Zhangjiashan M247 Corpus Writing Analysis

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1 Mawangdui M3 Corpus Control Group

1.1 Distinguishing second-century BCE Southern scripts

Hypothesis
A single *scripteur* can write in multiple scripts, so we must differentiate *the script* prior to *the scripteur.*

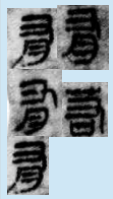
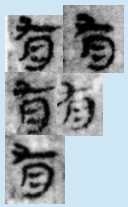
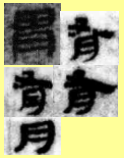
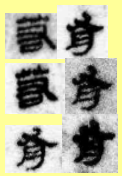
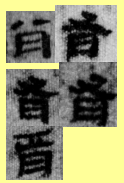
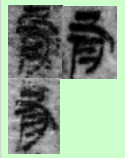
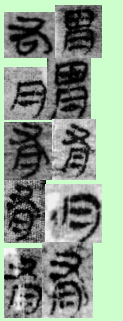
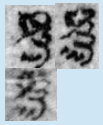
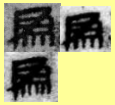
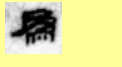
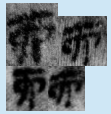
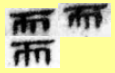
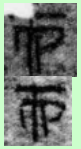
Scholarship
Chen Songchang identifies three scripts in the MWD corpus: 篆隸·古隸·漢隸.[1]

> **Working hypothesis**
> Chen Songchang is correct.

Question
How does the non-calligrapher identify these three scripts?

Experiment
I clipped images at random from 『馬王堆帛書藝術』of characters that I expected to differ from experiences with the ZJS 『筭數書』 and those that I noticed to differ upon visual inspection of the MWD corpus. Note that selections are not exhaustive.

[1] *Mawangdui boshu yishu* 馬王堆帛書藝術 (Shanghai: Shanghai shudian, 1996).

	古隸						漢隸				篆隸			
	五行	刑德甲	事語	縱橫家	老子甲	陰陽乙	黃帝書	相馬經	周易	五星占	養生方	足臂	陰陽甲	病方
有月胃若														
爲														
而														
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	古隸						漢隸				篆隸			
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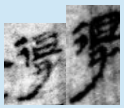
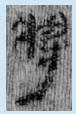
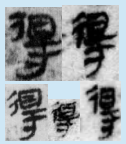
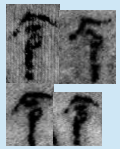
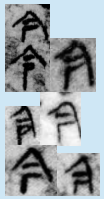
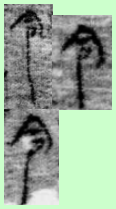
得														
令														
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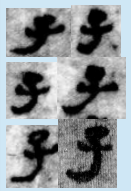
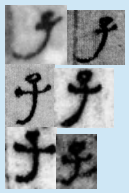
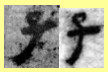
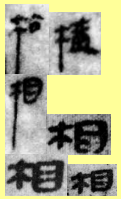
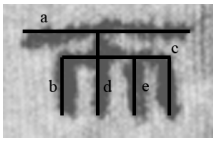
子														
相														
實														

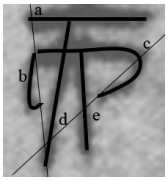
Conclusion

The selection does not reveal much that divides absolutely along Chen Songchang's lines, but there are a handful of quantifiable features that are more-or-less exclusive to each script category.

Script-specific feature 1: 而

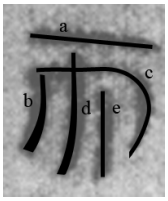


'Han clerical': right angles and equal segment lengths (*b*, *e* and bottom portion of *c* and *d*)



'Seal clerical': lines *b* and *c* curve inwards; lines *d* and *e* extend below *b* and *c* by a factor as high as 2.

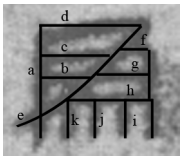
Exceptions: 養生方 full curves  ; 陰陽五行甲 linear 



'Ancient clerical': same features as 'seal clerical', but less exaggerated and more linear; stroke *b* curves outward.

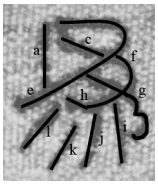
Exceptions: 刑德甲、戰國縱橫家 full curves

Script-specific feature 2: 為



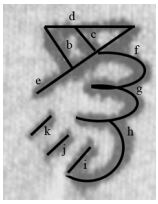
'Han clerical': right angles and equal segment lengths (*i*, *j*, *k* and bottom portion of *a* and *h*)

Exceptions: 陰陽五行乙 different balance 

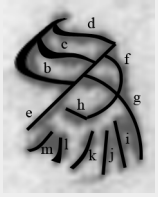


'Seal clerical' (陰陽五行甲): triangle *a-d-e* the same form, but divided by one diagonal line (*c*); section *f-g-h* in the form of 又 with wiggles; additional bottom line (*l*); bottom lines *i-j-k-l* at different angles.

