

Article

Identifying Codicological Sub-units in Bamboo Manuscripts: Verso Lines Revisited*

Thies Staack | Heidelberg

The year 2010 witnessed two important publications of early Chinese bamboo manuscripts, which in addition to photographs of the recto of all slips for the first time also included photographs of their verso.¹ One year later Sun Peiyang 孫沛陽 published the first study on the verso line phenomenon, mainly as it is reflected in a part of the manuscripts contained in these two volumes.² As the material basis for a discussion of the verso lines has grown significantly over the past few years and seven more publications that included photographs of the slips' verso³ have been issued, the phenomenon has also gained further

attention in the scholarly community⁴ and the evaluation and improvement of the first preliminary research results and hypotheses by Sun Peiyang are now possible and necessary. Following Sun Peiyang, several others have argued that the verso lines are obviously related to the original sequence of the slips inside a manuscript, meaning that the 'line sections'⁵ on the verso of individual slips can – by and large – be linked and appear to form continuous lines, if the slips are arranged according to the text written on the recto.⁶ At least with regard to this point, which underlines the importance of this phenomenon for the reconstruction of bamboo manuscripts, a consensus appears to have been reached in the scholarly community. Other aspects, however, are still disputed. This particularly concerns the issue at which point during the production process of a manuscript and by the use of which method the verso lines were applied to the verso of the slips. The following will show that these questions are not only important for a further improvement of our understanding of how bamboo manuscripts were actually produced in pre-imperial and early imperial China. They are likewise necessary to clarify

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¹ These are the first volumes of the manuscripts in possession of Tsinghua University and Yuelu Academy, see Li Xueqin and Qinghua daxue chutu wenxian yanjiu yu baohu zhongxin 2010 as well as Zhu Hanmin and Chen Songchang 2010.

² Sun Peiyang 2011. Note that the verso line phenomenon was first mentioned by the editors of the bamboo slips excavated from tomb no. 2 at Baoshan 包山, see Hubei sheng Jing Sha tielu kaogudui 1991, 4. Subsequently, however, it was completely neglected for nearly 20 years.

³ See volumes two to five of the Tsinghua University manuscripts (Li Xueqin and Qinghua daxue chutu wenxian yanjiu yu baohu zhongxin 2011, 2012, 2013 and 2015), volumes two and three of the Yuelu Academy manuscripts (Zhu Hanmin and Chen Songchang 2011 and 2013), as well as the first volume of the Peking University Han manuscripts (Beijing daxue chutu wenxian yanjiu suo 2012c). Among the other Peking University manuscripts still awaiting publication, there are reportedly further manuscripts containing verso lines, see Beijing daxue chutu wenxian yanjiu suo 2011, 49, 53; Beijing daxue chutu wenxian yanjiu suo 2012b, 66.

⁴ The verso lines are discussed in Li Tianhong 2011, Jia Lianxiang 2012, Han Wei 2012, Li Junming and Zhao Guifang 2012, Shi Da 2013, Yuelu shuyuan cang Qin jian zhengli xiaozu 2013, He Jin 2013 as well as Takeda 2013a and 2013b.

⁵ The distinction between 'line sections' on individual slips and complete 'lines' follows Sun Peiyang (2011, 449), who coined the terms *ke/mo huaxian* 刻/墨劃綫 and *jiance bei huaxian* 簡冊背劃綫 for it. A generally accepted set of terms for this in Chinese secondary literature does not yet appear to have been evolved, cf. the use of *huahen* 劃痕 vs. *huaxian* 劃綫 for the same distinction in Han Wei 2012, 228, footnote 4 as well as the ambiguous use of *bei huaxian* 背劃綫 for both in He Jin 2013.

⁶ This relation was first claimed by Sun Peiyang with regard to some bamboo manuscripts from the first volumes of the Yuelu Academy and Tsinghua University collections, see Sun Peiyang 2011, 449. It was later confirmed for other manuscripts from these two collections as well as the Peking University collection in Beijing daxue chutu wenxian yanjiu suo 2011, 53; Li Junming and Zhao Guifang 2012, 67; Beijing daxue chutu wenxian yanjiu suo 2012b, 66; Yuelu shuyuan cang Qin jian zhengli xiaozu 2013, 81.

in which ways the verso lines relate to the slips of a certain manuscript and in which ways they can or cannot be utilized for the purpose of manuscript reconstruction. Finally, the basic function of the verso lines will also have to be reconsidered.

1. Knife-cut vs. ink-drawn, position and inclination

Sun Peiyang observed in 2011 that of all the verso lines (or individual line sections) discovered so far the majority had apparently been cut with a sharp knife (*ke huaxian* 刻劃綫) – obvious from frequent breakage of slips at the position of the line sections⁷ – whereas there were comparatively few examples of lines that seemed to have been drawn with ink (*mo huaxian* 墨劃綫).⁸ From the examples of ink-drawn lines that Sun cited, it can be gathered that he only included



Fig. 1: Knife-cut line (left) vs. thick ink-drawn line (right).⁹

⁷ Han Wei 2012, 227 with footnote 3; He Jin 2013, 459. For the case of the Peking University *Laozi* 老子 Han Wei observed that the knife-cuts appear to be deeper near the top edge of the slips than near the middle, which suggests that the cuts were applied from the top edge towards the middle through a downward movement with a sharp knife, see Han Wei 2012, 233 with footnote 12.

⁸ Sun Peiyang 2011, 455. Sun mentioned slips 17^v and 119^v from Baoshan tomb no. 2 (Hubei sheng Jing Sha tielu kaogudui 1991, plates 9, 52), slip 1^v of *Zhuang wang ji cheng* 莊王既成 from the Shanghai Museum collection (Ma Chengyuan 2007, 64) as well as slip 403^v of the *Sun Bin bingfa* 孫臏兵法 from Yinqueshan 銀雀山 tomb no. 1 (Yinqueshan Han mu zhujian zhengli xiaozu 1985, 40) as examples for ink-drawn lines (Sun Peiyang 2011, 454).

into this category comparatively thick lines, which were most probably drawn with a brush (see fig. 1).

It has later been proposed that some of the fainter knife-cut lines might have been filled with ink in a second step, or that ink had been applied to the knife before cutting to enhance the visibility of the lines.¹⁰ This could explain cases like that of the Yuelu Academy calendar (*Zhiri* 質日) of the 34th year (of King Zheng of Qin), where the lines are much thinner than usual brush-strokes, but it appears that some ink has run down from them (see fig. 2). Another possibility would be that this kind of thin ink-drawn line was not applied with a brush but with a different tool, e.g. some kind of stylus. However, to the author's knowledge there is no archaeological evidence for the existence of such a writing implement in early China.



Fig. 2: Verso line in Yuelu Academy *Zhiri* 34.¹¹

⁹ Both slips are from the Shanghai Museum collection. The photograph on the left shows *Fan wu liu xing A* 凡物流形 (甲), 3^v (Ma Chengyuan 2008, 80); the photograph on the right shows *Ming* 命, 11^v (Ma Chengyuan 2011, 68). The line sections are indicated by black arrows.

¹⁰ He Jin 2013, 460.

¹¹ The Yuelu Academy calendars of the 27th, 34th and 35th year of King Zheng of Qin are for simplicity's sake named *Zhiri* 27, *Zhiri* 34 and *Zhiri* 35 here and in the following. For photographs of the two slips see Zhu Hanmin and Chen Songchang 2010, 80. As it is quite impossible that ink actually ran up – which appears to have been the case with the current orientation of the slips – it can be gathered that the slips were turned upside down at the time the lines were applied or shortly afterwards.

Although additional examples for what Sun Peiyang calls ink-drawn lines have been found in the meantime, the observation that the lines are more often cut with a knife (or at least as thin as knife-cuts and therefore sometimes barely visible) remains generally valid.¹² Furthermore, there are to date no examples of manuscripts in which several ink-drawn line sections on neighbouring slips form a continuous line.¹³

Sun's earlier observations also appear to hold true as far as the position and inclination of the lines in the new material are concerned. Inside a certain manuscript, they usually only occur either in the lower or in the upper half of the slips, and in almost all cases their general inclination is from the top left towards the bottom right (i.e. somewhere between 90° and 180°). This means that the lines 'fall' in a left to right direction, either from the top end of the slips towards their middle (see Yuelu Academy *Zhiri* 34), or from somewhere below their middle towards the bottom end (see Yuelu Academy *Zhiri* 27 and 35), if the individual line sections on adjacent slips are connected (see fig. 11, 12 and 13 in appendix A).¹⁴

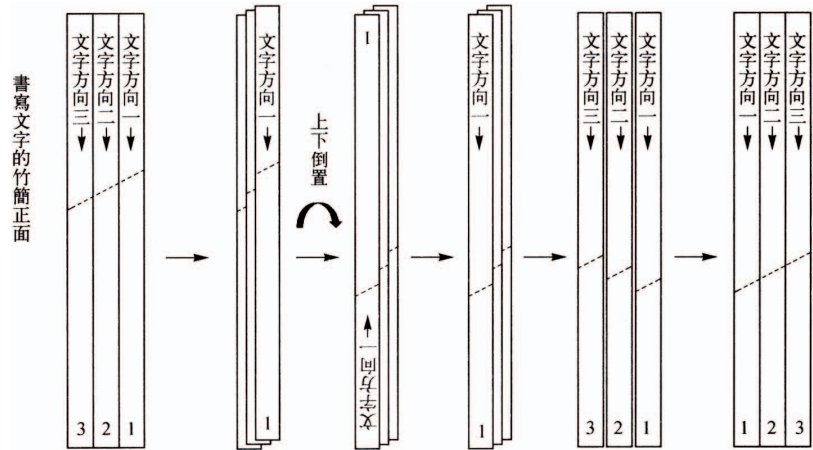


圖 1 “逆次簡冊背劃線”形成示意圖

(圖中斜虛線表示不可見的背劃線)

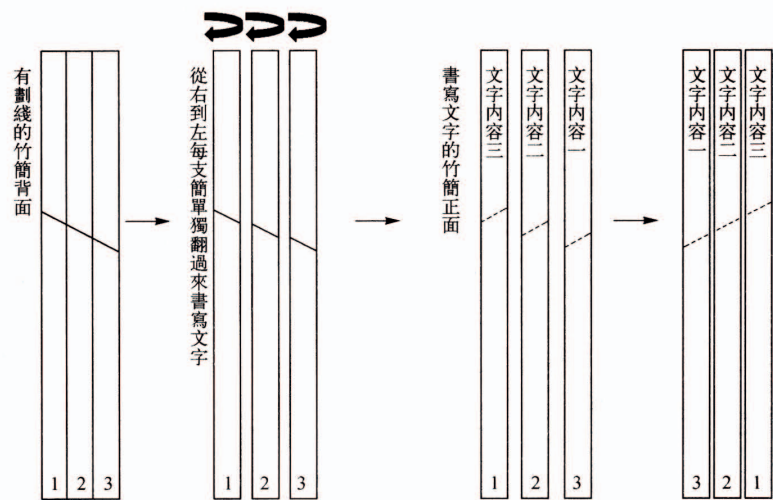


圖 2 “逆次簡冊背劃線”形成示意圖

(圖中的背劃線,實線為可見,虛線為不可見)

¹² For additional examples of ink-drawn lines see the yet unpublished Jingmen Yancang 荊門嚴倉 slips as well as Tsinghua University *Chuju* 楚居 slip 6^v (Li Xueqin and Qinghua daxue chutu wenxian yanjiu yu baohu zhongxin 2010, 26), Shanghai Museum *Ming* 命 slip 11^v (Ma Chengyuan 2011, 68), *Wangju* 王居 slip 1^v (Ma Chengyuan 2011, 72) and the Qin slips of roll A (*Bainang* 白囊) from the Peking University collection (Beijing daxue chutu wenxian yanjiu suo 2012b, 66); cf. Li Tianhong 2011, 103 and He Jin 2013, 459. Ink-drawn lines were also found on two additional slips from Baoshan tomb no. 2, viz. 155^v and 202^v, see Takeda 2013a, 70. Apart from the Peking University Qin slips of roll A, which are made of wood, all other examples mentioned here are bamboo slips.

¹³ However, Takeda cites a statement by Ge Liang 葛亮 of Shanghai Museum according to which there are such examples on the verso of the manuscript *Ming*. This means that in some cases the ink-drawn lines – just like the knife-cut lines – appear to be related to the sequence of the slips. See Takeda 2013a, 71 with footnote 8.

¹⁴ The only other example to date is the ink-drawn line section on *Chuju* slip 6v, the inclination of which is from bottom left to top right. Cf. also ‘verso stripes’ in footnote 112. With regard to the most common application technique for verso lines (see below), it is in fact possible – if not probable – that the lines were usually applied with a knife from the top end of the slips towards their middle. Whether the lines are eventually located on the lower or upper half of the slips in a certain manuscript is merely due to differences in the orientation of the slips at the time the writing was applied.

Fig. 3: Two possible reasons for ‘reversed verso lines’ according to He Jin.¹⁵

In the meantime, a good explanation for special cases called ‘reversed verso lines’ (*nici jiance bei huaxian* 逆次簡冊背劃線),¹⁶ where the text on the recto would have to be read from left to right instead of the usual direction from right to left, if the slips were arranged according to the verso lines, has been proposed.¹⁷ Sun Peiyang originally assumed that there might

¹⁵ This figure was taken from He Jin 2013, 464.

¹⁶ Sun Peiyang 2011, 453.

¹⁷ More complex situations, where verso lines in different directions might form ‘v’- or ‘w’-shaped patterns as exemplified by the Tsinghua University *Qiyè* 耆夜 (Li Xueqin and Qinghua daxue chutu wenxian yanjiu yu baohu zhongxin 2010, 12–13, cf. Sun Peiyang 2011, 455 and Li Tianhong 2011, 104), appear to be scarce. However, a ‘<’-shaped pattern can be found in the Tsinghua University *Liangchen* 良臣 and *Zhuci* 祝辭 (Li Xueqin and Qinghua daxue chutu wenxian yanjiu yu baohu zhongxin 2012, 17–19, cf.

have been a small number of manuscripts, in which the slips were bound in a way that necessitated changing the normal reading direction and read the text from left to right.¹⁸ He Jin 何晉 suspected ‘mistakes’ that might easily have occurred when slips that had previously been completely prepared (and furnished with verso lines) were used for writing or bound together. It is conceivable that the person involved in the latter activities (most probably the scribe) either turned the slips upside down before using them or used them in an order different from the one prescribed by the verso lines, whether on purpose or by mistake (see fig. 3).¹⁹

This explanation appears more reasonable than the hypothesis forwarded by Sun Peiyang, especially if one accepts He Jin’s assumption that the one who prepared the slips (and also applied the verso lines) and the one who wrote the text on them were most probably different persons.²⁰ It can also better explain examples where there is a reversed verso line only on some slips of a certain manuscript, while on the other slips of the same manuscript a verso line appears in the usual direction.²¹

2. ‘Pinched off head and removed tail’

As already stated above, verso lines apparently either begin at the top edge or end at the bottom edge of certain slips – depending on whether the lines are generally situated on the upper or lower half of the slips in a bamboo manuscript. Moreover, as far as the vertical position of the respective line sections is concerned, there is usually at least one quarter of the length of a complete

Takeda 2013b, 144, footnote 12). The two groups of slips possibly belong to the same manuscript, at least the verso lines on them were apparently produced at the same time. See fig. 16 in appendix B.

