黄	少	棋
~	*a*	*b*	*c*	*d*	*e*	*f*	*g*

b. reading sequence:

	a	b	c	d	e	f	g
1	37	38	39	40	41	42	43
2	36	17	18	19	20	21	44
3	35	16	5	6	7	22	45
4	34	15	4	1	8	23	46
5	33	14	3	2	9	24	47
6	32	13	12	11	10	25	48
7	31	30	29	28	27	26	49
~	*a*	*b*	*c*	*d*	*e*	*f*	*g*

c. Mandarin transcription: ↓

d. pivot characters/ realignment types ↓

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x	a	b	c	d	e	f	g
1	*jī* *jǐ*	*shí*	*dé*	*dào*	*táo*	*yuán*	*dòng* *tóng*
2	*wàng*	*zhōng*	*gǔ*	*xiǎng* *yīn*	*tíng*	*shǐ*	*bǐ*
3	*jìn*	*wén*	*huì*	*jiā*	*qī* *yuè*	*jué*	*xián*
4	*zuò*	*wéi*	*nǚ*	*niú*	*xià*	*xīng*	*rén*
5	*ér*	*jìng*	*zhì*	*láng*	*tán*	*dǒu*	*xià*
6	*jī*	*sì* *shī*	*fù*	*yòu*	*qín*	*yí* *duō*	*xiàng*
7	*jiàn* *guān*	*dào*	*guī*	*guān*	*huáng*	*shǎo*	*qí*

3e: 期 *qī* → 月 *yuè*
[ps]　　　[s]

6b: 詩 *shī* → 寺 *sī*
[sp]　　　　[p]

2d: 響 *xiǎng* → 音 *yīn*
[p↓s]　　　　[s]

6f: 移 *yí* → 多 *duō*
[sp]　　　[p]

7a: 觀 *guān* → 見 *jiàn*
[ps]　　　　[s]

1a: 機 *jī* → 幾 *jǐ*
[sp]　　　[p]

1g: 洞 *dòng* → 同 *tóng*
[sp]　　　　[p]

[section structure]

e. translation:

4d-3e *Cowherds and weaving girls gather for tryst TIME*

3e'-6b *Under the MOON, playing the zither and reciting POETRY*

6b'-2d *The MONASTERY is silent, just a bell and drum to be heard ECHOING*

2d'-6f *When the sounds stop, I first sense the stars are MOVING*

6f'-7a *So MANY (yellow caps =) Daoist priests go back to their SHRINE*

7a'-1a *Having gained INSIGHT into it, they are blissfully at ease with forgetting
the CRUX of life*

1a'-1g *WHEN will I get to peach blossom CAVE*

1g'-7g *to play a game of chess with those immortals?!*

2.2 a **Taiping slogan** embedded synthanalytically in a poem (cf. Zʜᴏᴜ Xɪɴɢᴜᴏ 1997):

a. text

●	a	b	c	d	e	f	g	TRANSLATION
1	人	王	腳	下	兩	堆	沙	*Beneath the king of people's feet: two heaps of sand,*
2	東	門	頭	上	草	生	花	*on top of the eastern gate, vegetation is sprouting buds.*
3	絲	線	穿	針	十	一	口	*A silken string threads eleven people together.*
4	羊	羔	美	酒	是	我	家	*lamb and fine wine — that's my home!*

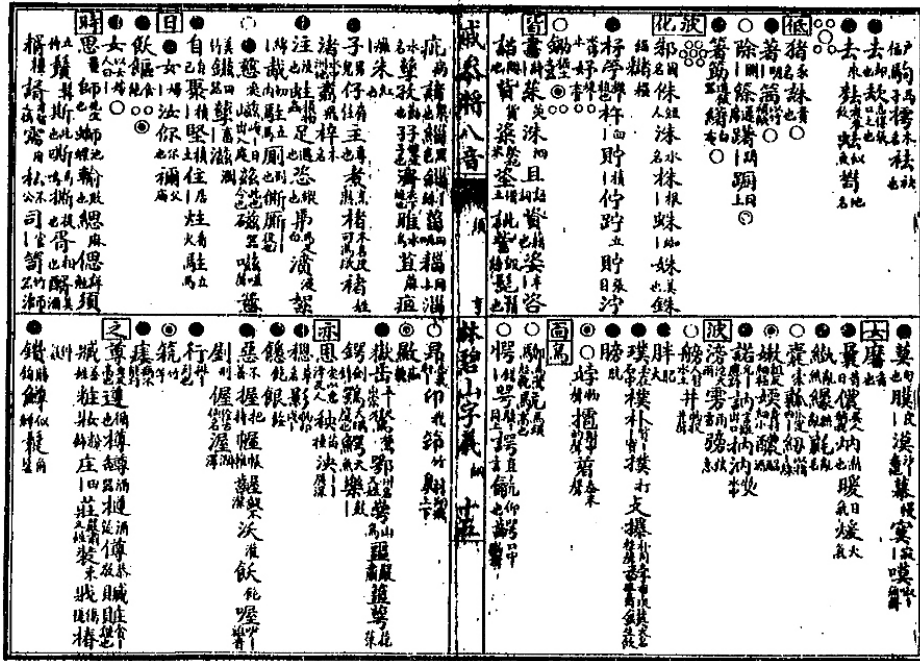("Jīnlán jiéyì shī", *Jìndài mìmì shèhuì shǐliào* 《近代秘密社會史料》348)