Exceptions: 五十二病方、養生方 have more bottom dots.

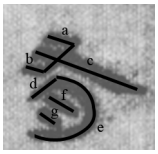


'Ancient clerical' (春秋事語): upper left same triangle structure as 'seal clerical'; *f-g-h* not a 又, but three connected semi-circles; lines *i-j-k* parallel.



'Ancient clerical' (戰國縱橫家): top left not a triangle, *b-c-d* forming a 爪; *f-g-h* form a 又, like the 'seal clerical' example; extra bottom lines (*l*, *m*).

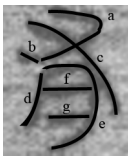
Script-specific feature 3: 有



'Han clerical': line *c* extends below 月; lines *a*-*b*-*c* parallel; line *a* roughly 90°.

Exceptions: 五星占 square 月 

Exceptions: 周易 upward 又 



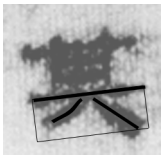
'Seal clerical': line *c* round, extends below 月; line *a* roughly parallel with line *e*, top larger than line *b* by factor of 2, bends roughly 45°.

'Ancient clerical': line *a* a semi-circle with a roughly 45° bend at top; line *c* stays above 月.

Exception: 刑德甲 square 月 

'Ancient clerical' (戰國縱橫家): strict linearisation in imitation of 又 component in 若 

Script-specific feature 4: Little feet

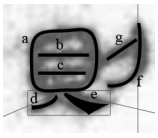


'Han' & 'Ancient clerical': the feet on characters like 其、貝、黃 are asymmetrical, the one on the right extending about twice as far below the upper line than the left foot.

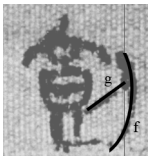
Exception: 'Ancient' less exaggerated, some mixing, i.e. 

'Seal clerical': the feet are more evenly sized, left foot might be longer than the right, and the angle between the feet is less than half of that in 'Han' & 'Ancient Clerical'

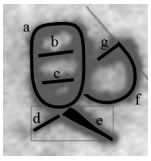
Script-specific feature 5: 則



'Han clerical': appropriate little feet; 貝 nearly a square; line *f* of 刀 component starts with vertical line; line *g* connects part-way down.



'Seal clerical': line *f* of 刀 component is a gentle arc; line *g* connects part-way down.



'Ancient clerical': appropriate little feet, with less curvature; 貝 is elongated ovoid; line *f* of 刀 component a semi-circle; line *g* connects with *f* at its end.

Exception: 縱橫家 extravagant 'seal' 刀  , weird feet  .

1.2 Distinguishing personal idiosyncrasies within a script

Observation
Within a single script-group, as identified by Chen Songchang on the basis of overall uniformity, there are orthographic variations that are consistent within individual manuscripts; some of these variations reproduce the norms of other script-groups.

Working hypothesis
Variations on a script group unique to and consistent within a single manuscript represent the personal idiosyncrasies of the individual *scripteur*.

Question
What *scripteur*-specific idiosyncrasies do we see in the MWD corpus?

Findings

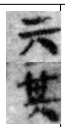
有			(1) Square 月 (throughout all characters): 刑德甲(‘ancient’)  , 五星占(‘Han’)  , 陰陽甲(‘seal’)  .
			
篆	古	漢	

爲			(1) ‘Ancient’ wavy-line variant: 縱橫家  (2) ‘Ancient’ linear variant: 陰陽五行乙 
			
篆	古	漢	

而			(1) ‘Seal’ in ‘ancient’: 刑德甲  (2) ‘Ancient’ in ‘seal’: 陰陽五行甲 
			
篆	古	漢	

人			(1) Single-stroke: 黃帝書 (‘Han’)  , 周易 (‘Han’)  *Form identical across script.
			
篆	古	漢	

則			(1) ‘Seal’ feet in ‘ancient’: 縱橫家  (2) ‘Seal’ 刀 in ‘ancient’: 縱橫家 
n/a			
篆	古	漢	

其			(1) ‘Seal’ feet in ‘ancient’: 縱橫家  (2) Curved horizontal stroke in ‘seal’: 陰陽五行甲  (3) ‘Ancient’ inconsistent on abbr. vs. full form: 縱橫家、老子甲
n/a 			
篆	古	漢	

得			(1) Consistent use of short form: 縱橫家
n/a			
篆	古	漢	

令			(1) 'Ancient' linear variant: 縱橫家  (2) 'Seal' elongated variant, like of 'Han' & 'Ancient': 病方 
			
篆	古	漢	

見			(1) 'Seal' in 'Ancient': 縱橫家 
			
篆	古	漢	

相			(1) 'Seal' elongated asymmetry: 病方 
			
篆	n/a 古	漢	

Conclusion
The MWD script-groups reveal idiosyncrasies at the level of *scripteur*.