¹⁸ Sun Peiyang 2011, 458.

¹⁹ He Jin 2013, 463. That slips were sometimes mistakenly turned upside down during the production of manuscripts (in the process of writing, before binding) can also be gathered from some cases, where the notches marking the position of the binding strings on a certain slip suddenly appear on the left side, whereas on other slips of the same manuscript they appear on the right, see Cheng Pengwan 2006, 25, cf. Li Tianhong 2011, 104.

²⁰ He Jin 2013, 455.

²¹ In the *Huangmen* 皇門 from the Tsinghua University collection for example, it could hardly be the case that one part of the coherent text on the recto had to be read from left to right, while another part had to be read from right to left. That the slips were in fact tied together in the sequence reconstructed by the editors is moreover suggested by sequence numbers (see footnote 123) on the verso of the slips, see Li Xueqin and Qinghua daxue chutu wenxian yanjiu yu baohu zhongxin 2010, 163. On the *Huangmen* slips there appears to be a ‘reversed’ verso line on slips 1 to 6, but a ‘normal’ verso line on slips 10 to 13 (Li Xueqin and Qinghua daxue chutu wenxian yanjiu yu baohu zhongxin 2010, 20–21, cf. Sun Peiyang 2011, 453).

slip between this beginning/end on the edge of a certain slip and the respective end/beginning located near the middle of a certain other slip. The amount of slips that is crossed by one verso line is usually quite stable inside the same manuscript but varies considerably when comparing different manuscripts.²² In a significant number of cases, however, not every verso line that can be found on the slips of a certain manuscript appears to be ‘complete’, which means that it either does not begin at one of the edges, and/or does not run as far towards the middle of the slips as usual (when comparing other verso lines in the same manuscript and other manuscripts). Although such cases also occur in the manuscripts that Sun Peiyang analysed (see e.g. the last verso line of each of the three Yuelu Academy *Zhiri*),²³ he did not discuss them. He Jin offered an explanation for these phenomena, which he calls ‘pinched off head and removed tail’ (*qia tou qu wei* 掐頭去尾). There must have been many cases where a manuscript had already been completed, but some slips from the last group which had been used for its production and which carried a certain verso line had remained unused. In such cases, they were surely not discarded but rather used on another occasion, so that a group of slips (or more precisely a verso line) with a ‘pinched off head’ would occur somewhere in another manuscript. At the end of the first manuscript this would at the same time result in a ‘removed tail’ – exactly as it is the case in the mentioned Yuelu Academy *Zhiri*.²⁴

3. The application of verso lines as part of the overall production of a manuscript

Sun Peiyang was the first to discuss the application of verso lines as part of the whole process of producing a manuscript. Basically dividing this process into the steps ‘application of verso lines’, ‘writing’ and ‘binding’, he argued that, as there was no evidence indicating anything else, the application of verso lines most probably had always taken place before binding. On the contrary, there are many examples where line sections are visible at the position of one of the binding strings or even partly covered by remains of a binding string, which proves that the bindings were fixed after the lines had been applied.²⁵ According to the distinction into the abovementioned

²² He Jin 2013, 460–462.

²³ See fig. 1 to 3 in Sun Peiyang 2011, 459–460.

²⁴ He Jin 2013, 462–463.

²⁵ Sun Peiyang 2011, 456, cf. Shi Da 2013, 23.

three steps of production, this premise leads to three possible sequences of production:²⁶

1. Application of lines → binding → writing
2. Writing → application of lines → binding
3. Application of lines → writing → binding

In sum, this means that verso lines were either applied to blank slips (sequences 1 and 3) or slips that already carried writing (sequence 2). But in any case this was done before they were tied together. According to He Jin the application of verso lines was always the first step because he assumes that this belonged to the ‘production of the slips’. He Jin generally suggests that this production was carried out by others than the professional scribes who applied the writing.²⁷ Although this is not unlikely at all, it remains a mere assumption. In fact, judgements about the order in which the verso lines and the writing were applied to slips are closely related to the interpretation of ‘gaps’ of different sizes, which often occur in the verso lines between slips that carry consecutive passages of text on their recto.²⁸ He Jin assumes that application of lines must have come before writing because otherwise such gaps in the lines would be difficult to explain.²⁹ Sun Peiyang had earlier suggested three possible reasons for the gaps:

1. The slips were not carefully aligned side-by-side when the lines were applied.
2. After the lines had been applied, some slips were discarded before/during the writing process (e.g. due to writing mistakes or some kind of material defect).
3. The lines were applied to complete bamboo culm segments before these were cut into slips, and the slips became slightly narrower during processing (e.g. through abrasion).³⁰

²⁶ Sun Peiyang 2011, 456.

²⁷ He Jin stresses this division of labour several times in his paper, see He Jin 2013, 463–465.

²⁸ This phenomenon is usually named *cuowei* 錯位 in Chinese scholarship. For examples in the three *Zhiri* contained in Yuelu Academy volume one see Sun Peiyang 2011, 450–451.

²⁹ He Jin 2013, 463–464.

³⁰ Sun Peiyang 2011, 456–457.

Apart from the first possibility, in which the lines could at least theoretically be applied to slips that already carry writing, the other two would definitely require the lines to be applied before the writing. Sun Peiyang himself already considered the first possibility the least likely. In most cases of wider gaps in the verso lines, the part of a certain verso line that appears to be missing would correspond to one or several line sections. Therefore the possibility that one or several slips had been discarded for some reason or used in another (part of the same) manuscript is comparatively high.³¹ Further evidence for the practice of discarding and replacing individual slips after application of verso lines but before writing can be drawn from examples where slips without any visible line section occur among slips with a continuous verso line.³² On the whole, one might therefore say that the probability of the production sequences ‘application of lines → binding → writing’ and ‘application of lines → writing → binding’ is much higher than that of the sequence ‘writing → application of lines → binding’.³³ This means that the verso lines were probably applied to blank slips as the first of the three steps that were mentioned above.

4. The spiral line theory

The third of the possible reasons proposed by Sun Peiyang to explain gaps in the verso lines (see above) is directly connected to a key hypothesis that has been forwarded with regard to the application process of the verso lines. It shall be referred to as the ‘spiral line theory’ in the following. Sun had suggested that in some cases (e.g. the Tsinghua University *Qiyè* 耆夜 and *Jinteng* 金滕), the verso lines might actually have been applied to complete bamboo culm segments before these were cut into slips, and that this could have entailed the occurrence of small gaps because the slips probably became slightly narrower during further processing.³⁴ This hypothesis

³¹ Sun Peiyang 2011, 451, 456–457, cf. Han Wei 2012, 233 and He Jin 2013, 464–466.

³² See e.g. slips 84 and 178 of the Peking University *Laozi*. Han Wei proposed a second explanation for this, namely that the application of the respective verso line might for some reason not have left a line section on these slips, see Han Wei 2012, 233. However, this appears quite unlikely, as the line sections on the neighbouring slips were apparently clearly and completely visible; see tracings in Beijing daxue chutu wenxian yanjiu suo 2012c, 113, 116.

³³ The same view is shared by Takeda (2013a, 78–79). He Jin (2013, 466) argues that there are no convincing examples yet for the production sequence ‘writing → application of lines → binding’.

³⁴ Sun Peiyang 2011, 457.

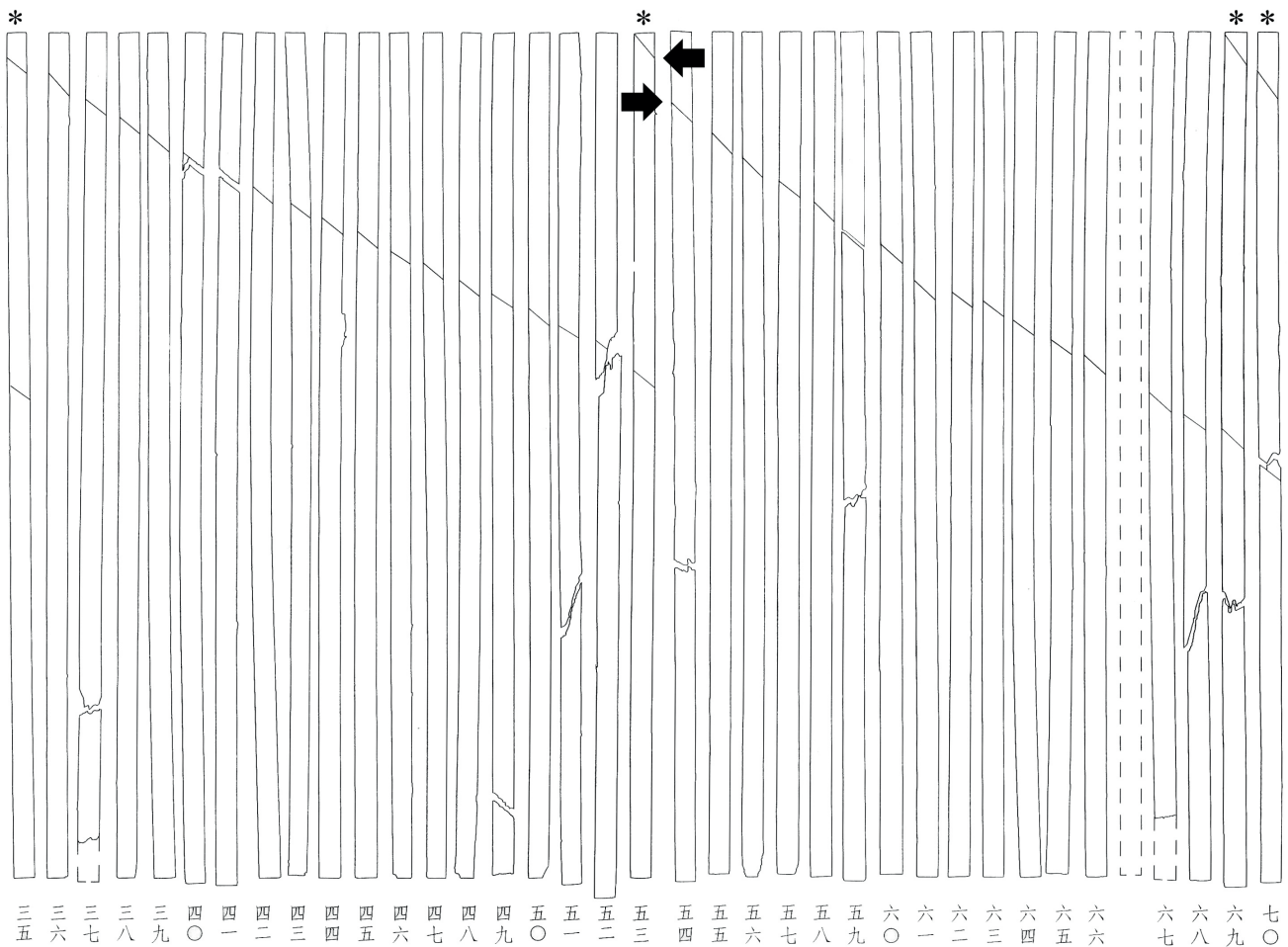


Fig. 4: Example for gap in verso lines between Peking University *Laozi* slips 53 and 54.³⁵

shifts the application of the verso lines even further towards the beginning of the production of a manuscript – to a stage where the individual slips have not even been produced. At the same time it draws a connection between slips that belong to the same verso line and a certain bamboo culm segment. Li Tianhong 李天虹 was the first to point out the correlation between verso lines and slips that were apparently made from the same segment of a bamboo culm. She observed in the Tsinghua University *Qiyè* 耆夜 that the line sections on slips that were most probably made from the same such segment

(based on the number and position of bamboo nodes) show a very similar slant and can sometimes be joined to form a continuous line. Therefore they appear to have been made at the same time or rather during the same production step. However, the slips were not necessarily used in the respective order in the manuscript, which is why a continuous line is not visible in every case. Li Tianhong concluded that the verso lines were probably made during ‘the processing of a segment’ of a bamboo culm (*xiuzhi huanjie* 修治環節).³⁶

³⁵ The two arrows indicate the position of the line sections on slips 53 and 54, between which there is an obvious gap. The asterisks on the top were used by the editors to indicate slips with two line sections. For this figure the two reduced-size tracings of *Laozi* slips 35 to 53 and 54 to 70 in Beijing daxue chutu wenxian yanjiu suo 2012c, 112 have been combined. Cf. the discussion of these slips as groups 3 and 4 in Han Wei 2012, 230. Note that the position of the lower line section on slip 35 differs significantly when comparing the full-scale tracing included as a supplement in the same volume and the reduced-size tracing of the respective group. Only the latter seems to be in accordance with the description in text-form provided by Han Wei, which is the reason why a combination of two reduced-size tracings was used for the above figure.

³⁶ Li Tianhong 2011, 103–104. A similar view is expressed in Jia Lianxiang 2012. According to traditional sources, the production of bamboo slips for manuscripts included several steps. First, a bamboo culm segment had to be cut to the right length and, in a second step, was split lengthwise into parts of the right width (usually somewhere between 0.5 and 1 cm). To produce the writing slips, which were often as thin as 0.1 cm, most of the softer material on the inside of these parts was scraped away. To make the slips more durable and suitable for writing they were also dried (*shaqing* 殺青 or ‘to kill the green’) and polished. Most of the writing was applied to the recto side of the slips which originally faced towards the middle of the culm segment (*zhuhuang* 竹黃) although it was also common to write titles or sequence numbers on the verso (*zhuqing* 竹青) after the very smooth outer surface had been prepared for this, e.g. by scraping. For more details on the production process see e.g. Zhang Xiancheng 2004, 114–117.

