

Workshop on Zhangjiashan tomb 247

Université Paris Diderot
November 25, 2015

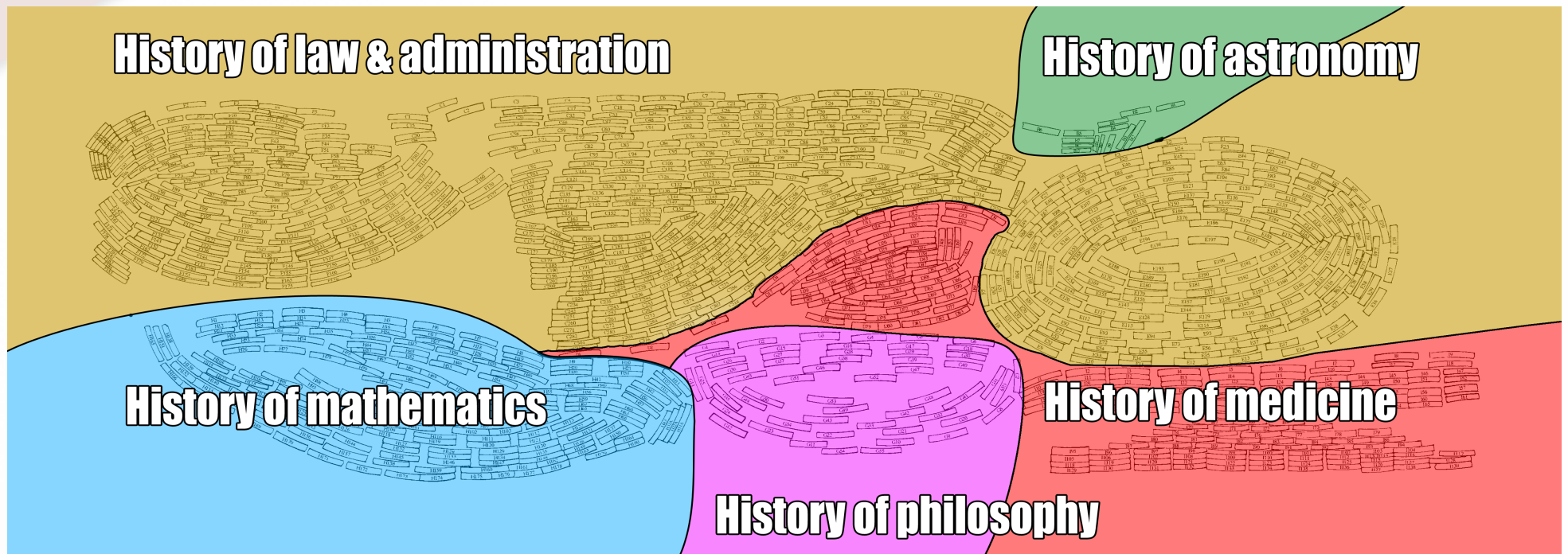
Organised jointly by **Daniel Morgan** ERC project SAW (CNRS – Paris 7)
Karine Chemla
&
Alain Thote EPHE – CRCAO
Olivier Venture