2 Zhangjiashan M247 Corpus

2.1 ZJS Script Analysis

The Zhangjiashan M247 corpus consists of eight manuscripts:

1. 二年律令
2. 奏讞書
3. 筭數書
4. 引書
5. 脈書
6. 蓋廬
7. *曆譜
8. *遣策

Question
Are there distinct scripts of the sort identified in the MWD corpus at ZJS?

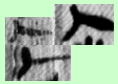
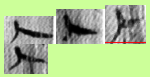
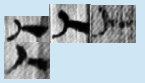
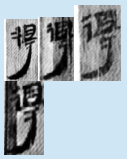
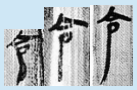
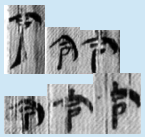
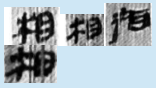
Scholarship
Li Jingrong and others have identified multiple hands in 二年律令,[2] and Morgan & Chemla identify multiple hands in 筭數書,[3] so we can therefore expect multiple scripts/*scripteurs* in a single manuscript.

Experiment
I clipped images from the ZJS corpus to fill out the same table as for the MWD sample in Section 1.1; where I encountered inconsistencies in the same slip, I created 'A & B' columns to distinguish the scripts/*scripteurs* as best as possible. I then compared each MS/hand to Chen Songchang's MWD script-groups, attempting to place the ZJS samples within this typology via process of elimination. For each character form, I noted which criteria a given sample *failed* to meet (e.g. asymmetrical, outward-running 'feet' on 其、貝, etc. *fail* the criteria for 'seal clerical'). I then tabulated the results across the five 'script-specific features' in Section 1.1, and I separated script-groups by exclusion (i.e. I distinguished samples that consistently fail the test for 'ancient clerical' from those that fail the test for 'seal clerical'). With the MSS divided into 2-3 groups, I then *positively* identified MSS with Chen Songchang's script-groups, my criterion being that a MS *pass* 4/5 rounds of elimination. Having done this, I rearranged my original table according to script-group and pass-rate (samples passing 5/5 criteria on the left, those passing 4/5 to the right, etc.). Lastly, I assigned colours to each cell indicative of which form a particular orthography matches, thus identifying 'ancient' features in 'seal clerical' and *vice versa*.

[2] Li Jingrong, "The *Ernian Lü Ling* Manuscript" (Ph.D. diss., Universität Hamburg, 2014), 33–50; Zhang Yaojun 張耀鈞 and Yan Pin 閻頻, "Jiangling Zhangjiashan san zuo Han mu chutu dapi zhujian" 江陵張家山三座漢墓出土大批竹簡, *Wenwu* 文物 1985.12 (1985): 1126; 張忠煒, 秦漢律令法系研究初編 (Beijing: Shuihui kexue wenxian, 2012), 21; 冨谷至, "Jiangling Zhangjiashan ersiqi hao Hanmu chutu zhujian: tiebie shi guanyu *Ernian lüling*" 江陵張家山二四七號漢墓出土竹簡：特別是關於『二年律令』, in *Jianbo yanjiu erlinglingba* 簡帛研究二零零八, ed. Bu Xianqun 卜憲群 and Yang Zhenhong 楊振紅 (Guilin: Guangxi shifan daxue chubanshe, 2010), 21.

[3] Mo Zihan 墨子涵 and Lin Lina 林力娜, "Ye you lunzhe xiede: Zhangjiashan Han jian Suan shu shu xieshou yu bianxu chutan" 也有輪着寫的：張家山漢簡『筭數書』寫手與編序初探, *Jianbo* 簡帛 (forthcoming-).

篆隸			Skinny	古隸				古隸 Misc			Unidentified	
exmpl	筭數 B	蓋廬	脈書	exmpl	筭數 A	引書	二年 B	二年 A	奏讞 B	奏讞 A	曆譜	遣策
也	–			也	–	–	–		–		–	–
											–	–
							–				–	
											–	–
											–	–

篆隸			Skinny	古隸				古隸 Misc			Unidentified	
exmpl	筭數 B	蓋廬	脈書		筭數 A	引書	二年 B	二年 A	奏讞 B	奏讞 A	曆譜	遣策
人											–	
得			–								–	–
令											–	–
見	–	–			–		–				–	–
相			–								–	–
實							–	–			–	–
所	–	–							–		–	–

Analysis

All samples consistently failed the test for ‘Han clerical’, leaving us with the possibility of only ‘seal clerical’, ‘ancient clerical’ and other scripts. Within this, 筭數書 hand B is paradigmatic of **‘seal clerical’**, 筭數書 hand A is paradigmatic of **‘ancient clerical’**, and 脈書 seem to merit separate classification, for which I chose **‘skinny seal clerical’**; due to the limited number and variety of characters, lastly, it was difficult to identify 曆譜 and 遣策 with any one script on the basis of such examination.