Following up on the possibility already hinted at by Sun Peiyang, Li Shoukui 李守奎 elaborated on this hypothesis claiming – likewise with regard to the Tsinghua University slips – that ‘to some bamboo culm segments a line that surrounded the whole culm segment was applied, before it was further processed into slips.’³⁷ However, he did not supply any further details or explanations. This desideratum was later met by Han Wei 韓巍, who finally provided the proper basis for a spiral line theory through an analysis of the verso lines on the slips of the Peking University *Laozi* 老子. As he pointed out, the *Laozi* is a favourable source to investigate the verso line phenomenon because its slips are comparatively well preserved, and the text has several textual counterparts in both received literature as well as manuscripts, which means that the reconstruction of the original sequence of the slips is largely unproblematic.³⁸ Han Wei noticed that especially near the end of a certain verso line and the beginning of the next, where some of the respective slips usually show two line sections instead of only one, obvious gaps in the verso lines often occur (see fig. 4).

After repeated inspection of the verso lines, Han Wei arrived at the following conclusion that can actually explain the distributional pattern of the line sections on the *Laozi* slips: The person in charge of producing the bamboo slips must have applied a ‘spiral-shaped line’ (*luoxuan zhuang de huaxian* 螺旋狀的劃綫) to a bamboo culm segment that had already been cut to the right length (in this case about 32 cm)³⁹ before it was split into individual bamboo slips.⁴⁰ Therefore, if a slip shows two line sections, these line sections belong to the same verso line rather than to two different ones. In fact, the line section(s) on the last slip of a certain group of slips that all belong to the same verso line can in many cases be directly connected with the line section(s) on the first slip of the respective group. At the same time, no such connection is possible with the line section(s) on the first slip of the following group of slips.⁴¹ If both, the first as well as the last slip of a group, show two line sections, then the upper line section on the last slip can be connected with the

upper line section on the first, whereas the lower line section on the last slip can be connected with the lower line section on the first (see fig. 5).⁴²

Han Wei identified overall 14 groups of slips that can each be assigned to the same verso line and therefore the same bamboo culm segment.⁴³ Such a fixed group of slips shall be named a ‘set’ in the following.⁴⁴ Han Wei further stated that this practice of applying the verso lines to complete bamboo culm segments had probably not only been used for the slips of the Peking University *Laozi* from the late second or early first century BCE.⁴⁵ Rather, it apparently had a long tradition that dated back at least 200 years because Shen Jianhua 沈建華 of Tsinghua University supposed that the same practice could be observed on the slips of the Tsinghua University *Xinian* 繫年, which have been dated to around 300 BCE.⁴⁶ He Jin however voiced some scepticism with regard to a general validity of the spiral line theory. He argued that this hypothesis might be true for the case of the Peking University *Laozi*, but that this rather appears to be a special case that is not necessarily representative. His arguments against the theory were the following:⁴⁷

1. In the *Laozi* a complete verso line is applied on 16 to 19 slips.⁴⁸ If this number of slips is assumed to constitute the complete circumference of a bamboo culm segment, then the spiral line theory could hardly explain other cases where slips have about the same width but a complete verso line is applied on as few as 9 (e.g. Peking University *Wangji* 妄稽)⁴⁹, as many as 25 (e.g. Tsinghua University

⁴² Cf. Takeda 2013b, 127–128.

⁴³ See tables in Han Wei 2012, 228.

⁴⁴ Takeda calls these ‘bamboo slip groups’ (*chikkan gun* 竹簡群), see Takeda 2013b, 128.

⁴⁵ Cf. Beijing daxue chutu wenxian yanjiu suo 2012c, preface, 2.

⁴⁶ Han Wei 2012, 228, footnote 6 as well as 232, footnote 10. Cf. Li Shoukui 2012, 4. By use of the C14-method the slips of the Tsinghua University collection were dated to 305 BCE +/- 30 years, see Li Xueqin and Qinghua daxue chutu wenxian yanjiu yu baohu zhongxin 2010, preface, 3. Sun Peiyang (2011, 455) observed that the practice of applying verso lines in general (not particularly the application of spiral lines) appears to have been common from Warring States until Western Han times.

⁴⁷ For these arguments see He Jin 2013, 467.

⁴⁸ Cf. Han Wei 2012, 233.

⁴⁹ On this manuscript see He Jin 2011.

³⁷ 有的竹簡在製成竹簡前，沿圓周作一道劃痕，see Li Shoukui 2012, 4.

³⁸ Han Wei 2012, 227.

³⁹ Beijing daxue chutu wenxian yanjiu suo 2012c, 121.

⁴⁰ Han Wei 2012, 228.

⁴¹ Han Wei 2012, 228–232.

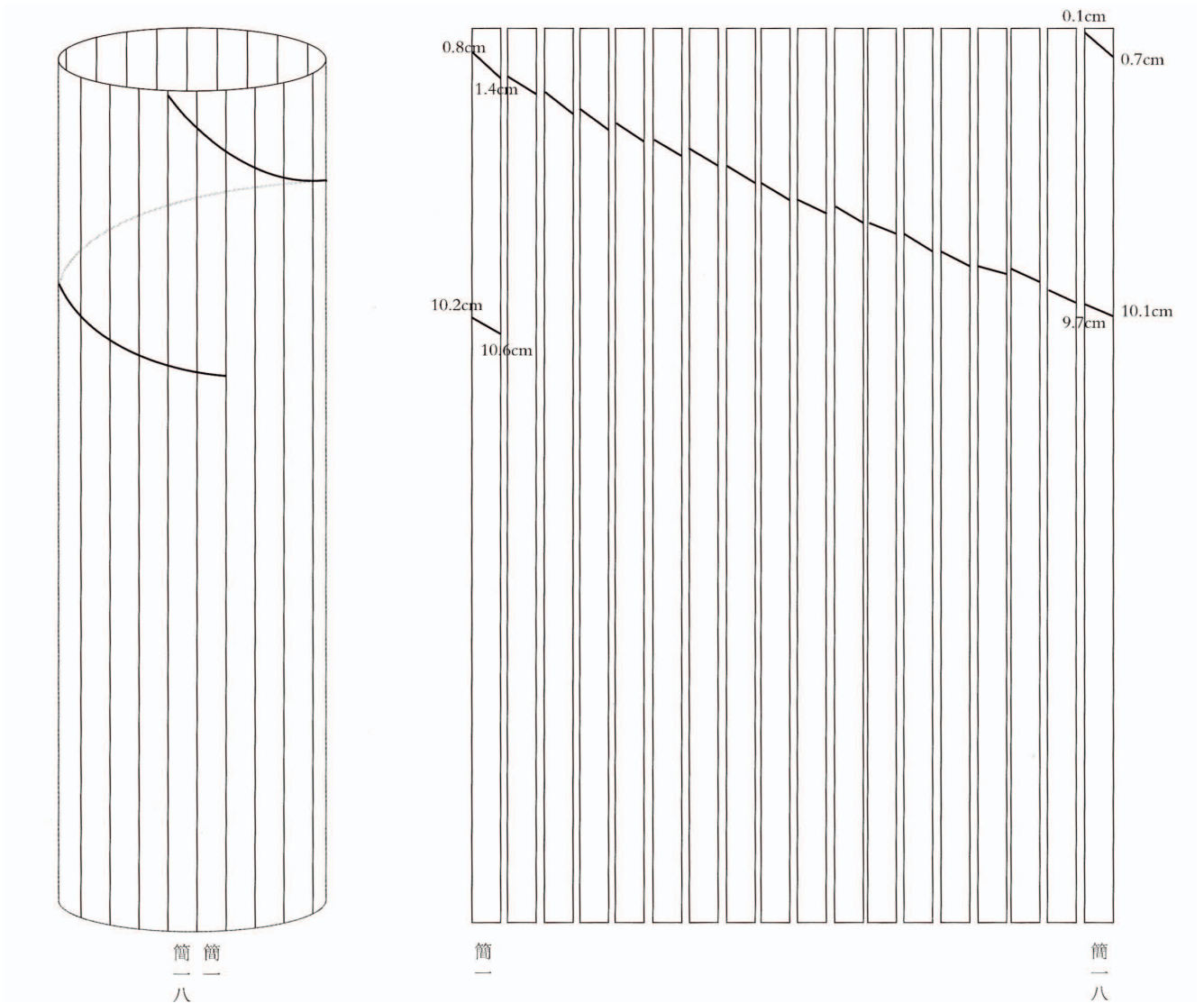


Fig. 5: Spiral-shaped verso line on Peking University *Laozi* slips 1 to 18.⁵⁰

Xinian) or even more than 30 slips (e.g. Yuelu Academy *Zhiri*).

2. In the Tsinghua University *Qiyè* there appears to be a continuous verso line on slips 10, 11 and 12, although the bamboo node visible on slip 10 is in a completely different position than those on slips 11 and 12. Therefore, the three slips could not possibly have been part of the same bamboo culm segment, which means that the verso line cannot have been applied in the way suggested by Han Wei. Rather, this line was applied to slips that had been produced from different culm segments.

3. Verso lines were also discovered on wood slips.⁵¹ In those cases the lines could hardly have been applied that way.

In fact the above three arguments do not withstand closer investigation. First, Han Wei calculated that according to the width of the *Laozi* slips and the average number of slips that can be assigned to the same verso line/bamboo culm segment, the culm segments that were used to produce the slips must have had a diameter of 5 to 6 cm.⁵² He further argued that

⁵¹ See the Qin slips of roll A (*Bainang*) from the Peking University collection (Beijing daxue chutu wenxian yanjiu suo 2012b, 66).

⁵² For this calculation Han Wei probably applied: a number of slips between 16 and 19, a width of 0.8 to 0.9 cm and an assumed loss of material during production of 0.1 cm in width per slip, see Han Wei 2012, 233. Using the above numbers, the circumference of one culm segment must have been between a minimum of 14.4 cm (=16*[0.8cm+0.1cm]) and a

⁵⁰ This figure was taken from Han Wei 2012, 229.

these diameters correspond with the natural growth of the type of bamboo that was used for the Peking University Han bamboo slips.⁵³ According to material analysis, the slips were made of bamboo belonging to the *Phyllostachys* (*gangzhu* 剛竹) genus.⁵⁴ However, no matter which type of bamboo was used to produce slips, the diameter can even vary significantly for culms of the same bamboo species. In the case of *Phyllostachys sulphurea viridis*, culms can have a diameter of between 4 and 10 cm.⁵⁵ A culm segment with a diameter of 10 cm could easily produce more than 30 slips.⁵⁶ Takeda Kenji 竹田健二 further gathered from

maximum of 19 cm (=19*[0.9cm+0.1cm]). The corresponding diameters (=circumference/π) are nearly 4.6 and slightly more than 6 cm, respectively.

⁵³ Han Wei 2012, 233.

⁵⁴ Hu Dongbo et al. 2011, 90, cf. Wang Zhengping and Stapleton 2006, 163–180. The Qin bamboo slips in possession of Peking University and the Tsinghua University slips were in fact made from the same type of bamboo (Beijing daxue chutu wenxian yanjiu suo 2012a, 41–42; Li Junming 2012, 39). For the Yuelu Academy slips there is unfortunately no information on this in the respective material analysis report, see Zhu Hanmin and Chen Songchang 2010, 197–201.

⁵⁵ Wang Zhengping and Stapleton 2006, 167.

⁵⁶ A culm segment with a diameter of 10 cm would have a circumference of around 31 cm (=diameter*π). Following Han Wei's calculations (see footnote 52), one could produce at least 34 slips (=31cm/[0.8cm+0.1cm]) in the same width as those of the Peking University *Laozi* from such a culm segment. In the case of the Yuelu Academy *Zhiri*, which were cited by He Jin as examples for verso lines that are applied to up to 35 slips (He Jin 2013, 467), the slips only have a width of 0.5 to 0.6 cm (Zhu Hanmin and Chen Songchang 2010, preface). A culm segment that could produce 35 slips with a width of 0.6 cm (+0.1 cm assumed loss of material) would have to have a circumference of 24.5 cm (=35*0.7cm), which is equal to a diameter of around 7.8 cm (=circumference/π). Although it is unclear exactly which type of bamboo was used for the production of the Yuelu Academy slips, the existence of bamboo culms with a diameter of nearly 8 cm is easily conceivable. They definitely exist for the *Phyllostachys* genus, see Wang Zhengping and Stapleton 2006. It might be interesting in this respect that the *Suanshushu* 算數書 manuscript excavated from Zhangjiashan 張家山 tomb no. 247 contains a passage titled *chengzhu* 程竹, which appears to refer to frequent dimensions of bamboo culm segments that were used to produce slips. The text mentions 'bamboo of eight inches (*cun* 寸)' and 'bamboo of nine inches' (*Suanshushu* 70–71, see Zhangjiashan er si qi hao Han mu zhujian zhengli xiaozu 2006, 141, cf. translation in Cullen 2004, 60). In Han times, one inch was equal to about 2.31 cm, which would mean that these measurements correspond to around 18.5 cm and 20.8 cm, respectively. With regard to the usual diameter of culms for the frequently used *Phyllostachys* genus it seems in fact unlikely that the numbers here refer to a diameter, as proposed in Zhangjiashan er si qi hao Han mu zhujian zhengli xiaozu 2006, 141, footnote 2. Of 40 species listed for this genus, only one (*maozhu* 毛竹) can reach culm diameters of 15 to 20 cm (Wang Zhengping and Stapleton 2006, 172). Rather, these are circumferences that would correspond to diameters of nearly 6 and slightly more than 6.5 cm, respectively. The very large number of slips (i.e. 183) with a length of three feet (*san chi* 三尺, ca. 70 cm) that according to the *Suanshushu* can be produced from a 'bamboo of eight inches' must be due to the fact that the length of the bamboo culm – which in fact does not enter the calculation (Cullen 2004, 61) – was much more than three feet, probably a multiple of this length (e.g. 18 feet or about 4 m).

He Jin's description of the Peking University *Wangji* – with only 9 slips per verso line, but at the same time no slips with more than one line section⁵⁷ – that the respective sets of slips are likely to be incomplete and do not necessarily contain a complete line.⁵⁸ Possible reasons for the existence of such incomplete sets had been forwarded by He Jin himself (see above).⁵⁹

Second, as has already been pointed out by Takeda, He Jin's analysis of slips 10 to 12 of the Tsinghua University *Qiye* is untenable. There is in fact no line section visible on slip 10, which is why He Jin inferred – with reference to an allegedly similar situation on the following slip 11 – that there had originally been a line section at the position where the slip had broken. This assumption, however, is questionable because on slip 11 the line section is still clearly visible, which means that this slip did in fact not break at exactly this position but slightly above the line section.⁶⁰ Also, even if there was a line section on slip 10 at the position proposed by He Jin, it still would not be possible to directly connect it with the line section on the following slip 11. Takeda stated that, according to his investigation of the Tsinghua University slips (up to volume three), there is in fact not a single example for a continuous verso line on slips with bamboo nodes at different positions which could prove that the lines were applied after the slips had been manufactured.⁶¹ The author of this paper could also not find such an example in volume four.⁶²

Third, the fact alone that verso lines also occur on wood slips, where the application of spiral lines seems unlikely, does not prove in any way that the lines might not have been applied to bamboo slips in exactly that way. These different materials certainly required different techniques for processing – not only concerning the application of verso lines. It is furthermore noteworthy that the lines on the Qin wood slips of roll A (*Bainang* 白囊) from the Peking

⁵⁷ He Jin 2013, 460.