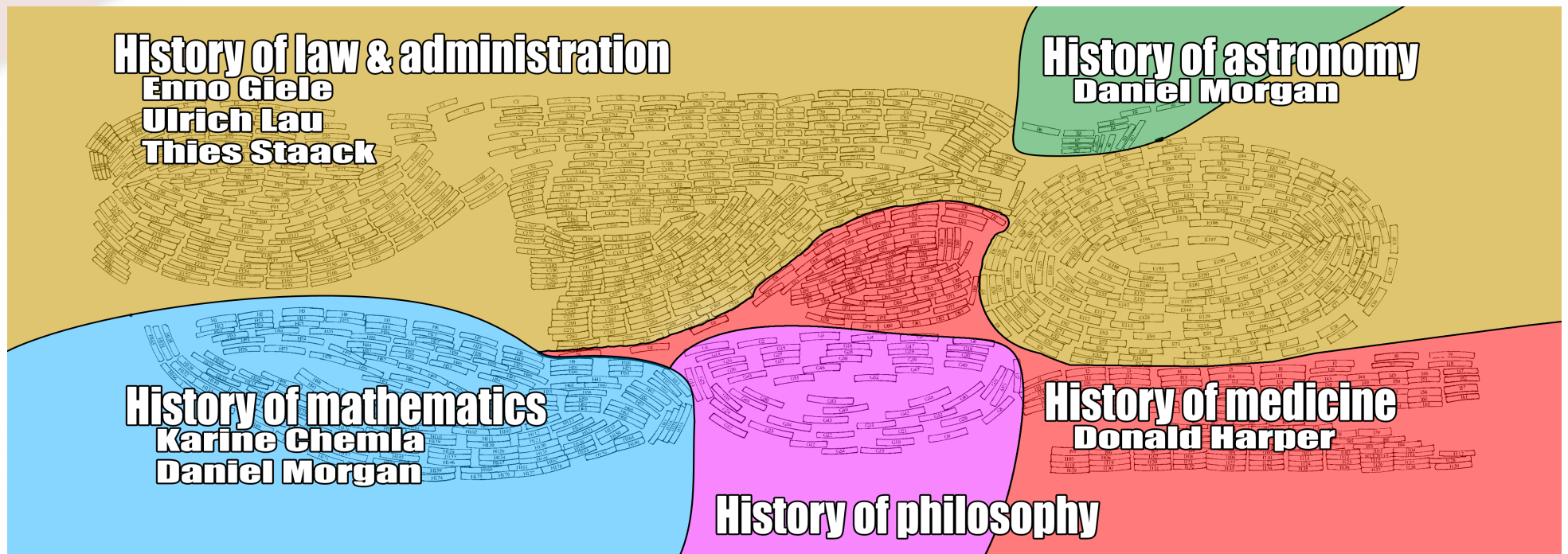
The Zhangjiashan M247 corpus



The Zhangjiashan M247 corpus



The Zhangjiashan M247 corpus



The Zhangjiashan M247 corpus

History of law & administration

Enno Giele

Ulrich Lau

Thies Staack

History of astronomy

Daniel Morgan

History of mathematics

Karine Chemla

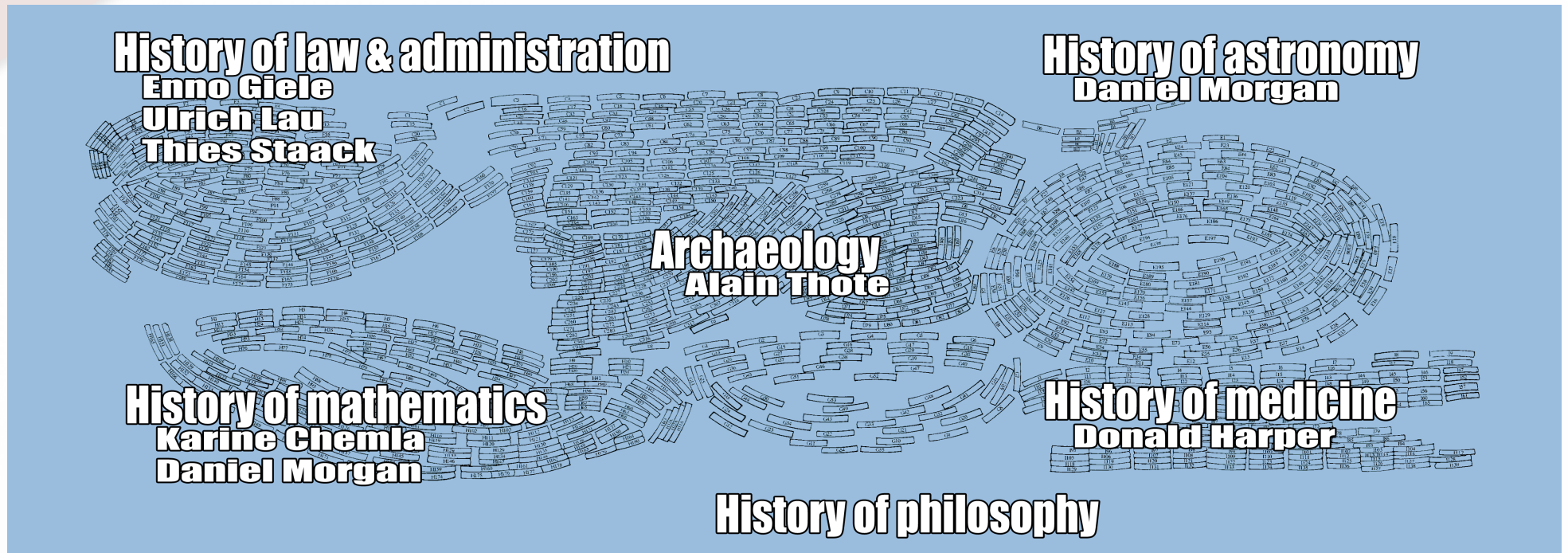
Daniel Morgan

History of medicine

Donald Harper

History of philosophy

The Zhangjiashan M247 corpus



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Centre de recherche sur les civilisations de l'Asie orientale



COLLÈGE DE FRANCE
— 1530 —



École Pratique des Hautes Études

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ERC project

ERC Project SAW