The rational for distinguishing ‘skinny seal clerical’ from ‘seal clerical’ is based foremost upon my subjective impression of an overall difference in visual style between, for example, the 脈書 and 蓋廬 MSS *rather than fundamental structural differences*. The one structural difference (from my samples) that may merit the distinction of *script* is the the old Qin form for 也 in 脈書.

脈書　蓋廬

2.2 Script contamination

Question
After having distinguished the scripts in which the ZJS MSS were written, we can eliminate certain variants from consideration as 'idiosyncrasies'—e.g. MS A gives *x*, where MS B gives *y*, because MS A is written in a script where you always write *x*. Having identified *one* non-idiosyncratic factor behind variora, what other phenomena factors do we need to circumscribe before we identify *scritpeurs*?

Scholarship
Feng Shengjun has shown positive evidence for 'domestication' of foreign scripts in Warring States Chu MSS—where the *scripteur* 'translates' a text in another script into his own, sometimes leaving the occasional character 'undomesticated' for whatever reason.[4] In a similar vein, Mathias Richer hypothesises that occasional variant forms in a single manuscript might result from the *scripteur* reverting to another, more familiar script as he/she writes in another.[5] In short, the two phenomena—one substantiated, the other inferred—imply opposite processes behind script contamination: the one, that foreign script forms are *reproduced* from the original *because they are unfamiliar*, the other, that foreign script forms *are reverted to* from the *scriteur*'s repertoire *because they are familiar*; in one, foreign script forms depend on the manuscript that the *scripteur* is copying at the time, while, in the other, they represent a personal idiosyncrasy that may assist in identifying the *scripteur*.

Question
Is there script contamination in the ZJS corpus?

Methodology
Given that Chen Songchang's identification of 'seal', 'ancient' and 'Han clerical' scripts is correct (Section 1.1), and given that certain ZJS exemplars conform with his 'seal' and 'ancient' sample (Section 2.1), identifying examples of 'seal' forms in 'ancient clerical', and *vice versa*, should provide us with positive evidence of script contamination. Here, it probably also behoves us to distinguish between contamination that is *consistent* within a single MS or script-group vs. that which is *occasional*.[6]

2.2.1 Consistent 'seal'/'ancient' contamination

其			
			N/A
篆	古	漢	

則			
n/a			N/A

[4] *Guodian jian yu Shangbo jian duibi yanjiu* 郭店簡與上博簡對比研究 (Beijing: Xianzhuang shuju, 2007).

[5] "Towards a Profile of Graphic Variation: On the Distribution of Graphic Variants within the Mawangdui Laozi Manuscripts," *Asiatische Studien/Etudes Asiatiques* 59, no. 1 (2005): 169–207.

[6] Note that I define 'occasional' and 'consistent' provisionally on the basis of subjective experience with the MSS; I intend to refine the following results with quantitative criteria later.

篆	古	漢	

而			(1)引書(‘ancient’): majority ‘seal’ form  (2)二年 A(‘ancient’ misc): majority ‘seal’ form  (3)奏讞 B(‘ancient’ misc): consistent ‘seal’ form 
			
篆	古	漢	

有			(1)蓋廬(‘seal’): horizontal 又 above 月, as per ‘ancient’  (2)奏讞 A(‘ancient’ misc): bent/diagonal 又, as per ‘seal’/‘Han’ 
			
篆	古	漢	

爲			(1)二年 A(‘ancient’ misc): consistent ‘seal’ form from 又  (2)奏讞 B(‘ancient’ misc): majority rounded ‘Han’ form 
			
篆	古	漢	

2.2.2 Occasional ‘seal’/‘ancient’ contamination

其			N/A
			
篆	古	漢	

則			(1)引書(‘ancient’): ‘seal’ form 刀 on some characters  (2)奏讞 A(‘ancient’ misc): ‘seal’ form 刀  * Refine analysis with expanded sample of characters.
n/a			
篆	古	漢	

而			(1)二年 B(‘ancient’ misc): occasional ‘seal’ form 
			
篆	古	漢	

有			(1)引書(‘ancient’): occasional ‘seal’ or ‘Han’ 又  (2)奏讞 A(‘ancient’ misc): occasional ‘ancient’ form amid ‘seal’ 
			
篆	古	漢	

爲			(1)奏讞 A(‘ancient’ misc): occasional ‘seal’ form of 筭數 B 
			
篆	古	漢	

Conclusion

The ZJS corpus does indeed show evidence of script contamination between ‘seal’ and ‘ancient clerical’ forms.

Question
Can we identify whether a particular instance of contamination is the product of unfamiliarity (Feng) or familiarity (Richter), and thus whether it is a useful criterion for identifying a *scripteur*?