⁵⁸ Takeda 2013b, 140.

⁵⁹ He Jin 2013, 462–463.

⁶⁰ Takeda 2013a, 80, footnote 12, cf. Takeda 2013b, 131.

⁶¹ Takeda 2013a, 80, footnote 12, cf. Takeda 2013b, 141.

⁶² See Li Xueqin and Qinghua daxue chutu wenxian yanjiu yu baohu zhongxin 2013, 6–9, 14–15. Unfortunately, the recently published volume five was not available before the submission of this paper.

University collection cited as an example by He Jin are ink-drawn and furthermore described as ‘intersecting’ (*jiaocha* 交叉).⁶³ This in fact points towards a different application technique. A closer investigation of these lines will have to wait until photographs of the material are published.

5. Further examples of manuscripts with spiral lines

5.1 The Tsinghua University manuscripts

As has been shown there is to date no convincing evidence to disprove a possibly more general validity of Han Wei’s spiral line theory. On the contrary, Takeda provided further evidence to verify Shen Jianhua’s statement that the situation concerning the verso lines in the Tsinghua University *Xinian* is similar to that in the Peking University *Laozi*,⁶⁴ which had been doubted by He Jin.⁶⁵ The most important factors that enabled the identification of spiral lines in the *Laozi* were the exceptionally well preserved state of the two respective manuscripts (with only two missing slips)⁶⁶ and the occurrence of two line sections (from the beginning and the end of the same verso line) on 19 slips.⁶⁷ This often made it possible to trace complete verso lines from beginning to end and thereby identify sets of slips that can be assigned to the same verso line as well as to the same bamboo culm segment.

A very similar situation can in fact be found in the Tsinghua University *Xinian*. Only three of the total of 138 slips appear to be seriously fragmented, whereas no slips are completely missing.⁶⁸ Although the description of the verso lines on the *Xinian* slips by two members of the editorial team suggests that none of the slips show more than one line

section,⁶⁹ Takeda has pointed out that there are in fact six slips that have two line sections.⁷⁰ Although there are less slips with two line sections in the *Xinian* than in the *Laozi*, it is easily possible to identify slips that probably belong to the same set because the comparatively long slips of the *Xinian* (44.6 to 45 cm)⁷¹ consistently show one bamboo node, and differences in the position of these nodes are usually quite obvious. He Jin had thereby already identified seven groups of slips (see table 1) although he did not think that the verso line on each of these groups was in fact a spiral line (which is why they are as yet not called ‘sets’ here):

Table 1: Groups of slips in the Tsinghua University *Xinian* according to He Jin.⁷²

Group	Slips	Number of slips
1	1 to 25	25
2	26 to 44	19
3	45 to 69	25
4	70 to 95	26
5	96 to 120	25
6	121 to 134	14
7	135 to 138	4

After analysis of the verso lines on the *Xinian* slips, Takeda observed that the continuity of the lines is extremely regular, meaning that the slips inside a certain group were usually placed in accordance with the respective verso line.⁷³ In

⁶³ Beijing daxue chutu wenxian yanjiu suo 2012b, 66.

⁶⁴ Takeda 2013b. Cf. Han Wei 2012, 228, footnote 6.

⁶⁵ He Jin 2013, 467.

⁶⁶ Having pieced together 105 fragments in addition to the 176 completely extant slips, the editors arrived at 211 complete or nearly complete slips and 10 fragments. As the editors assume that the overall number of slips in the two *Laozi* manuscripts was 223, this means that only two slips are completely missing. See Beijing daxue chutu wenxian yanjiu suo 2012c, 121.

⁶⁷ Han Wei 2012, 227.

⁶⁸ This can be gathered from the sequence numbers that were written on the verso of the slips. The numbers range from 1 to 137, because the last slip does not have a sequence number written on it. Also, there are two mistakes in the numbering: the sequence number ‘52’ was used twice (on slip 52 and by mistake again on the following slip 53), whereas the sequence number ‘88’ was apparently left out, because there appears to be no text missing. See Li Junming and Zhao Guifang 2012, 66–67, cf. photographs in Li Xueqin and Qinghua daxue chutu wenxian yanjiu yu baohu zhongxin 2011, 18–33.

⁶⁹ Li Junming and Zhao Guifang 2012, 67 and 69, fig. 1.

⁷⁰ These are slips 1, 45, 70, 71, 96 and 97, see Takeda 2013b, 133. He Jin had earlier identified three of these slips (45, 96, 97), see He Jin 2013, 461, footnotes 3, 4 and 5. Takeda further argued that the slightly fragmented slip 135 probably originally had a second line section at the very top, which could be linked with that on the following slip 136, see Takeda 2013b, 134. This appears to make more sense than He Jin’s proposal that slip 135 was, just as slip 44, misplaced, see He Jin 2013, 465–466.

⁷¹ Li Xueqin and Qinghua daxue chutu wenxian yanjiu yu baohu zhongxin 2011, 135.

⁷² He Jin 2013, 461. Cf. the erroneous description of groups 1 to 4 in Li Junming and Zhao Guifang 2012, 67.

⁷³ Apart from four slips that do not show any line sections, which is apparently either due to their fragmented state (slips 63 and 64) or the fact that they might be later replacements for the original slips (slips 8 and 60), only the last slip of the second group (slip 44) does not fit into the sequence as far as its line section is concerned, see He Jin 2013, 465. Judging from the position of the line section this slip should have been placed between slips

contrast to He Jin, he further proposed that the lower line sections of all six slips that show two line sections (1, 45, 70, 71, 96 and 97) and which are actually all situated at the beginning of a certain group of slips, can be connected with the line section on the last slip of the respective group.⁷⁴ In fact, a direct link is possible between 70-71 and 95 for group 4 (see fig. 9 in appendix A) in the same way as in 10 of overall 14 sets of the two manuscripts constituting the Peking University *Laozi*.⁷⁵ For slips 1, 45 and 96 (groups 1, 3 and 5) one would have to assume one or two missing slips, respectively, to connect them with the last slip of the respective group (see e.g. group 5, fig. 10 in appendix A), as it is also the case in one set of the *Laozi*.⁷⁶ In the *Laozi* as well as in the *Xinian*, these slips must have been discarded for some unknown reason, before the writing was applied because there is obviously no part of the text missing. Just as in the *Laozi* there are also groups of slips in the *Xinian*, which do not contain any slip with two line sections or which are very clearly incomplete (groups 2, 6 and 7).⁷⁷ However, with regard to the evidence provided by groups 1 and 3 to 5 it seems likely that the verso lines in these three groups were applied in exactly the same way.⁷⁸ Therefore, it is justified to call the seven groups of slips in the *Xinian* ‘sets’ in the same way as those in the *Laozi*. As supporting evidence one can calculate the approximate diameter a bamboo culm segment would require to produce enough slips. The largest group of the *Xinian* is group 4 (slips 70 to 95) with 26 slips, which actually appears to contain a complete verso line (see fig. 9 in appendix A). This suggests that, following Han Wei’s

assumption of a loss of width of about 0.1 cm per slip during processing,⁷⁹ the circumference of the original culm segment from which these 26 slips with a width of 0.5 to 0.6 cm⁸⁰ were probably produced must have been around 17 cm. The respective diameter would be circa 5.5 cm, which is a typical culm diameter for the type of bamboo from which the Tsinghua University bamboo slips were produced (*Phyllostachys* or *gangzhu* 剛竹).⁸¹

But the *Xinian* is not the only manuscript from the Tsinghua University collection which supports the spiral line theory. Takeda argued that the *Jinteng* is another example.⁸² Of the overall 14 slips, the first three show two line sections.⁸³ Apart from the fact that the lower line sections on slips 1 to 3 appear to form a continuous line that is parallel to the one formed by the upper line sections on slips 1 to 3 and those on slips 4 to 14,⁸⁴ the number and position of the bamboo nodes on all 14 slips are identical. Takeda further suggested that – provided that there were originally two more slips between them – the line section on slip 14 and the lower line section on slip 1 may be linked. Pointing to similar circumstances in the Peking University *Laozi* and the Tsinghua University *Xinian*, where a certain set of slips manufactured from the same bamboo culm segment had apparently not been completely used up, Takeda proposed that the *Jinteng* is probably another example for Han Wei’s spiral line theory.⁸⁵

37 and 38 of the same group, but was probably mistakenly placed at the end, see Takeda 2013b, 133–134.

⁷⁴ Takeda 2013b, 135–136.

⁷⁵ These are sets 1, 2, 3, 4, 5 and 7 of *Laozi shangjing* 老子上經 and sets 1, 2, 4 and 6 of *Laozi xiajing* 老子下經, see Han Wei 2012, 229–232. Cf. the tracings in Beijing daxue chutu wenxian yanjiu suo 2012c, 111–117.

⁷⁶ In set 5 of *Laozi xiajing* one slip appears to be missing between the first and the last slip of the set according to the verso lines, see Han Wei 2012, 229–232. Cf. the tracings in Beijing daxue chutu wenxian yanjiu suo 2012c, 111–117.

⁷⁷ Set 6 of *Laozi shangjing* and set 3 of *Laozi xiajing* do not contain slips with two line sections, whereas set 8 of *Laozi shangjing* with only 6 slips is obviously incomplete, see Han Wei 2012, 229–232. Cf. the tracings in Beijing daxue chutu wenxian yanjiu suo 2012c, 111–117. Note that both *Xinian* group 7 and *Laozi shangjing* set 8 are positioned at the very end of the respective manuscript, which means that their incomplete state is in no way surprising. Cf. Takeda 2013b, 134.

⁷⁸ Takeda 2013b, 136.

⁷⁹ See footnote 52.

⁸⁰ The width was measured with the help of the full-scale photographs in Li Xueqin and Qinghua daxue chutu wenxian yanjiu yu baohu zhongxin 2011, 2–17.

⁸¹ See footnote 54.

⁸² Takeda 2013b, 138–139.

⁸³ Li Xueqin and Qinghua daxue chutu wenxian yanjiu yu baohu zhongxin 2010, 16–17, cf. Takeda 2013b, 138, fig. 2.

⁸⁴ Sun Peiyang 2011, 453.

⁸⁵ Takeda 2013b, 139. He further suggested that, although there are no slips with two line sections visible in these cases, the Tsinghua University *Chengwu* 程寤 (Li Xueqin and Qinghua daxue chutu wenxian yanjiu yu baohu zhongxin 2010, 6–7) and *Chi Hu zhi Ji Tang zhi wu* 赤鵠之集湯之屋 (Li Xueqin and Qinghua daxue chutu wenxian yanjiu yu baohu zhongxin 2012, 20–23) are possibly further examples, see Takeda 2013b, 143, footnote 11. For the 15 slips of *Chi Hu zhi Ji Tang zhi wu*, it has recently been proposed that the respective verso line continues on slips 1 to 3 of the *Yinzi* 尹至 (Li Xueqin and Qinghua daxue chutu wenxian yanjiu yu baohu zhongxin 2010, 2–3), see Xiao Yunxiao 2013. This would mean that this set consisted of overall 18 slips.

5.2 The Yuelu Academy manuscripts

Han Wei pointed out with regard to the Yuelu Academy *Zhiri* that in manuscripts where according to Sun Peiyang the verso lines had definitely been applied after the slips had been produced, two line sections likewise occur on the same slip in certain cases. He stated that the reason for an ‘overlap of verso lines’ in these cases is unclear.⁸⁶ This deserves closer investigation. Sun Peiyang thought that, if there are two line sections visible on certain slips of the Yuelu Academy *Zhiri*, these belong to two *different* verso lines. His analysis of *Zhiri 27* can serve as an example. Sun assumed that there are three continuous verso lines on the slips of *Zhiri 27*: the first starting on slip 1 and ending on slip 23, the second starting on slip 21 and ending on slip 43, the third starting on slip 41 and ending on slip 54. Due to an ‘overlap’ of the first and second lines on slips 21, 22 and 23 as well as of the second and third lines on slips 41, 42 and 43, these six slips each show two line sections.⁸⁷

With regard to Sun Peiyang’s analysis, there are some things that warrant revision. First, there is in fact only one line section visible on slip 23. The lower line section, as postulated by Sun, is not observable on the photograph of this slip.⁸⁸ Second, the upper line sections on the preceding slips 21 and 22, which according to Sun belong to the second verso line, cannot be connected with the line section on slip 23. This means that there is no direct connection possible between slips 22 and 23 as far as the verso lines are concerned. Instead, however, the upper line section on slip 22 can be directly connected with the line section on slip 1 in the same way as in some sets of slips in the Peking University *Laozi* and the Tsinghua University *Xinian* (see fig. 11 in appendix A). As pointed out by Sun, there is a gap in the first verso line between slips 9 and 10, which probably means that one slip was discarded after application of the line and that furthermore slip 17 from *Zhiri 35* should be placed between slips 6 and 7 of *Zhiri 27*.⁸⁹ Overall, this means that

slips 1 to 22 of *Zhiri 27* (plus the additional slip) constitute a set of 23 slips (originally very likely 24) that were probably produced from the same bamboo culm segment.

Bearing this discovery in mind, it is necessary to re-examine the second verso line, which according to the above analysis starts on slip 23. It appears from Sun Peiyang’s reconstruction of *Zhiri 27* that the upper line section on slip 43 and the line section on slip 44 can be directly connected.⁹⁰ In fact this is not the case, as slip 44 would have to be placed slightly lower than the preceding slip 43 according to its state of fragmentation.⁹¹ In Sun’s reconstruction, however, the top ends of the two slips appear at exactly the same height.⁹² Therefore, the upper line section on slip 43 can probably not be directly connected with the line section on the following slip 44. Instead it can be directly connected with the line section on slip 23 (see fig. 12 in appendix A). As observed by Sun, there is a gap in the second verso line between slips 38 and 39, which probably means that one slip was discarded after application of the line. Furthermore, there are apparently two slips missing between slips 32 and 33 (according to both, verso line as well as recto text) whereas slip 25 should be removed from *Zhiri 27* because it actually belongs to *Zhiri 34*.⁹³ In sum, this means that slips 23 to 43 of *Zhiri 27* (subtracting slip 25) constitute a set of 20 slips (originally very likely 24) that were probably produced from the same bamboo culm segment. The remaining slips 44 to 54 do not contain any slip with two line sections, which is why it is not possible to find a link between the last and the first of these 11 slips for the third verso line. However, even with regard to the fact that there are three slips missing between slips 50 and 51 and the original number of slips belonging to this verso line was therefore at least 14, this is obviously an incomplete set. A comparison with the other two nearly complete sets, where the assumed original number of slip is 24, supports this assumption. In *Zhiri 27* the number of slips in a complete set is accordingly slightly lower than in the case of the Tsinghua University *Xinian* (see table 2, cf. table 1). For the slips of *Zhiri 27*, which have a width of

⁸⁶ Han Wei 2012, 232, footnote 10, cf. Sun Peiyang 2011, 457. Takeda also pointed out that further investigation would be necessary to clarify the relation between the verso lines on the Yuelu Academy *Zhiri* and those on the *Laozi*, the *Xinian* and the *Jinteng*, see Takeda 2013b, 141.