b. reading:

- 1a 人 & 1b 王 with two heaps of 1g 沙 "sand" at the bottom :
- 2a 東 & 2b with 2e 草 "grass" on top:
- 3a 絲→糸 & 3e 十 & 3f 一 & 3f 口 bound together:
- the 4a 羊 4b [gāo] = 高 "on top of" 4c 美 & 4f 我:

| 金 |
| 蘭 |
| 結 |
| 義 |

"intimate conspiracy"

3. **Phonological-algorithmic encryption** based on the *Bā yīn zì yì biànlǎn* 八音字義便覽 [Handy survey of the meanings of the characters arranged by the eight tones], ascribed to Qī Jìguāng 戚繼光, later incorporated into the Early Qīng *Qī-Lín bā yīn* 戚林八音 [*The Eight Tones of Qī (Jìguāng) and Lín (Bìshān)*] rhyme dictionary.

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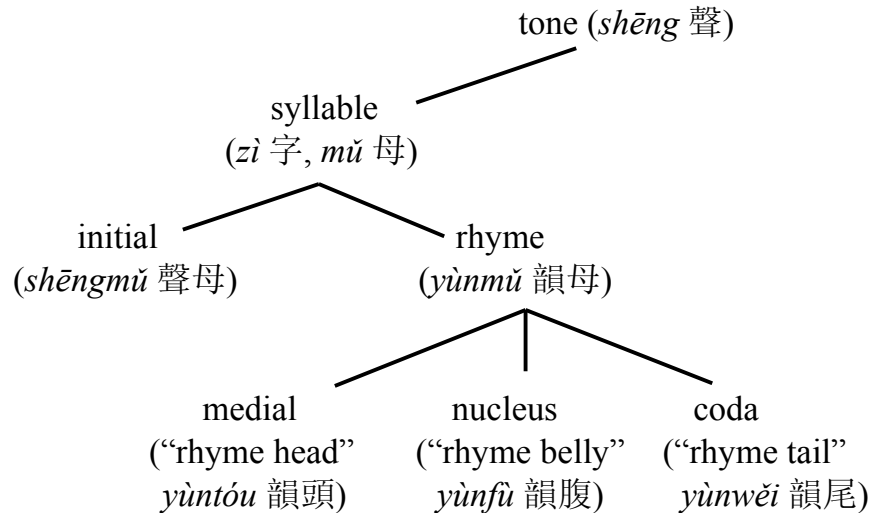
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3.1   some **biodata** on QĪ JÌGUĀNG:

- born 12.11.1528 in Jǐníng 濟寧/Shāndōng — died 5.1.1588 in Dēngzhōu 登州/ Shandong
- *style* Yuánjìng 元敬, *literary name* Nántáng 南塘, *retirement name* Mèngzhū 孟諸
- Míng general, poet, military theoretician, general famous for his leading role in coastal anti-Japanese (anti-piracy) struggle 1555-1568
- active in Mǐn-speaking regions for six years
- alternative authorship attribution to the famous phonologist CHÉN DÌ 陳第 (1541- 1617) dubious (cf. ZOU GUANGCHUN 1986)

3.2   the **phonological system** of the *Bāyīn zì yì biànlăn* (cf. on the text Geng Zhensheng 1992: 161-2, Li Xinkui & Mai Yun 1993: 399-400, Wang Shengkui 1995, Klöter 2005: 65)