(Mathematical Sciences in the Ancient World)

– Karine Chemla, directrice

Focus: history of mathematics in Mesopotamia, China & India

- Years 1-2: math & state finance administration.
- Years 3-4: math & astral sciences.
- Year 5: historiography of mathematics

Goals:

- Break down « national traditions » into plural math. cultures.
- Explore how idea of « national traditions » arose in 19/20th c.
- Explore how history of math. might be applied to pedagogy.

UNIVERSITÉ
PARIS
DIDEROT

SPHERE
SCIENCE, PHILOSOPHY, HISTORY
1984-2015

SAW
erc
MATHEMATICAL SCIENCES
IN THE ANCIENT WORLD

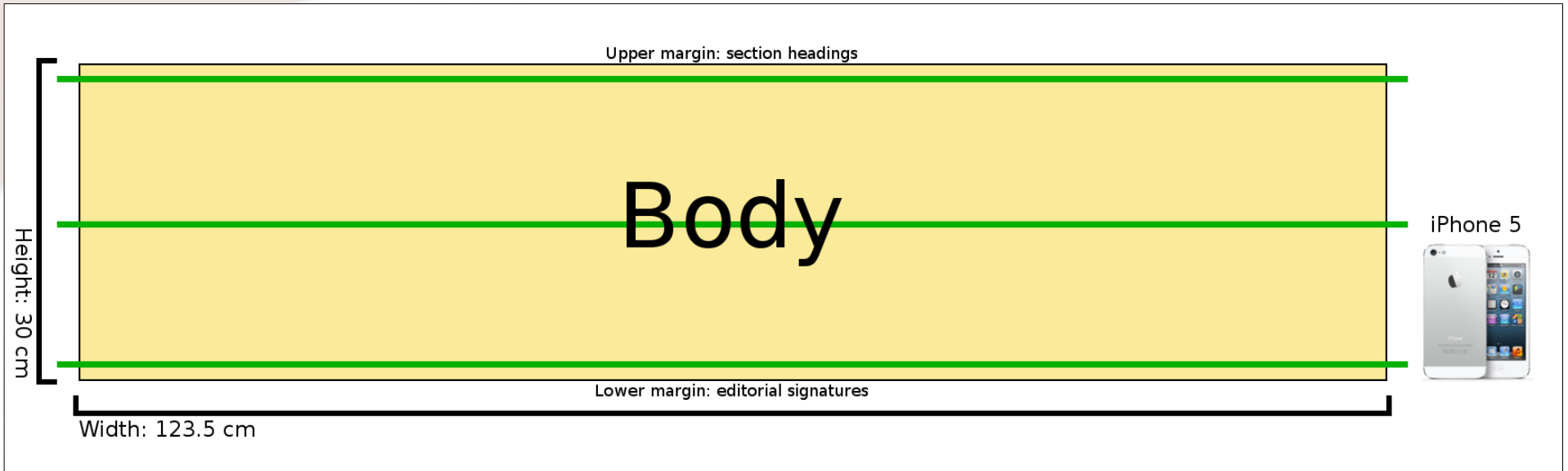
CNRS

Centre
de recherche

COLLÈGE
DE FRANCE
1631-1830

Antique
études

The *Suan shu shu* 算數書 MS (or, « how many hands is too many ? »)