⁸⁷ Sun Peiyang 2011, 450–451 and fig. 1.

⁸⁸ Zhu Hanmin and Chen Songchang 2010, 54.

⁸⁹ Sun Peiyang 2011, 450–451. A gap between slips 10 and 11, which was proposed by Sun, is not really supported by the evidence of the line sections on these slips, see fig. 11 in appendix A.

⁹⁰ Sun Peiyang 2011, fig. 1.

⁹¹ See photographs in Zhu Hanmin and Chen Songchang 2010, 61–62.

⁹² Sun Peiyang 2011, fig. 1.

⁹³ Sun Peiyang 2011, 450–451 and fig. 1.

0.6 cm,⁹⁴ this would suggest a reasonable diameter of around 5 to 5.5 cm for a complete bamboo culm segment.⁹⁵

Table 2: Sets of slips in Yuelu Academy *Zhiri* 27.

Set	Slips	Number of slips ⁹⁶
1	1 to 22 (+ <i>Zhiri</i> 35, slip 17)	23 (24)
2	23 to 43 (– slip 25)	20 (24)
3	44 to 54	11 (more than 14)

Although it is less obvious in the other two calendars from the Yuelu Academy collection, there is a hint in favour of the spiral line theory to be found in *Zhiri* 34 as well. In contrast to Sun Peiyang's findings, there actually are slips in *Zhiri* 34 which each carry two line sections that appear to be part of continuous lines, *viz.* slips 26 to 29 (see fig. 6).

While the upper line sections on these four slips were described by Sun as the beginning of the second verso line that ends on slip 58, he did not mention the respective lower line sections.⁹⁷ In fact, these lower line sections can be directly linked with the last line section of the second verso line on slip 58 (see fig. 13 in appendix A). From this it can be gathered that slips 26 to 58 of *Zhiri* 34 probably constitute a nearly complete set of 33 slips – due to a slip that was apparently discarded after application of the line,⁹⁸ the original number of slips was most likely 34. For the slips of *Zhiri* 34, which just as those of *Zhiri* 27 have a width of 0.6 cm,⁹⁹ a bamboo culm segment would have to have a diameter of around 7.5 cm to produce 34 slips, which is

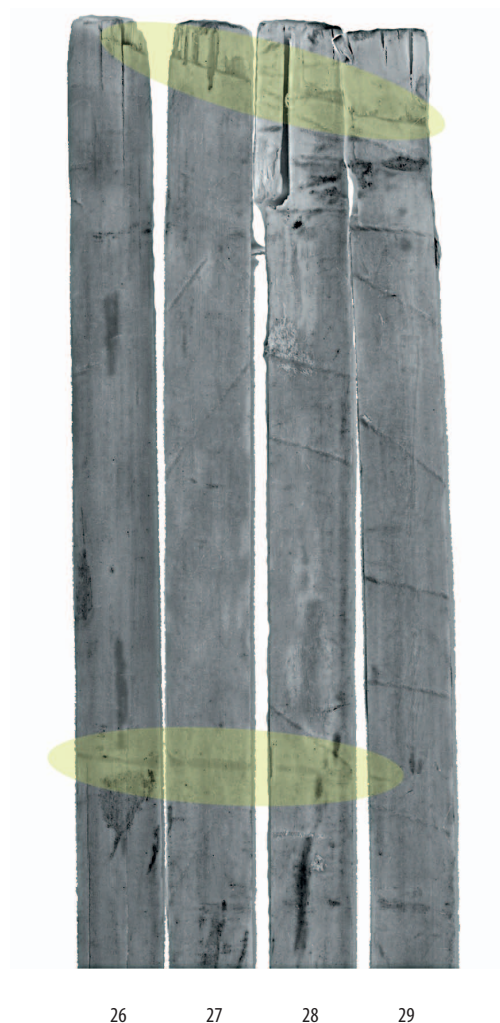


Fig. 6: Continuous lines on slips 26 to 29 of Yuelu Academy *Zhiri* 34.¹⁰¹

easily possible.¹⁰⁰ As there are no slips with two line sections in *Zhiri* 35, it is in this case difficult to argue for fixed sets of slips that might have been produced from the same bamboo culm segment to which a spiral line had been applied. However, it can be gathered from the analysis of *Zhiri* 27 and 34 that Sun Peiyang is probably wrong to assume that for all the Yuelu Academy *Zhiri* the verso lines were applied after the slips had been produced.

As a last example, manuscript 1 of the so-called *Wei yu deng zhuang si zhong* 為獄等狀四種 (hereafter *Zhuang si zhong* MS 1) from the Yuelu Academy collection shall be

⁹⁴ Zhu Hanmin and Chen Songchang 2010, preface.

⁹⁵ Cf. calculations for Peking University *Laozi* and Tsinghua University *Xinian* above.

⁹⁶ The first number refers to the number of extant slips of a certain set, the number in brackets refers to the assumed original number of slips in this set according to the verso lines. The latter number therefore includes both, slips that were apparently discarded after application of the respective verso line but before the writing was applied as well as slips that were lost later. In the second case, this not only caused an obvious gap in the verso line but at the same time a gap in the text on the recto of the slips.

⁹⁷ Sun Peiyang 2011, 451 and fig. 2.

⁹⁸ This refers to the gap between slips 36 and 37, see Sun Peiyang 2011, 451 and fig. 2. Also, slips 52 and 53 appear to have switched places, see fig. 13 in appendix A.

⁹⁹ Zhu Hanmin and Chen Songchang 2010, preface.

¹⁰⁰ Cf. calculations for Peking University *Laozi* and Tsinghua University *Xinian* above.

¹⁰¹ For photographs of these slips see Zhu Hanmin and Chen Songchang 2010, 76–77. Note that fig. 6 only shows the top part of the four slips. The continuous lines have been marked in yellow. On the additional line sections that appear not to be part of continuous lines see below and footnote 112.

examined.¹⁰² *Zhuang si zhong* MS 1 consists of 137 bamboo slips with a length of 27.5 cm and a width of 0.6 to 0.7 cm.¹⁰³ According to the editors, almost all slips of this manuscript show line sections on their verso, which mainly correspond to the sequence of the text on the recto. However, frequently gaps occur in the verso lines and while slips that belong to the same of overall seven textual units contained in *Zhuang si zhong* MS 1 show continuous lines, there is obviously no connection between slips that belong to different textual units, as far as the verso lines are concerned.¹⁰⁴ The editors therefore suppose that the seven parts might have been used separately before they were tied together in the same manuscript.¹⁰⁵

The amount of slips that can be assigned to a certain textual unit in *Zhuang si zhong* MS 1 varies significantly between as few as seven and up to 30 slips. As has already been shown, slips with two line sections are an important means to identify possible sets of slips that might be assigned to a certain spiral line and therefore the same bamboo culm segment. In *Zhuang si zhong* MS 1 ten slips show two line sections (see table 3).¹⁰⁶

The findings from the previously discussed manuscripts suggest that slips with two line sections normally occur at the beginning and/or end of a distinct set of slips. The distribution of such slips in *Zhuang si zhong* MS 1 in fact nicely fits the previously noted observation that in this manuscript there is no connection between slips that belong to different textual units as far as the verso lines are concerned. Indeed there are four slips with two line sections that are situated at the very beginning or end of a certain textual unit, *viz.* slips 1, 31, 62 and 94 (2) at the beginning of textual units 1, 2, 4 and 6, respectively, as well as slip 30 at the end of textual unit 1. However, there are further slips with two line sections in the

middle of the seven textual units, *viz.* slips 18, 19, 50, 51 and 84. These point to the possibility that the respective textual units (1, 3 and 4) contain slips from more than one set, and in fact neither the line sections on slips 18 and 19, nor those on 50 and 51 can be directly connected. Accordingly, they seem to mark the end and beginning of two separate sets of slips (see fig. 7). Slip 84 actually appears to constitute the second slip of a set because its lower line section can be directly linked with the preceding slip 83, but in turn slip 83 cannot be linked with the preceding slip 82 (see fig. 8). Apart from these three changes of sets inside textual units, there is

Table 3: Textual units and slips with two line sections in *Zhuang si zhong* MS 1.

Textual unit	Slips	Number of slips	Slips with two line sections
1	1 to 30	30	1, 18, 19, 30
2	31 to 43	13	31
3	44 to 61	18	50, 51
4	62 to 87	26	62, 84
5	88 to 94	7	-
6	94 (2) ¹⁰⁷ to 107	14	94 (2)
7	108 to 136	29	-

Table 4: Sets of slips in Yuelu Academy *Zhuang si zhong* MS 1.

Textual unit	Set	Slips	Number of slips	Slips with two line sections
1	1	1 to 18	18	1, 18
	2	19 to 30	12	19, 30
2	3	31 to 43	13	31
3	4	44 to 50	7	50
	5	51 to 61	11	51
4	6	62 to 82	21	62
	7	83 to 87	5	84
5	8	88 to 94	7	-
6	9	94 (2) to 107	14	94 (2)
7	10	108 to 117	10	-
	11	118 to 136	19	-

¹⁰² The corresponding slips are titled ‘first category’ (*di yi lei* 第一類) in the edition, see Zhu Hanmin and Chen Songchang 2013.

¹⁰³ Zhu Hanmin and Chen Songchang 2013, preface. One slip was discovered later (see footnote 107) and has been added to the original count of 136 slips.

¹⁰⁴ Shi Da 2013, 23–24. Cf. Zhu Hanmin and Chen Songchang 2013, 317.

¹⁰⁵ Zhu Hanmin and Chen Songchang 2013, 317.

¹⁰⁶ For *Zhuang si zhong* MS 1 see Zhu Hanmin and Chen Songchang 2013, 81–165.

¹⁰⁷ Slip 94 (2) was discovered after the publication of Zhu Hanmin and Chen Songchang 2013 and needs to be inserted at the beginning of textual unit 6, see Tao An 2014 and Shi Da 2014.

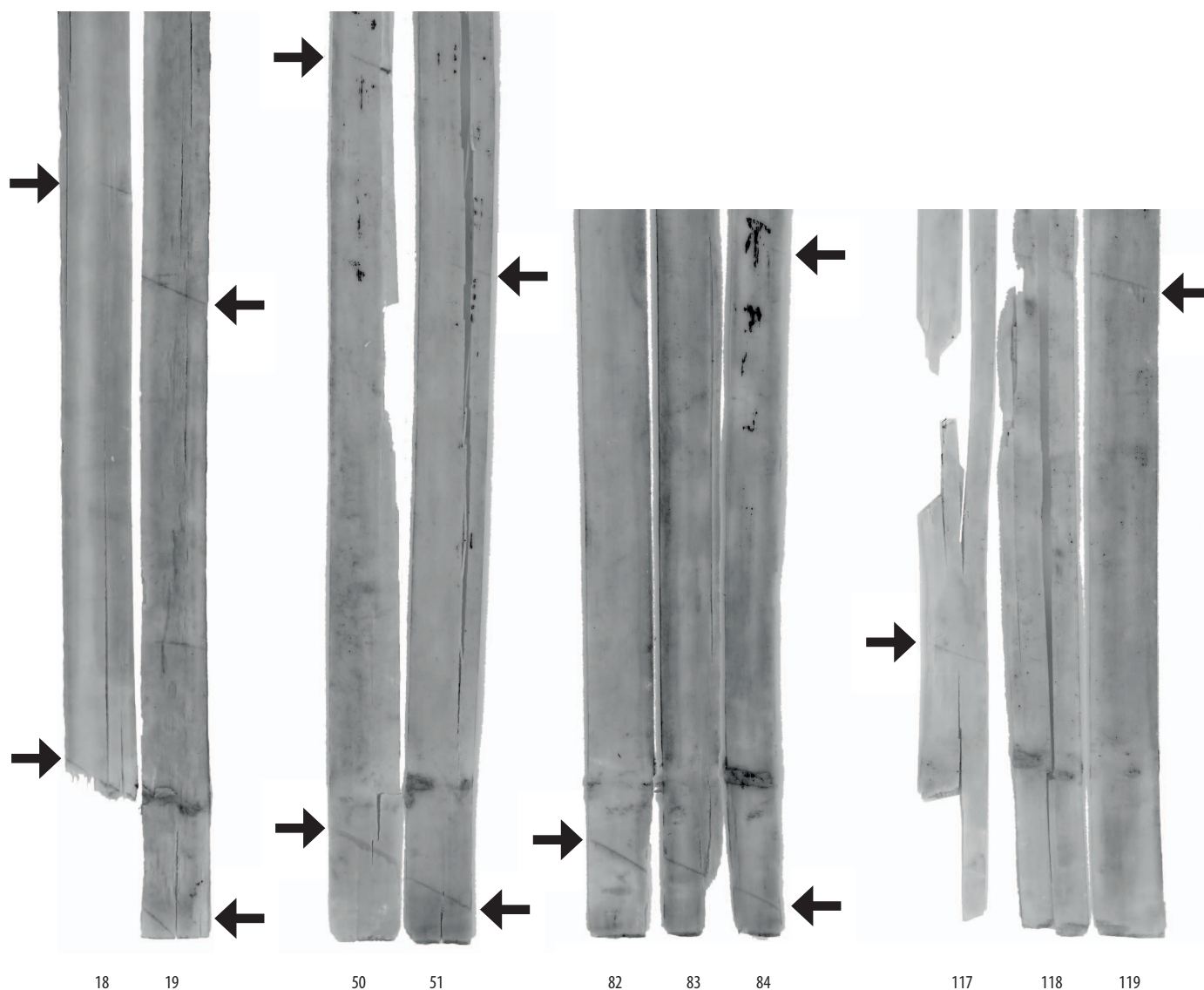


Fig. 7: End and beginning of separate sets in Yuelu Academy *Zhuang si zhong* MS 1 (I).¹⁰⁸

Fig. 8: End and beginning of separate sets in Yuelu Academy *Zhuang si zhong* MS 1 (II).¹⁰⁹

one additional, very obvious change between slips 117 and 118. The line sections on 118 and the following slips are at a significantly higher position than those on slips 108 to 117 (see fig. 8). This cannot be explained as one of the usual gaps within the same verso line, which is why slips 118 to 136 cannot possibly belong to the same set as slips 108 to 117.