3.3   prerequisites: traditional analysis of the internal hierarchy of the syllable in Middle Chinese

tone (*shēng* 聲)

syllable
(*zì* 字, *mǔ* 母)

initial
(*shēngmǔ* 聲母)

rhyme
(*yùnmǔ* 韻母)

medial
("rhyme head"
yùntóu 韻頭)

nucleus
("rhyme belly"
yùnfù 韻腹)

coda
("rhyme tail"
yùnwěi 韻尾)

3.4   aside: a current model of the syllable in Chinese (L<small>IN</small> & W<small>ANG</small> 1992)

$[_T \; \mu\mu \;]+[_\sigma[$<small>INITIAL</small> $C] [$<small>RHYME</small>' $[$<small>MEDIAL</small> $G] [$<small>RHYME</small> $[$<small>NUCLEUS</small> $V] [$<small>CODA</small> $C/G]]]]$

where: σ= syllable, μ= mora, C= consonant, G= glide, V=vowel, T=tone

3.5   analysis

3.5.1 **tone**

T/I	平	上	去	入	A		B		C		D	
陰 -vd	① 44	② 31	③ 213	④ <u>23</u>	君	**kjun* ⁴⁴*kuŋ*	滾	**kwonX* ³¹*kouŋ*	貢	**kuwngH* ²¹³*kouŋ*	谷	**kuwk* <u>23</u>*kouʔ*
陽 +vd	⑤ 52	⑥ 31	⑦ 242	⑧ <u>4</u>	群	**gjun* ⁵²*kuŋ*			郡	**gjunH* ²⁴²*kuŋ*	掘	**gjut* <u>4</u>*kuʔ*
MC system & FZ values					example characters / Baxter's *MC / Colloquial FZ							

3.5.2 **initials**: a pseudo-short regulated quatrain (*juéjù* 絕句) mnemonic verse of the "fifteen sounds" (*shíwǔyīn* 十五音)

a. text   b.translation

柳	邊	求	氣	低
1	2	3	4	5

Next to a willow, seeking a hideout from the damp,

波	他	曾	日	時
6	7	8	9	10

I'm brooding over times of yonder days.

鶯	蒙	語	出	喜
11	12	13	14	15

The oriole's obscure twitter effuses joy,

打 掌 與 君 知   *jolting me to share it with you.*

[→ clapping (the syllable numbers) to communicate sth. to you !] *

* cf. Táo Zōngjǐn 陶宗儀 (*fl.* 14 Jh.), *Náncūn Chuògēnglù* 南村輟耕錄 description of the "*shè zì fǎ*" 射字法 clap-spelling method (YANG NAISI 1960)

b. interpretation

PLACE/ARTICULATION	BILABIAL				DENTAL				VELAR				LARYNGEAL	
ORAL STOPS	邊	/p/	波	/pʰ/	低	/t/	他	/tʰ/	求	/k/	氣	/kʰ/	鶯	∅~/ʔ/
NASALS	蒙	/m/	日	/n/	語	/ŋ/								
FRICATIVES	時	/s/	喜	/x/										
AFFRICATES	曾	/ts/	出	/tsʰ/										
LATERALS	柳	/l/												

3.5.3 **finals**

a. a mnemonic air (*cí* 詞) of the "thirty-six syllables" (*sānshíliù zìmǔ* 三十六字母)

春 1	花 2	香 3	秋 4	山 5	開 6	
嘉 7	賓 8	歡 9	歌 10	須 11	金 8	盃 12
孤 13	燈 14	光 15	輝 16	燒 17	銀 18	釭 19
之 20	東 21	郊 22	過 23	西 24	橋 25	
雞 26	聲 27	催 28	初 29	天 30		
奇 31	梅 12	歪 32	遮 31	溝 33		

Spring flowers are fragrant,
fall mountains bloomy,

my honoured guests, delighted to sing,
yearning for golden cup.

The shining brightness of a lonesome lamp,
burns in an argentine bowl.

While I go to the eastern suburbs,
passed the west bridge,

a rooster's cry is pressing for the new day,

and rare prunes twist along the ditch.