Deduction
I suspect that it is unlikely that consistent contamination in the case of common characters (e.g. 有, 則, 其) and components (e.g. 又, 月, 刀), where the script-forms are structurally identical and visually similar, is the product of *unfamiliarity*. Here, one might raise the question of scribal illiteracy, but it strikes me that the presence of script contamination is evidence against this: if the *scripteur* does not understand the character 而 in *any* script, how could he either translate it into another (Feng) or relapse to it when visually copying something he cannot read (Richter)? Furthermore, the back-and-forth between hands and the three 'checkers' (讎) in the 筭數書 offers positive evidence within the ZJS corpus of scribal literacy and reading comprehension.[7] The more-or-less consistent use of a 'seal clerical' 則 in an 'ancient clerical' MS, for example, is probably *a habit* or *choice*. The question is whether the *scripteur* that does this in one MS does this in *all* MSS that he/she writes. *If* several MSS or script-groups express the same *patterns* of script contamination, this might reveal an overlap of hands worth exploring.

I suspect that occasional variants are better candidates to discuss the phenomena that Feng Shengjun and Richter describe. That said, I cannot currently think of how to distinguish whether, for example, the occasional 'seal clerical' 則 in an 'ancient clerical' MS is the product of imitation (Feng) or relapse (Richter).

Question
Do any two MSS or script-groups in the ZJS corpus express the same patterns of script contamination that we might identify as personal idiosyncrasy?

Analysis
Examining the colour patterns in the table on page 10, I do not see any consistent patterns.

Conclusion
I was able to identify instances of script contamination but not their specific implications for scribal practices, nor was I able to detect any pattern thereof between MSS and script groups; it is therefore prudent that we eliminate this phenomena from consideration as concerns identifying idiosyncrasies unique to individual *scripteurs*.

[7] Mo Zihan and Lin Lina, "Ye you lunzhe xiede: Zhangjiashan Han jian Suan shu shu xieshou yu bianxu chutan."

2.3 Personal Idiosyncrasies

Hypothesis
If we can eliminate orthographic variation linked to the norms of distinct scripts, be it there by default of script-choice or contamination, what variora remain should be personal idiosyncrasies specific to the *scripteur*.

Question
The strongest evidence for personal idiosyncrasy as independent of script would be a variant form that appears *across scripts*. Is there evidence for this in the ZJS corpus?

Analysis
From the sample on pp. 10-11, I can identify two *variora* that occur consistently in individual MSS in distinct scripts.

2.3.1 Consistent cross-script idiosyncrasy 1: vertical/linear 月

strd.	scr.	var.	src.	external precedence
	篆隸		蓋廬	 (MWD, 足臂)
	瘦篆		脈書	
	雜古		奏讞 A	 (MWD, 刑德甲)
	雜古		曆譜	

2.3.2 Consistent cross-script idiosyncrasy 2: 實 *from* 尹

strd.	scr.	var.	src.	external precedence
?	篆隸		筭數 B	
	篆隸		蓋廬	
	瘦篆		脈書	
	古隸		引書	 (銀雀山文字編)
	雜古		奏讞 B	
	雜古		奏讞 A	

***

Question
Having established the presence of consistent idiosyncrasies that occur across scripts, what consistent idiosyncrasies do we see within a single script?

2.3.3 Consistent script-specific idiosyncrasy 1: 相 *exaggerated asymmetry*

strd.	scr.	var.	src.	external precedence
	古隸		筭數 A	 (MWD, 相馬經, 漢隸)
	雜古		二年 A	(did not find on first pass)
	雜古		奏讞 B	(did not find on first pass)

2.3.4 Consistent script-specific idiosyncrasy 2: diagonal-line 其

strd.	scr.	var.	src.	external precedence
	雜古		奏讞 A	 (銀雀山文字編)

2.3.5 Consistent script-specific idiosyncrasy 3: tall-ear 其

strd.	scr.	var.	src.	external precedence
	古隸		二年 B	(did not find on first pass)

2.3.6 Consistent script-specific idiosyncrasy 4: linear-hand 有

strd.	scr.	var.	src.	external precedence
	古隸		筭數 A	 (MWD 戰國縱橫家)

2.3.7 Consistent script-specific idiosyncrasy 5: wavy, double-hand 爲

strd.	scr.	var.	src.	external precedence
	古隸		二年 B	 (MWD 戰國縱橫家)

* There is no exact standard for the character 爲

2.3.8 Consistent script-specific idiosyncrasy 6: disconnected 爲

strd.	scr.	var.	src.	external precedence
	古隸		奏讞 A	(did not find on first pass)

2.3.9 Occasional script-specific idiosyncrasy 1: cursive 爲

Given the idiosyncrasy of with which 爲 is written MS-to-MS, it is curious that the orthograph prevalent in 'seal clerical' 筭數書 B () appears also in the 'misc. ancient clerical' 奏讞書 B ().

2.3.10 Occasional script-specific idiosyncrasy 2: seal-feet 見

奏讞書 B occasionally renders 見 with feet reminiscent of 'skinny' and 'seal clerical' ().