- bamboo
- 190 slips/lines
- 69 section headings (upper margin)
- editorial signatures (lower margin)
- correction dots (?) (body, lower margin)
- book title on the verso

The *Suan shu shu* 算數書 MS

(or, « how many hands is too many ? »)

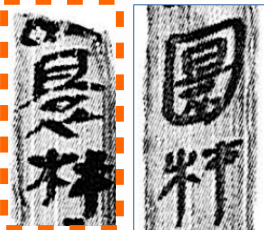
Headings

- Some are the same
- Some are very different:
 - style (angles, proportions, etc.)
 - structure

Exp: « Carrying charcoal »



Exp: « A round from a square timber »



例	1	2	3	4	5	6	7	8	9	10	11	12	13
標題	增減分	畏亭	以畏材方	以方材畏	歛黍	租吳券	共買材	狐出關	負米	負炭	誤券	舉脂	啓從
正文	增減分 簡13	圓亭 簡149	圓材方材方材 簡153	方圓材方圓材 簡154	圓材方材 簡66	租吳券 簡96-97	行賈 簡32	狐出關 簡34	負米半米 簡38-39	負炭炭負炭 簡126-127	誤券券券券 簡93-95	舉脂脂脂 簡79-82	啓從從從 簡160

The *Suan shu shu* 算數書 MS

(or, « how many hands is too many ? »)

Body

Methodology:















- identify hands via pattern recognition across multiple structural, angular, proportional and stylistic criteria.

Findings:

- simple, common characters (之) work poorly, because of *intentional variation*.
- complex, common character (爲) work great!

Hands:

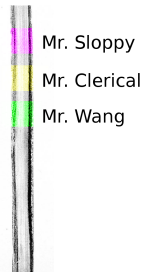
- A (angular, asym., full-forms, etc.)
- B (round, symet., abbrev., etc.)
- C (mix of A & B)

		1	2	3	4	5
A	又	 round	 angular	both		
B	L/R balance	 asymmetry	 symmetry	both/unclear		
C	Final downstroke	 exaggerated	 unexagtrd.	both/unclear		
D	之	 cursive	 rectilinear	both/unclear	multiple	
E	從	 cursive	 rectilinear	both/unclear		
F	乘	 U +=	 U + 人人	 _ _ _	both/unclear	
G	者			both/unclear		
H	術					both/unclear

Pattern-recognition samples

The *Suan shu shu* 算數書 MS (or, « how many hands is too many ? »)