Hence, it is possible to subdivide the groups of slips that belong to textual units 1, 3, 4 and 7 and thereby identify eleven distinct sets of slips in *Zhuang si zhong* MS 1 (see table 4).

When examining the verso lines on the slips of each set, it becomes clear that actually none of these sets appear to be complete. There are only two instances where at least the

beginning and end are complete so that line sections on the first and last slip of a certain set can be directly connected (see fig. 14 and 15 in appendix A):

1. The two line sections on slip 18 can be directly connected with the two line sections on slip 1.
2. The line section on slip 82 can be directly connected with the lower line section on slip 62.

Judging from the evidence of the verso lines alone, it is very likely that the set of slips 1 to 18 was originally comprised of one more slip between slips 6 and 7. This would mean that the complete set consisted of 19 slips. The set of slips 62 to

¹⁰⁸ For photographs of the slips see Zhu Hanmin and Chen Songchang 2013, 90, 92. The line sections are indicated by black arrows.

¹⁰⁹ For photographs of the slips see Zhu Hanmin and Chen Songchang 2013, 87, 89.

82 very likely once consisted of at least ten more slips – three between 77 and 78; two between 62 and 63; one between 67 and 68, 70 and 71, 71 and 72, 74 and 75, 79 and 80. This would mean that the complete set probably consisted of 31 slips. As all slips of *Zhuang si zhong* MS 1 have roughly the same width, the bamboo culm segments that served as raw material for the production of these two sets must have differed in diameter. Although this is a significant difference from the other manuscripts discussed before, where the number of slips in the sets was comparatively stable inside the same manuscript, it corresponds suitably with the fact that the *Zhuang si zhong* MS 1 was probably not produced as a whole in one step.

To sum up, the described examples of spiral lines suggest that the lines were at least in many cases applied to the culm segments before they were cut into slips. Although it is certain that not every line section occurring on a certain bamboo slip was produced this way – as pointed out by Takeda it is reasonable to assume different standards and techniques for manuscript production, e.g. at different times or in different regions¹¹⁰ – it is apparent from the material available to date that the application of spiral lines to complete bamboo culm segments was a very commonly used technique from Warring States until Han times. There are exceptions that deserve further investigation, which is however beyond the scope of this study: First, ‘<’-shaped lines such as those on the verso of the Tsinghua University *Liangchen* 良臣 and *Zhuci* 祝辭 slips.¹¹¹ Second, cases where several line sections occur on certain bamboo slips, but not all of them could possibly have been applied as part of a spiral line.¹¹² Third, verso lines on wood slips, to which the spiral line theory is probably not applicable. At least the latter two phenomena suggest that the application of verso lines did not always precede the production of individual slips. But for all examples discussed above, where the spiral line theory appears to be valid, this can be ruled out. In these cases slips that belong to the same verso line form

a materially self-contained set, which also has implications for codicological analysis and reconstruction.

6. The ‘set’ of slips as a new codicological category

The materially self-contained sets that are constituted by the slips belonging to the same spiral line and the same bamboo culm segment can be regarded as a new analytical category, which can be applied for the codicological description of bamboo manuscripts. Generally, a bamboo manuscript or ‘codicological unit’¹¹³ might consist of any number of complete and/or incomplete sets of slips. In this respect, the sets of slips in bamboo manuscripts are roughly comparable to the quires of codex manuscripts, which Gumbert has called ‘the essential building blocks of a manuscript’.¹¹⁴ The change from one set of slips to the next inside the same codicological unit can be seen as a boundary between two codicological sub-units and shall be called a ‘set boundary’ in the following.¹¹⁵ For ‘textual units’ similar statements as for sets of slips can be made: a codicological unit might consist of one (single-text manuscript, STM) or several textual units (multiple-text manuscript, MTM). The change from one textual unit to the next inside the same codicological unit can likewise be seen as a boundary. This will be called ‘text boundary’ in the following. Both, sets of slips as well as textual units are useful categories to describe a certain manuscript, but until now the former have been largely neglected. The sets of slips were only considered insofar as they each contained a verso line that was of use in reconstructing the original sequence of slips in a manuscript. However, set boundaries can likewise be significant for

¹¹⁰ Takeda 2013b, 139 with footnote 12.

¹¹¹ Li Xueqin and Qinghua daxue chutu wenxian yanjiu yu baohu zhongxin 2012, 17–19, cf. fig. 16 in appendix B.

¹¹² There is a similar phenomenon that shall be called ‘verso stripes’ here: Some slips show multiple lines that look exactly like the usual line sections but are often inclined bottom left to top right and occur in more or less regular intervals over the whole length of a slip, see fig. 17 in appendix B for some examples. Origin and significance of this phenomenon are as yet unknown.

¹¹³ For the technical terms ‘codicological unit’ (unité codicologique) and ‘textual unit’ (unité textuelle) in the context of early Chinese manuscripts see Kalinowski 2005. The concept codicological unit was borrowed from European codicology, where it was originally invented for the study of codex manuscripts. According to Gumbert (2004, 23) a codicological unit is ‘a discrete number of quires, worked in a single operation and containing a complete text or set of texts’. A codicological unit as a material object has to be distinguished from a textual unit, which has been defined either with regard to content (cf. Roth 1993, 227 on ‘text’) or from a purely formal point of view, independent from the content (Kalinowski 2005, 145).

¹¹⁴ Gumbert 2004, 22

¹¹⁵ Following the set–quire analogy a ‘set boundary’ would correspond to a ‘quire boundary’ (Gumbert 2004, 22). In his definition of the term ‘boundary’ as ‘a place where there is a change in any feature of the manuscript (for instance watermark, layout, hand, decoration, text), except quire boundaries’, Gumbert (2004, 40) explicitly excluded quire boundaries to be able to distinguish between ‘quire boundaries’ and ‘boundaries’ (of any other kind). The ‘set boundary’ in the present paper, however, is meant to be a sub-category of the more general ‘boundary’, instead of the two being mutually exclusive categories.

reconstruction, especially if a set boundary coincides with a text boundary. Gumbert coined the term ‘caesura’ for similar circumstances in codex manuscripts.¹¹⁶ In bamboo manuscripts, caesuras would be boundaries between materially *and* textually self-contained groups of slips, which can in fact cause problems for reconstruction. The sequence of several such twofold self-contained groups in a multiple-text manuscript cannot be determined without additional evidence. In fact, this problem is not confined to multiple-text manuscripts but also pertains to manuscripts with a single text that is separated into self-contained textual sub-units such as ‘chapters’ (*zhang* 章). The four comparatively long bamboo manuscripts with nearly 100 or even more slips discussed above, *viz.* the Peking University *Laozi* (overall 221 slips, *Laozi shangjing* 老子上經 123 slips, *Laozi xiajing* 老子下經 98 slips), the Tsinghua University *Xinian* (138 slips), as well as Yuelu Academy *Zhuang si zhong* MS 1 (137 slips), provide a good basis to illustrate this problem with a few examples. In both manuscripts of the Peking University *Laozi* the text is sub-divided into units that are referred to as *zhang* by the editors. These chapters of text are marked by black dots on the top end of the first slip belonging to a certain chapter and by blank space after the end of the text on the last slip belonging to the same chapter.¹¹⁷ On the 98 slips of *Laozi xiajing*, none of the text boundaries between two of the chapters coincides with a set boundary. On the 123 slips of *Laozi shangjing*, however, there are five instances where exactly this is the case (see table 5).¹¹⁸

According to these coinciding boundaries the *Laozi shangjing* manuscript can be divided into six parts:

- Slips 1 to 18 (chapters 1 to 5)
- Slips 19 to 53 (chapters 6 to 19)
- Slips 54 to 70 (chapters 20 to 25)
- Slips 71 to 100 (chapters 26 to 37)
- Slips 101 to 117 (chapters 38 to 42)
- Slips 118 to 123 (chapters 43 to 44)

¹¹⁶ According to Gumbert (2004, 40), a caesura is ‘a boundary which coincides with a quire boundary’. Note the already mentioned opposition between ‘boundary’ and ‘quire boundary’ in his definition.

¹¹⁷ Beijing daxue chutu wenxian yanjiu suo 2012c, 121.

¹¹⁸ See the photographs of the recto of the slips (Beijing daxue chutu wenxian yanjiu suo 2012c, 3–31) and the respective transcriptions (Beijing daxue chutu wenxian yanjiu suo 2012c, 123–162) as well as the tracings

Table 5: Coinciding set and text boundaries in Peking University *Laozi shangjing*.

Set boundaries (slip/slip)	Text boundaries (chapter/chapter)
18/19	5/6
53/54	19/20
70/71	25/26
100/101	37/38
117/118	42/43

This means that the current reconstruction of *Laozi shangjing*, in which the sequence of the chapters completely accords with the received version of the text and which is also not contradicted by the verso lines,¹¹⁹ does not necessarily reflect the original arrangement of the slips. Although Han Wei pointed out that the verso lines had a key function in determining the sequence of the chapters inside the Peking University *Laozi*,¹²⁰ the six parts described above could in fact be freely moved within the manuscript.¹²¹ The sequence of the chapters in *Laozi xiajing* on the other hand appears to be beyond dispute and in fact accords with the received version of that part of the text. This actually hints towards the possibility that the same was the case in *Laozi shangjing*. However, the verso lines alone are not a suitable means to support such a claim. As can be seen, even with evidence from the verso lines, it is not possible to safely reconstruct the original sequence of the slips in *Laozi shangjing*.

The situation is slightly different in the Tsinghua University *Xinian*. The text on the 138 slips of this manuscript is likewise divided into chapters, which are usually indicated by a hook-shaped mark directly following the text of a certain chapter. If the respective slip is not completely filled with writing,

of the sets (Beijing daxue chutu wenxian yanjiu suo 2012c, 111–117). Han Wei in fact claimed that there is no obvious correspondence between the sets of slips and the text (Han Wei 2012, 233). As can be seen this is not entirely correct.

¹¹⁹ Han Wei 2012, 233–234.

¹²⁰ Han Wei 2012, 235.

¹²¹ This can at least be said for the first five of these parts. For the last part it is comparatively safe to assume that it was really positioned at the end of the manuscript. This is suggested by the fact that the last set with only six slips (118 to 123) is the only set with more than its second half clearly missing, see Beijing daxue chutu wenxian yanjiu suo 2012c, 114.

then the space below the mark is left blank.¹²² On the *Xinian* slips there are two instances where a text boundary between two of the chapters coincides with a set boundary (see table 6, cf. table 1 above).

Table 6: Coinciding set and text boundaries in the Tsinghua University *Xinian*.

Set boundaries (slip/slip)	Text boundaries (chapter/chapter)
44/45	7/8
95/96	17/18

According to these coinciding boundaries the *Xinian* manuscript can be divided into three parts:

- Slips 1 to 44 (chapters 1 to 7)
- Slips 45 to 95 (chapters 8 to 17)
- Slips 96 to 138 (chapters 18 to 23)

As in the case of *Laozi shangjing* there are several materially and textually self-contained parts in the *Xinian*, which could theoretically be freely moved inside the manuscript. However, the original sequence of the slips is in this case unambiguously determined by the sequence numbers on the verso of the slips.¹²³ Furthermore, the whole manuscript text contains historical records in chronological order.

The situation in Yuelu Academy *Zhuang si zhong* MS 1 is significantly different from both the *Laozi* and the *Xinian*. As has already been noted, there is obviously no connection between slips that belong to different textual units, as far as the verso lines are concerned.¹²⁴ In other words, in *Zhuang si zhong* MS 1 text boundaries *always* coincide with set boundaries –

¹²² Cf. photographs of the recto in Li Xueqin and Qinghua daxue chutu wenxian yanjiu yu baohu zhongxin 2011, 2–17. Note that the bottom of slip 65, which supposedly contained the end of chapter 13, is fragmented and therefore the part where such a mark would be expected is missing. Furthermore, there was apparently no mark added at the end of chapters 15 and 22 (slips 84 and 125). See Li Xueqin and Qinghua daxue chutu wenxian yanjiu yu baohu zhongxin 2011, 10–11, 16.

¹²³ Li Xueqin and Qinghua daxue chutu wenxian yanjiu yu baohu zhongxin 2011, 135. It is often unclear exactly at which point of the production process of a manuscript the sequence numbers were written on the slips. Furthermore, they could be applied by the scribe, who also wrote the main text, or another person. However, the numbering usually corresponds to the sequence of the main text in a similar way as modern page numbers do, and was probably applied to indicate the sequence of the text (either before binding or in case the manuscript falls apart). The numbers therefore provide information that is extremely valuable for reconstruction. On sequence numbers see in detail He Jin 2013, 452–458.

¹²⁴ Shi Da 2013, 23–24. Cf. Zhu Hanmin and Chen Songchang 2013, 317.

although set boundaries do not in every case coincide with text boundaries (see table 4 above). Although for *Zhuang si zhong* MS 1 there is, in contrast to the *Laozi*, no textual counterpart available for comparison, the sequence of the seven parts (textual units) could be determined by an analysis of mirror-inverted imprints of writing that had been found on the verso of some slips and which reflected the original structure of the manuscript roll.¹²⁵ Unfortunately, the editors of the Peking University Han slips decided not to publish photographs of the verso of all slips. Because the verso lines are barely visible with the naked eye, they instead supply tracings of the verso that show the position of line sections, but do not contain any information on possible imprints.¹²⁶ This regrettably prevents an analysis as conducted for *Zhuang si zhong* MS 1, which might also have supplied additional evidence for the reconstruction of the Peking University *Laozi*.

Obviously, closer attention needs to be paid to the self-contained sets of slips marked by each spiral line. The analysis has shown that the verso lines alone would in many cases not provide a reliable basis with which to determine the original sequence for all slips of a certain manuscript as they only indicate the sequence of slips inside a certain set. In single-text manuscripts with one continuous text, the set boundaries are usually without further implications, but in manuscripts with multiple texts or a single text consisting of several self-contained sub-units, they are potentially significant. If set boundaries coincide with text boundaries, the sequence of the slips in such manuscripts can only be determined by additional evidence provided, for example, by sequence numbers¹²⁷ or mirror-inverted imprints of writing.