2.4 Identifying hands

Question
Is each MS written by a different hand, or is one *scripteur* responsible for more than one MS or script-group?

Hypothesis
Assuming that the personal idiosyncrasies identified Section 2.3 are indeed indicative of individual hands—that a *scripteur* does not consistently resort to an atypical variant over the course of writing only a single MS—patterns of overlap between manuscripts should reveal if a single *scripteur* wrote more than one text.

Methodology
I will begin by process of elimination, singling out those MSS and script groups that that are incompatible with others. Within what remains, I will attempt a positive identification on the basis of patterns of idiosyncrasy.

2.4.1 Insufficient data

曆譜 and 遣冊 provide insufficient character forms within the given sample to positively or negatively identify with any certainty, we will thus temporarily eliminate them from consideration.

2.4.2 Unique patterns

奏讞書 A is the most unique handwriting sample in the ZJS corpus, considering that it expresses consistent personal idiosyncrasy with 'diagonal-line 其' (2.3.4) and 'disconnected 爲' (2.3.8), as well as occasional idiosyncrasy with 'small-feet 見' (2.3.10). This reinforces my subjective impression that this script-group is otherwise quite distinct from the others, especially in terms of stroke curvature. I believe that we can eliminate this sample from any further comparison. I label this ***Scripteur* A**.

二年 B is likewise unique, expressing consistent personal idiosyncrasy with 'tall-ear 其' (2.3.5) and 'wavy, double-hand 爲' (2.3.7). This likewise reinforces a previous, subjective impression that script group was distinct and, thus, eliminates the sample from further comparison. I label this ***Scripteur* B**.

2.4.3 Positive identification

筭數書 B ('seal') consistently renders 爲 in the 'cursive' form  , which is unique to the corpus with the exception of 奏讞書 B ('ancient misc.'), where the form  occurs occasionally amid the more consistent 'Han' or 'ancient clerical' form . (It is worth noting that in 奏讞書 B, the 'feet' on 其, 則, etc. are also rather symmetrical for 'ancient clerical', which may be a case of script contamination, or may reflect idiosyncratic consistency with 筭數書 B). This raises the issue of 'domestication' (Feng) vs. 'relapse' (Richter)—is the 奏讞書 B *scripteur* copying an original written by the 筭數書 B *scripteur*, or is it the same person who, when writing in another

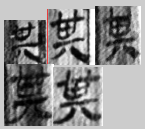
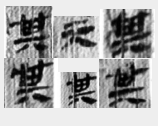
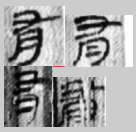
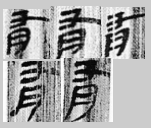
script, falls back onto that with which he is most comfortable? I suspect that this is a case of 'relapse' due to (1) the commonness of this character, (2) the occasional nature of the variant—if the *scripteur* couldn't read  in the original, he would not have been able to translate the dozens of other instances in the text—(3) the (subjective) fidelity with which he has reproduced this form. Tentatively, I offer that 筭數書 B and 奏讞書 B are *by the same hand, writing in different scripts*—I label this ***Scripteur* C**.

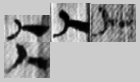
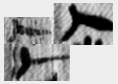
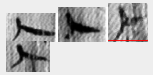
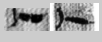
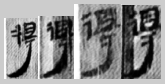
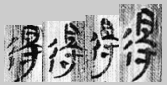
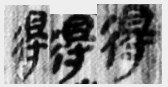
蓋廬 ('seal') and 脈書 ('skinny') use the same form for 爲 ( vs. ), the difference being one of elongation and neatness, and this form is unique within the corpus; the two scripts are otherwise structurally similar, so it is difficult to detect what overlap may be due to personal habit vs. script choice. Nevertheless, I tentatively offer that 蓋廬 and 脈書 are by the same hand hand, writing in slightly different styles/scripts —I label this ***Scripteur* D**.

Based on the interaction between 筭數書 A & B, we can conclude that 筭數書 B does not belong to *Scripteur* A (Section 3.1). 筭數書 B, given its consistent use of 貫實 and the asymmetrical 相, is distinct from 二年 A. 筭數書 B expresses certain structural similarities with *Scripteur* D, e.g. the rounded upper-left corner of 爲, but this does not seem sufficient to me for positive identification. Differences in 爲, feet, etc. point to a distinction from 引書. All-in-all, I believe 筭數書 B to be unique, and I label this ***Scripteur* E**.

The two MSS that remain are 引書 and 二年 A. Comparison of 爲, 所, etc. point to a difference, I thus label these ***Scripeur* F** and ***Scripteur* G**, respectively.

I have rearranged the ZJS sample below, in pp. 22-23, according to *scripteur.* Note, again, that my identifications are tentative.