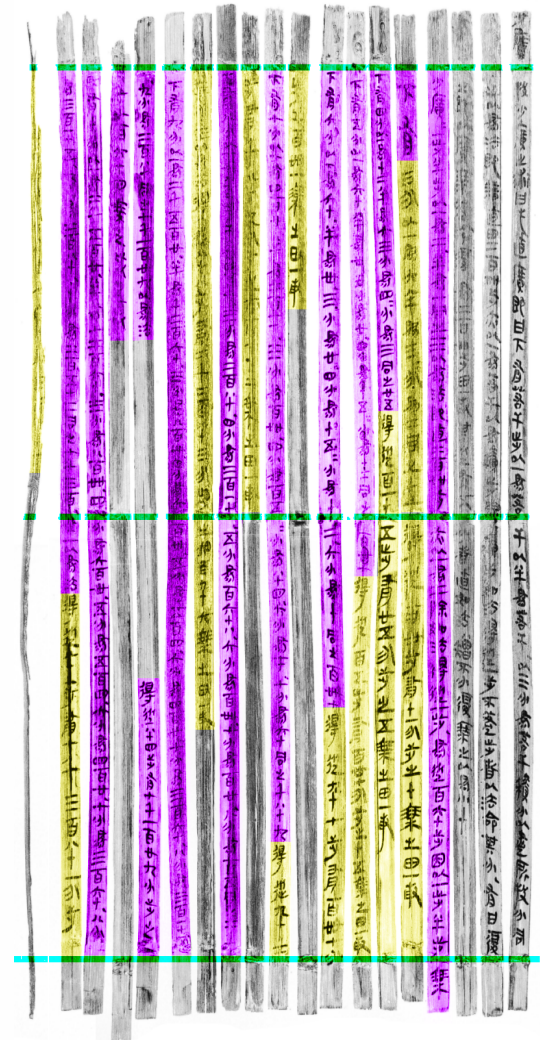
Writing order



In « Reduced Width » 少廣,
Hand A
fills out blanks left by
Hand B

???

However,
the headings belong to
Hand B
so shouldn't he come last?



Corpus-wide handwriting analysis

Control: Scripts present at Mawangdui M3 (according to Chen Songchang 陳松長)

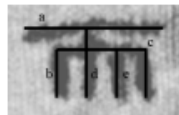
	古隸						漢隸				篆隸			
	五行	刑德甲	事語	縱橫家	老子甲	陰陽乙	黃帝書	相馬經	周易	五星占	養生方	足臂	陰陽甲	病方
有月胃若														
爲														
而														
貝黃														
其														
人														

Corpus-wide handwriting analysis

Control: Scripts present at Mawangdui M3 (according to Chen Songchang 陳松長)

Step 1: Identify features that are universal & unique to each script

Script-specific feature 1: 而

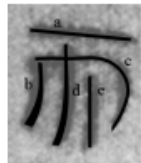


‘Han clerical’: right angles and equal segment lengths (*b*, *e* and bottom portion of *c* and *d*)



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

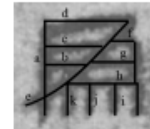
Exceptions: 養生方 full curves 𠄎; 陰陽五行甲 linear 𠄎



‘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 𠄎

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 𠄎



‘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*).

Corpus-wide handwriting analysis

Control: Scripts present at Mawangdui M3 (according to Chen Songchang 陳松長)

Step 2: Identify features that are universal & unique to **one manuscript** or, idiosyncrasies that occur in **multiple scripts**.

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

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

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

其			(1) 'Seal' feet in 'ancient': 縱橫家
n/a			(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
篆	古	漢	

Corpus-wide handwriting analysis

Step 1: identify scripts at Zhangjiashan M247

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	遺策
也	-			也	-	-	-		-		-	-
											-	-
							-				-	
											-	-
												-

Corpus-wide handwriting analysis

Step 2: identify individual hands at Zhangjiahan M247

Scripteur A	Scripteur B	Scripteur C		Scripteur D		Scripteur E	Scripteur F	Scripteur 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
	-	-	-			-	-		-	-
									-	-
	-								-	
									-	-
										-

Corpus-wide handwriting analysis

Step 2: identify individual hands at Zhangjiahan M247

<i>Scripteur A</i>	<i>Scripteur B</i>	<i>Scripteur C</i>		<i>Scripteur D</i>		<i>Scripteur E</i>	<i>Scripteur F</i>	<i>Scripteur G</i>	?	
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
	-	-	-			-	-		-	-
									-	-
	-								-	
									-	-
										-

Corpus-wide handwriting analysis

Step 2: identify individual hands at Zhangjiahan M247

<i>Scripteur A</i>	<i>Scripteur B</i>	<i>Scripteur C</i>		<i>Scripteur D</i>		<i>Scripteur E</i>	<i>Scripteur F</i>	<i>Scripteur G</i>	?	
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
	-	-	-			-	-		-	-
									-	-
	-								-	
									-	-
										-

Corpus-wide handwriting analysis

Step 2: identify individual hands at Zhangjiahan M247

<i>Scripteur A</i>	<i>Scripteur B</i>	<i>Scripteur C</i>		<i>Scripteur D</i>		<i>Scripteur E</i>	<i>Scripteur F</i>	<i>Scripteur G</i>	?	
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
	-	-	-			-	-		-	-
									-	-
	-								-	
									-	-
										-

The Zhangjiashan M247 corpus