7. Conclusions – The function of verso lines

Now that some more light has been shed on the way the verso lines were probably applied on many bamboo manuscripts and how they in these cases relate to sets of slips, the

¹²⁵ Shi Da 2013. Cf. Zhu Hanmin and Chen Songchang 2013, 317–319.

¹²⁶ Beijing daxue chutu wenxian yanjiu suo 2011, 55, footnote 2. See e.g. the tracings for the *Laozi* slips in *Beijing daxue chutu wenxian yanjiu suo* 2012c, 111–117.

¹²⁷ Sun Peiyang proposed with regard to the slips contained in volume one of the Tsinghua University manuscripts that sequence numbers might only have been added in cases, where the sequence of the slips could no longer be determined with the help of the verso lines, e.g. due to too many discarded slips, see Sun Peiyang 2011, 457. With regard to the results of the analysis above, which suggest that the verso lines are generally only of limited use to determine the sequence of slips for the complete manuscript, this appears doubtful.

question of their function needs to be discussed anew. Many scholars share the view that the verso lines were applied as an indicator for the correct sequence of the slips inside a certain manuscript. This assumption is of course based on the observation that the line sections on individual slips in many cases form largely continuous lines, if the slips are put in a sequence which is in accordance with the text on the recto. Regardless of whether this indication was the original function, the lines are certainly useful to a certain degree even today for the reconstruction of the original sequence of the slips.

Li Shoukui observed in the Tsinghua University manuscripts that the persons who produced bamboo manuscripts did not randomly use slips that merely had a consistent format, but that they usually used slips that had been made from the same bamboo culm segment for this purpose. If the manuscript exceeded a certain length, then the slips of several culm segments were subsequently used, but slips from different culm segments appear to normally not have been mixed with each other. If verso lines were applied to the culm segments, it is easily possible to use them in the exact same sequence the slips had been positioned in as part of a culm segment.¹²⁸ Apparently, this was a usual procedure. So rather than – together with other verso lines and in a rather ambiguous way – hinting towards the correct sequence of the slips inside a *whole manuscript*, the function of a certain verso line was probably first and foremost to indicate the original sequence of a certain *set* of bamboo slips. This enabled the scribe to adopt the sequence the slips originally had as part of a bamboo culm segment for the production of a manuscript. That this was considered necessary or at least favourable is strongly suggested by the fact that the lines were applied even before the culm segments were cut into individual slips. If the main function of the lines really were to indicate the sequence of slips in the whole manuscript, it would be more practical to apply as few lines as possible – ideally only one continuous line – on all slips of a complete manuscript, either before or after binding.

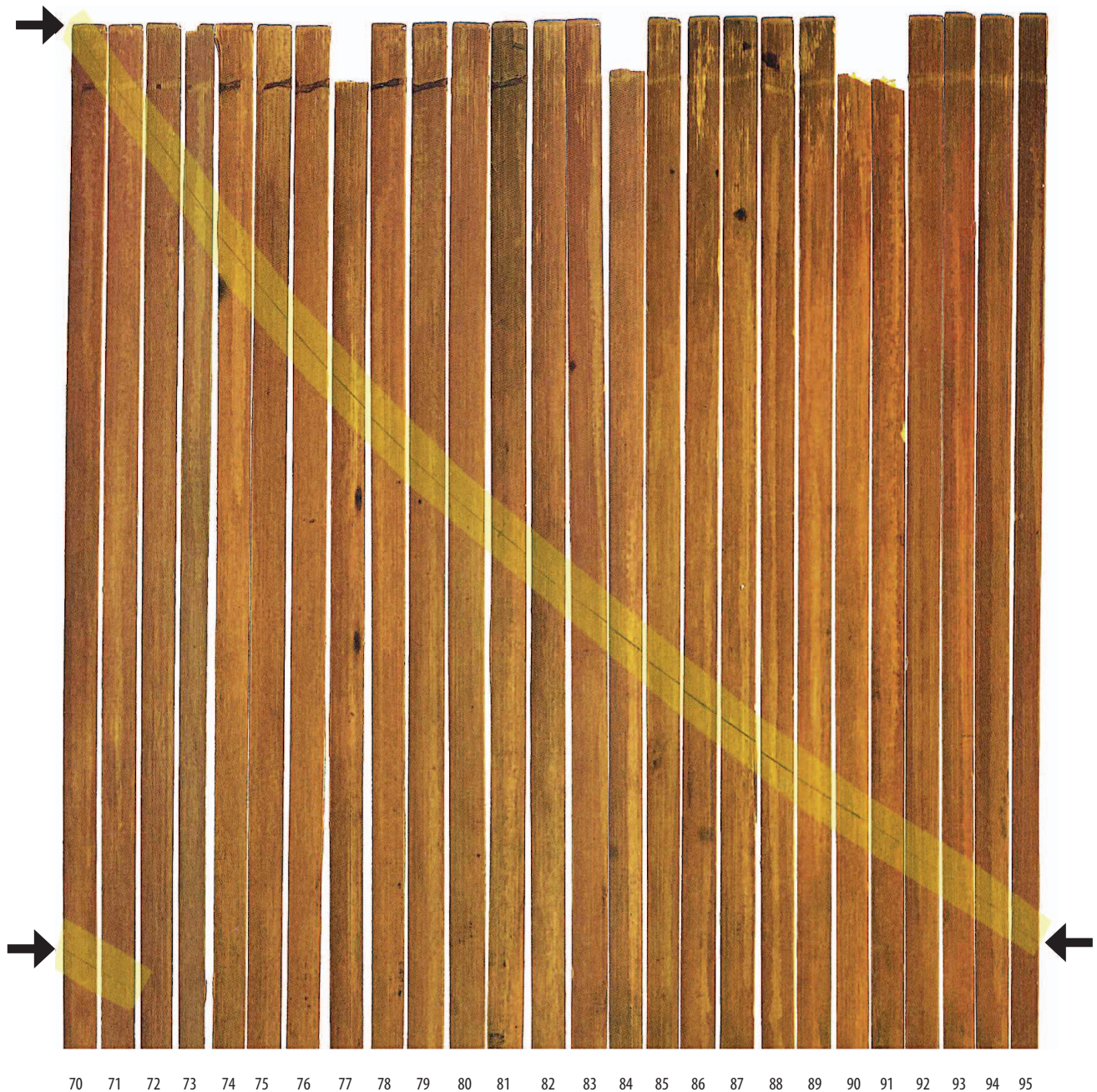
The motive behind the application of spiral lines to the culm segments might have been something different, namely to indicate the most practical way to put the slips together side by side. If the sides of certain slips are not completely vertical after cutting, then this will probably lead to a certain deviation of slips in their horizontal alignment, when tying together several slips to form a manuscript. The

higher the number of slips contained in a manuscript, the more this effect would normally be aggravated. If, however, the slips cut from a certain bamboo culm segment are put in this manuscript in exactly the same sequence they had as part of the bamboo culm segment, then this effect will be automatically balanced: a slip with a right side that is not at an angle of exactly 180° – meaning exactly vertical – but instead 175° will certainly be followed by a slip with a left side at the exact same angle.¹²⁹ This, however, is merely a hypothesis. What is certain is that the reference unit of the verso lines are sets of slips, not complete manuscripts. Furthermore, the connection between the verso lines and the sequence of the text is secondary (and therefore not always reliable),¹³⁰ whereas the primary connection is between the lines and the original sequence of a set of bamboo slips, which do not yet carry any writing. That the original function of the verso lines was to indicate the correct sequence of the slips in a certain manuscript may therefore be doubted.

¹²⁹ After presenting this paper at the *Qin jian du yan jiu guo ji xueshu yan tao hui* 秦簡牘研究國際學術研討會 conference in Changsha on 6 December 2014, I was informed by a conference participant that a scholar from Tsinghua University forwards the same hypothesis regarding the main function of the verso lines in a yet unpublished paper on the Tsinghua University bamboo manuscripts. I thank the author for kindly sending me a copy of this work, which will be published in *Jiang Han kao gu* 江漢考古, see Jia Lianxiang (forthcoming). Further evidence to support this hypothesis can be drawn from the M.A. thesis of Xiao Yunxiao (2015, 75–79) who observed that, in the case of the Tsinghua University *Xinian*, the slips of a certain set were first tied together, before these sets were in a second step combined to form the complete manuscript.

¹³⁰ That the verso lines should not be followed blindly when trying to reconstruct the original sequence of the slips in a certain manuscript due to their limited reliability was already stressed by Sun Peiyang (2011, 457–458) and Han Wei (2012, 235). Takeda noted that although there are manuscripts with quite ‘regular’ verso line circumstances like the Peking University *Laozi* or the Tsinghua University *Xinian*, these only make up a certain part of all manuscripts. In other manuscripts, verso lines can be completely absent or the circumstances can be more complex (Takeda 2013b, 139).

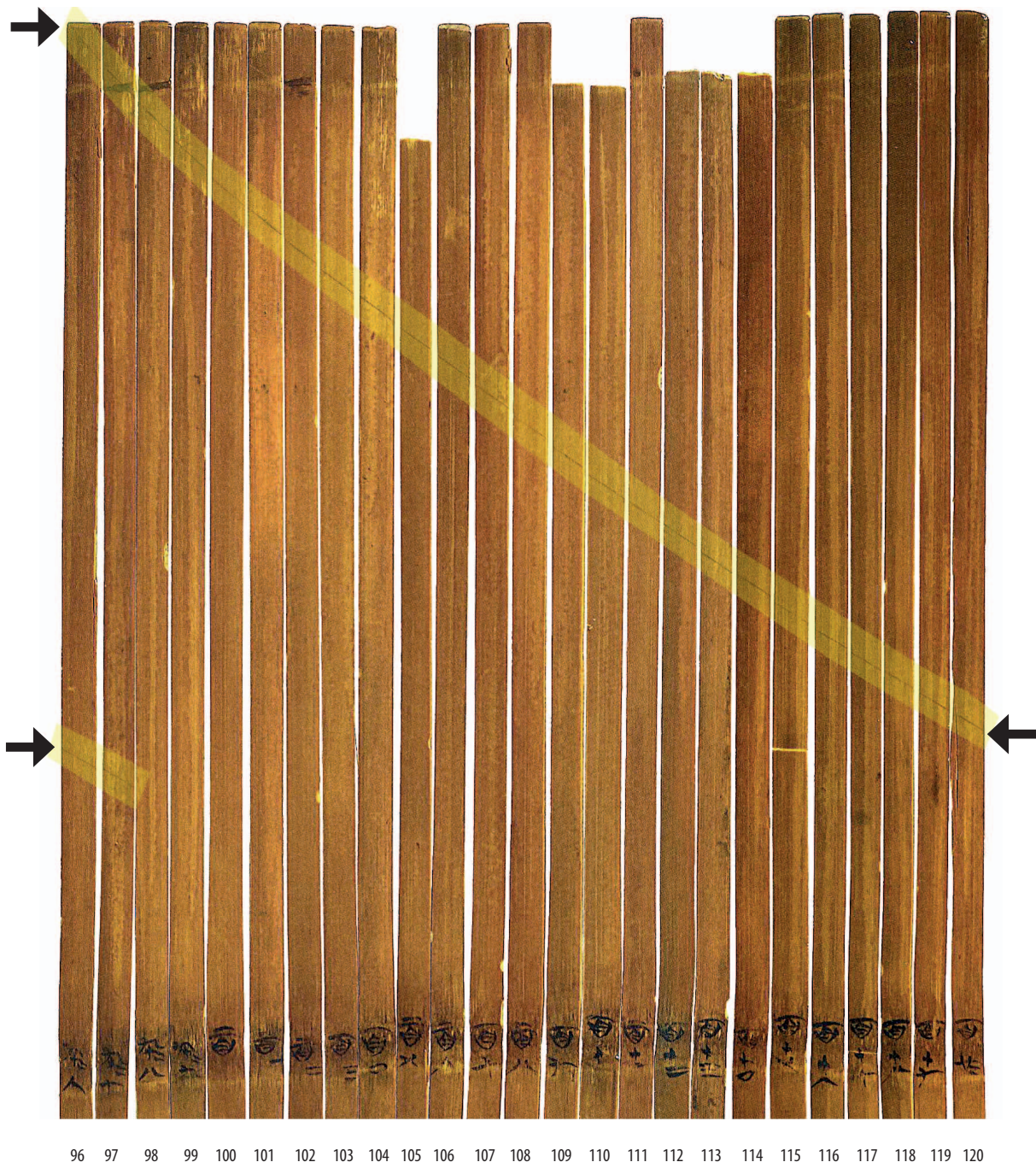
¹²⁸ Li Shoukui 2012, 3–5.

Appendix A: Examples of sets ¹³¹Fig. 9: Tsinghua University *Xinian* group/set 4 (slips 70 to 95). ¹³²

¹³¹ For all the following examples of sets (fig. 9 to 15) the photographs of individual slips were assembled using Adobe Photoshop CS5. In each case arrows indicate the positions where the verso line arrives on the left side of the first or the right side of the last slip of the respective set. The line itself is highlighted in yellow. Note that the figures with examples of sets do not display complete slips but only their upper or lower half – depending on where the verso line is situated. Missing slips (according to both verso lines as well as recto text) are marked with ‘???’.