***Scripteur* A**	***Scripteur* B**	***Scripteur* C**		***Scripteur* D**		***Scripteur* E**	***Scripteur* F**	***Scripter* G**	**?**	
雜古	古隸	篆隸	古隸	篆隸	授篆	古隸	古隸	雜古	雜古	雜古
奏讞 A	二年 B	筭數 B	奏讞 B	蓋廬	脈書	筭數 A	引書	二年 A	曆譜	遣策
	–	–	–			–	–		–	–
									–	–
	–								–	
										
									–	–
										–

Scripteur A	Scripteur B	Scripteur C		Scripteur D		Scripteur E	Scripteur F	Scripter G	?	
雜古	古隸	篆隸	古隸	篆隸	授篆	古隸	古隸	雜古	雜古	雜古
奏讞 A	二年 B	筭數 B	奏讞 B	蓋廬	脈書	筭數 A	引書	二年 A	曆譜	遣策
									–	
					–				–	–
									–	–
	–	–		–		–			–	–
					–				–	–
		–	–	–					–	–

3 ZJS Corpus Individual MSS

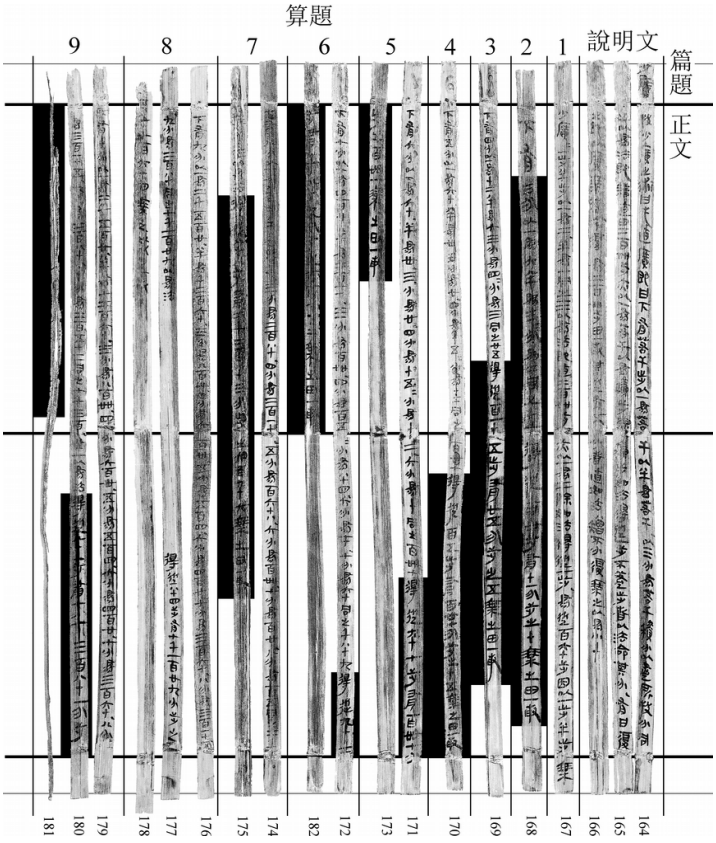
3.1 筭數書

Scholarship

The following is a summary of Morgan & Chemla's findings on the 筭數書.[8]

Between the upper and lower binding string, 筭數書 is comprised of sixty-nine separate textual units or 'maths problems'. In the upper margin, each textual unit features a one- to four-character title. In the lower margin is written fourteen 'signatures' by 楊 and 王, two of which note specifically 'X already checked' 某已讎, and a variety of dots.

Using the above methodology, Morgan was able to distinguish two hands active in the body and upper margin of the MS—*Scripteur* C & E. The distribution was very unexpected. First, 62 percent of the body belonged to *Scripteur* E, while almost all of the titles belonged to *Scripteur* C. Second, in one specific section (『少廣』), the two hands alternated *on the same slips*, one after the other, *Scripteur* E coming *after Scripteur* C. With consideration of the contents, it is clear that *Scripteur* E is filling out exercises/copying left for him/her by *Scripteur* C. *Scripteur* E leaves one exercise blank (#8), leaving *Scripteur* C gives the answer, but there we find a long blank and a slip of abnormal length, clearly suggestive of a back & forth between the two hands.



We were unable to identify the signatures due to sparsity.

[8] Ibid.

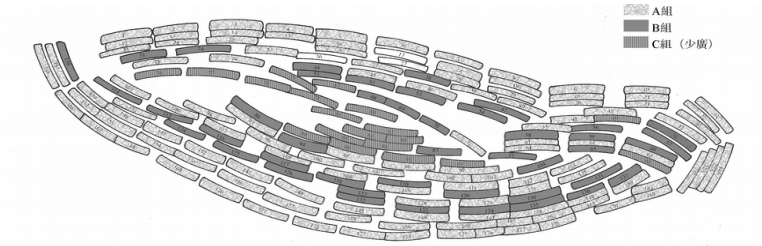
Of the sixty-nine units comprising the body, the distribution is as follows:

彭序	篇名	寫手
1	相乘	E
2	分乘	E
3	乘	E
4	增減分	E
5	分當半者	E
6	分半者	E
7	約分	E
8	合分	E
9	徑分	E
10	出金	E
11	共買材	E
12	狐出關	E
13	狐皮	E
14	負米	E
15	女織	C
16	並租	C
17	金價	E
18	舂粟	E
19	銅耗	E
20	傳馬	E
21	婦織	C
22	羽矢	E
23	漆錢	E
24	繒幅	E
25	息錢	E
26	飲漆	E
27	稅田	C
28	程竹	E
29	醫	E
30	石率	E
31	賈鹽	E
32	絲練	C
33	挐脂	E
34	取程	C
35	耗祖	C

彭序	篇名	寫手
36	程禾	E
37	取枲程	C
38	誤券	C
39	租誤券	C
40	粺穀	E/C
41	耗	C
42	粟爲米	C
43	粟求米	E
44	粟求米	E
45	米求粟	E
46	米粟並	E
47	粟米並	E
48	負炭	E
49	簋篡	E
50	羽矢	E
51	行	E
52	分錢	E
53	米出錢	E
54	除	E
55	塹堵	E
56	芻	E
57	旋粟	E
58	囷蓋	E
59	圜亭	E
60	井材	E
61	以圜材方	E
62	以方材圜	E
63	圜材	E
64	啓廣	C
65	啓縱	C/E
66	少廣	E+C
67	大廣	C
68	方田	C
69	里田	C

As concerns distribution, Chemla notes that *Scripteur* C accounts for all problems concerning operations on fractions and measuring units, excepting those jointly written by the two hands (少廣、啓縱); the same holds for tables concerning decimal powers, fractions and measuring units, excepting, again, joint units (少廣、粺穀).

Due to the division of the text into discreet units, it is difficult to reconstruct the original strip-order. Our analysis revealed no clear logic to the distribution of hands within the archaeological diagram. We believe the diagram to be faulty.



In addition to the back-and-forth between *scripteurs* C & E, there are even more complicated interactions between hands as evidenced in areas of 'checking' and correction. We are currently working on an article for *Manuscript Cultures*.

In conclusion, we suspect that the interaction that we see between the two hands in this MS reflect a learning environment, wherein *scripteur* C is leaving assignments for *scripteur* E to fill out, then coming back and correcting or filling in what is wrong. If this is correct, this is strong positive evidence for the literacy of each hand, and of the status of the text as a 'real text', not a *mingqi*.

3.2 奏讞書

Question
Scripteur C was the leader/teacher-figure in 筭數書, what role does he/she play in 奏讞書?

Methodology
Not having read or ever worked on 奏讞書, I went through the PDF dividing the MS into colours reflecting the character forms of *scripteurs* A & C (A in orange, C in yellow, potentially common forms in green, and anomalies in red).

Results
Scripteur C appears concentrated in slips 75-84, 99-120, 162-196 and mixed with *Scripteur* A in slips 217-228. In terms of sections, this is where *Scripteur* C is concentrated:

1. 淮陽守行縣掾新鄴獄，七月乙酉新鄴信爰書：求盜甲告曰：... (Note that the section is finished by *Scripteur* A, slips 85-91)
2. 四月丙辰黫城旦講气(乞)鞫，曰：故樂人，....
3. 毛改曰：十月中與謀曰：南門外有縱牛....
4. 異時獄□曰：爲君、夫人治食不謹，罪死。...
5. 異時魯瀘：盜一錢到廿，罰金一兩；過廿到百...
6. 故律曰；死夫(?)以男爲後。毋男以父母，...

Each of these aligns with an integral textual unit as begun at the top of a slip and terminating with a blank, which the exception of the first section, which is begun by *Scripteur* C. Whatever the correct order of the MS, it would appear that *Scripteur* C is once again the leader.

Further questions
Is there a pattern to *Scripteur* C's appearance in this MS? What might the presence of two hands here explain? I leave these questions up to the experts on legal texts.

3.3 二年律令

Question
What can we say about the distribution of *scripteurs* B & G in this MS?

Methodology
Here, I divided up the PDF of the MS again, as per 奏讞書, this time into yellow (*Scripteur* B) and purple (*Scripteur* G).

Results
Scripteur B does not appear very often, leaving most of the MS to *Scripteur* G; in what remains, however, one finds a number of anomalous character forms that might argue dividing *Scripteur* G in two.

It just so happens that the first concentrated section of *Scripteur* B is 盜律, which is signed 'written by Zheng X' 鄭某書. It is important to note, however, that in this section (s. 55-81), slips 58, 61, 65-66 and 74 bear the traits of *Scripteur* G.

In addition to 盜律, *Scripteur* B only really appears on single or paired slips ending with blanks. These insertions (?) appear in the following sections:

1. 賊律 s. 6
2. 具律 s. 100
3. 捕律 s. 137
4. 亡律 s. 172
5. 襍律 s. 182-183