（原註： "內金同賓，梅同杯，庶同奇，實只三十三字母。"）

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b.   interpretation: **rhyme classes**

  ● closed syllable variants represent nasal finals (*yangsheng* 陽聲) and glottal stop finals (*rusheng* 入聲), respectively)

1 春	2 花	3 香	4 秋	5 山	6 開	
/uŋ/, /uʔ/	/ua/	/yɔŋ/, /yɔʔ/	/ieu/	/aŋ/, /aʔ/	/ai/	
7 嘉	8 賓	9 歡	10 歌	11 須	✘金	12 盃
/a/, /aʔ/	/iŋ/, /iʔ/	/uaŋ/, /uaʔ/	/ɔ/	/y/	(/iŋ/, /iʔ/)	/uei/
13 孤	14 燈	15 光	16 輝	17 燒	18 銀	19 釭
/u/	/eiŋ/, /eiʔ/	/uɔŋ/, /uɔʔ/	/uei/	/ieu/	/yŋ/, /yʔ/	/ouŋ/, /ouʔ/
20 之	21 東	22 郊	23 過	24 西	25 橋	
/i/	/øyŋ/, /øyʔ/	/au/	/uɔ/, /uɔʔ/	/ɛ/	/yɔ/, /yɔʔ/	
26 雞	27 聲	28 催	29 初	30 天		
/ie/	/iaŋ/, /iaʔ/	/øy/	/œ/	/ieŋ/, /ieʔ/		
31 奇	✘梅	32 歪	✘遮	33 溝		
/ia/, /iaʔ/	(/uei/)	/uai/	(/ia/, /iaʔ/)	/eu/		

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c. encryption: sequence **R**hyme-**I**nitial-**T**one

向右 "rightward move"
FZ ^{213}*xyɔ* ^{242}*ieu* ⇒ 25-15-③, 11-17-⑦

賊移營 "enemy relocates camp"
FZ ^{4}*tseiʔ* ^{52}*ie* ^{52}*iŋ* ⇒ 14-8-⑧, 26-11-⑤, 8-11-⑤

倭寇投降 "Japanese bandits surrender"
FZ ^{44}*uei* ^{213}*khau* ^{52}*tau* ^{52}*xouŋ* ⇒ 12-11-① , 22-4-③, 22-5-⑤, 19-15-⑤

etc.

➢ no further transposition or substitution attested!

4.   **Late Imperial bilingual encryption**?

4.1   The *Hóngdǐng shāngrén Hú Xuěyán* 紅頂商人胡雪岩 [*Redhead salesman Hu Xueyan*] 13 (Gāo Yáng 高陽, 1926-1992) on 'alum writing' (*fánshū* 礬書)

在他（胡雪岩）的記憶中，早年聽說過康熙末年奪嫡的許多故事，有的使用"礬書"；有的用羅馬字代替滿州話的"字头"來拼音，"九阿哥"胤的門客中，有一個是"東正教"的教士，因而发明了用俄文拼音來表達滿州話，傳遞反抗雍正的信息，雖为雍正截獲了，却不知說些甚麼？因而胤所部署的"造反"的策略，始終是個謎。

"In his (Hu Xueyan's) memory he had heard in his early years that during the Kangxi period there had been many stories about spouse robberies, some of them making use of alum writing, some of them making use of Latin characters to represent the pronunciation of the Manchu letters, and that among the clientele of "Old Ninety's" descendants there was one, who was a Russian orthodox priest, which is why he came up with a Russian transcription to represent Manchu. And when the news about a rebellion against the Yongzheng-emperor was transmitted, the Yongzheng government had no clue what it said, despite the fact that they had intercepted it. Therefore the plot for rebellion of the descendant's entourage remained a secret from beginning to the end."

5. *fănqiè* 反切 or *qièjiăo* 切腳 codes based on *spoken* language, used by secret socie-
    ties, triads, guilds etc. widespread in Mĭn and Yuè speaking regions and in the adja-
    cent Hmong-Mienic, Tai-Kadaic, Austroasiatic areas but *never* used for premodern
    language stages and/or in writing (cf. Zhao Yuanren 1934, Ma Chongqi 1994, Yip
    1998, Bao 2001 etc.)

    ex.:   FZ 好 $^{33}ho \rightarrow {}^{35}lo\ {}^{31}hi \rightarrow$ 老喜 [$_\sigma$TOR] $\rightarrow$ [$_\sigma$Ṯ-l-R] [$_\sigma$T-O-i]

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6.   Fixing of **6899** Chinese characters as the first commercial numbering system by the Shanghai North Atlantic Telegraph Company (上海大北水电报公司) in 1871; many algorithms used to code/scramble character numbers ever since

7. References

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