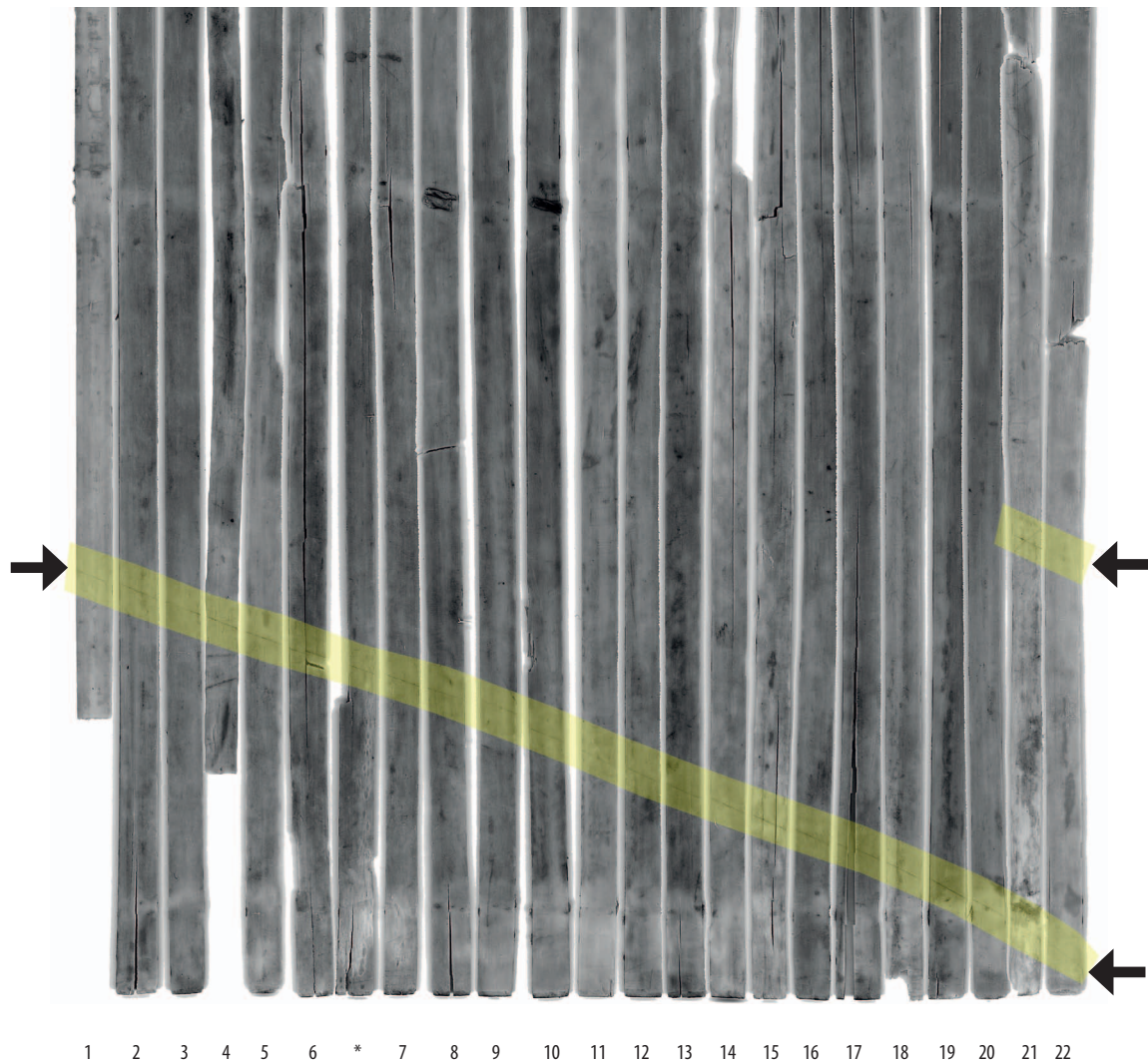
¹³² For photographs of the slips see Li Xueqin and Qinghua daxue chutu wenxian yanjiu yu baohu zhongxin 2011, 23–25.

Fig. 10: Tsinghua University *Xinian* group/set 5 (slips 96 to 120).¹³³



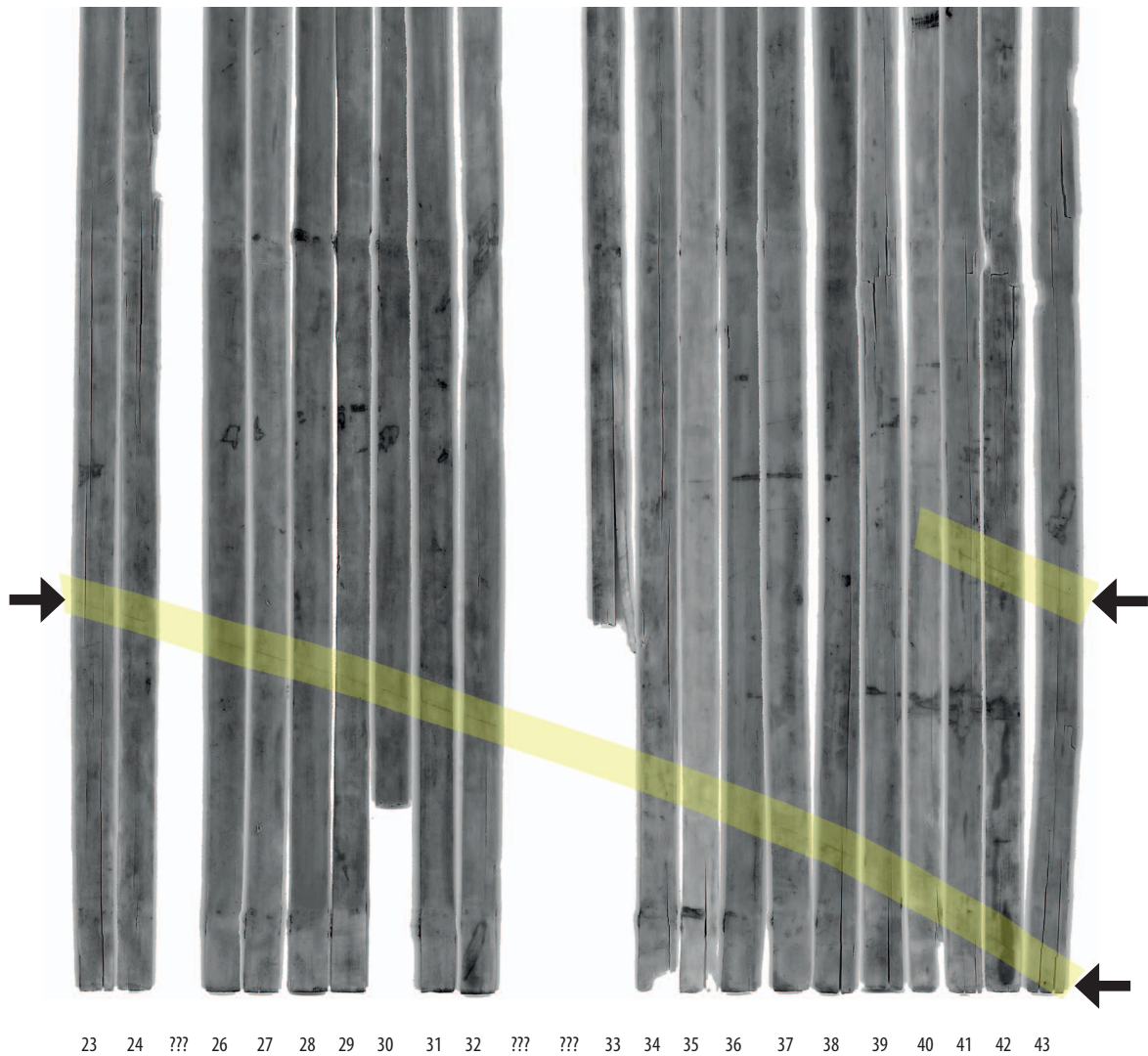
¹³³ For photographs of the slips see Li Xueqin and Qinghua daxue chutu wenxian yanjiu yu baohu zhongxin 2011, 19–22.

Fig. 11: Yuelu Academy *Zhiri* 27 set 1 (slips 1 to 22).¹³⁴



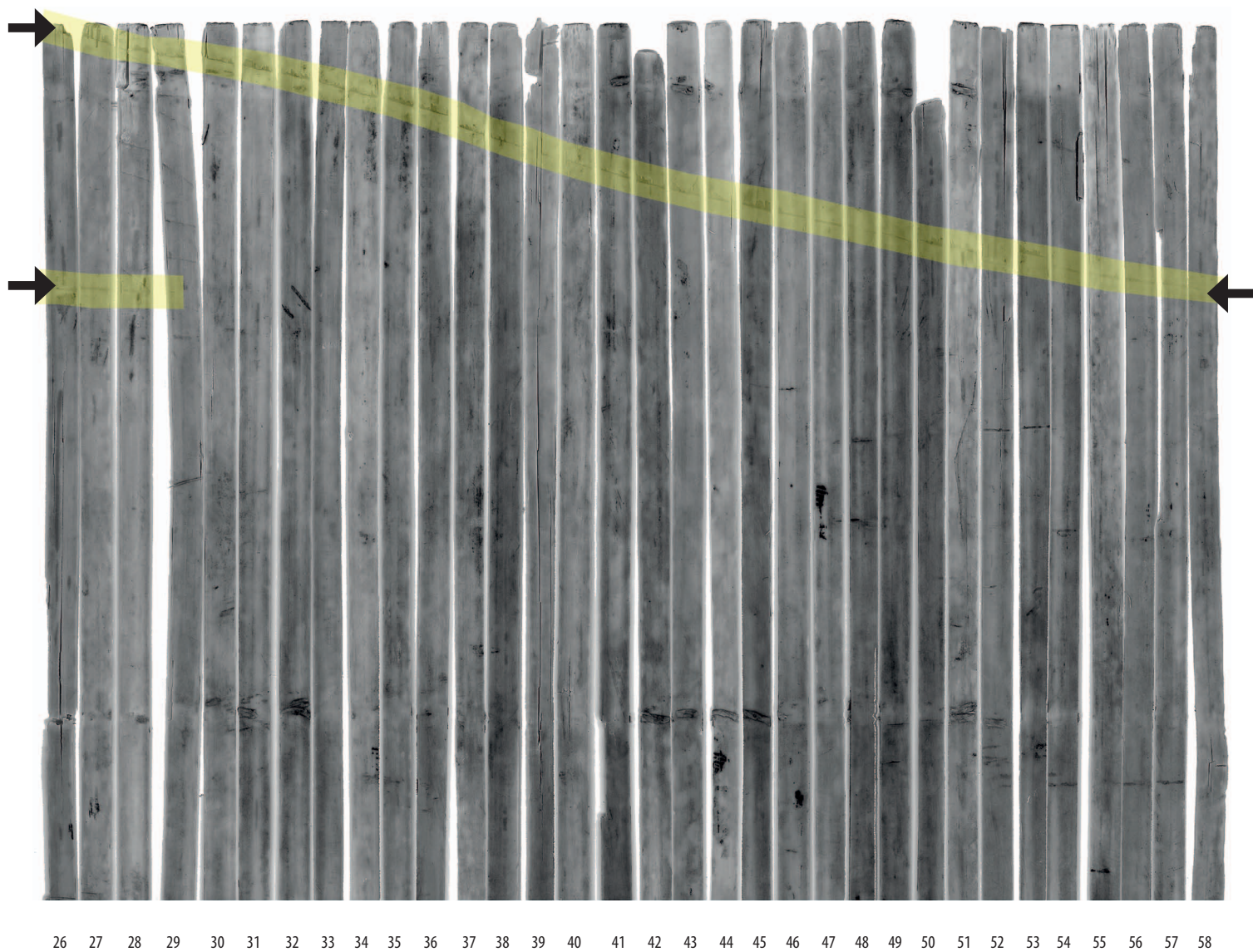
¹³⁴ For photographs of the slips see Zhu Hanmin and Chen Songchang 2010, 47–54. The asterisk on the bottom indicates the slip that was originally assigned to *Zhiri* 35, see Sun Peiyang 2011, 450.

Fig. 12: Yuelu Academy *Zhiri* 27 set 2 (slips 23 to 43).¹³⁵



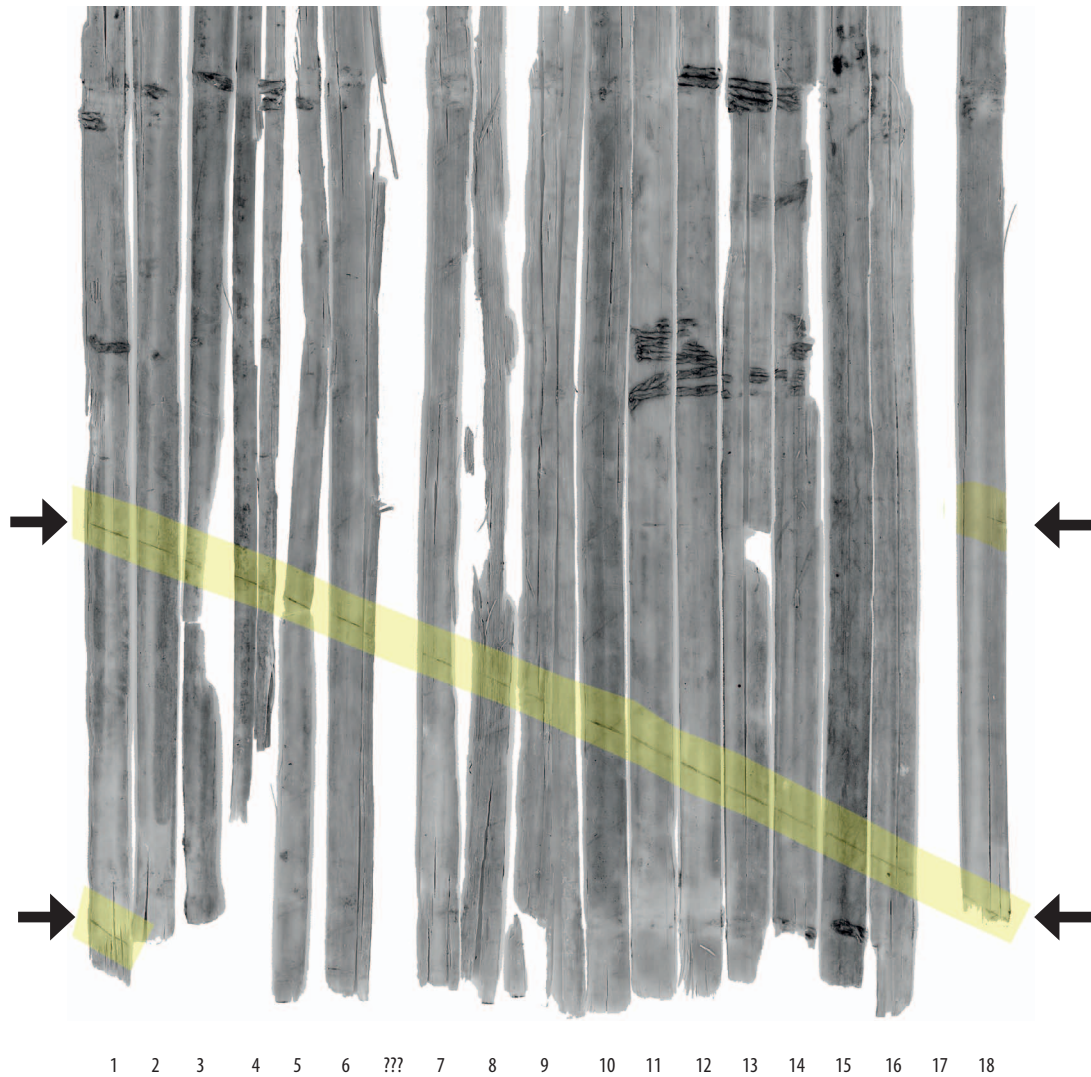
¹³⁵ For photographs of the slips see Zhu Hanmin and Chen Songchang 2010, 54–61.

Fig. 13: Yuelu Academy *Zhiri* 34 set 2 (slips 26 to 58).¹³⁶



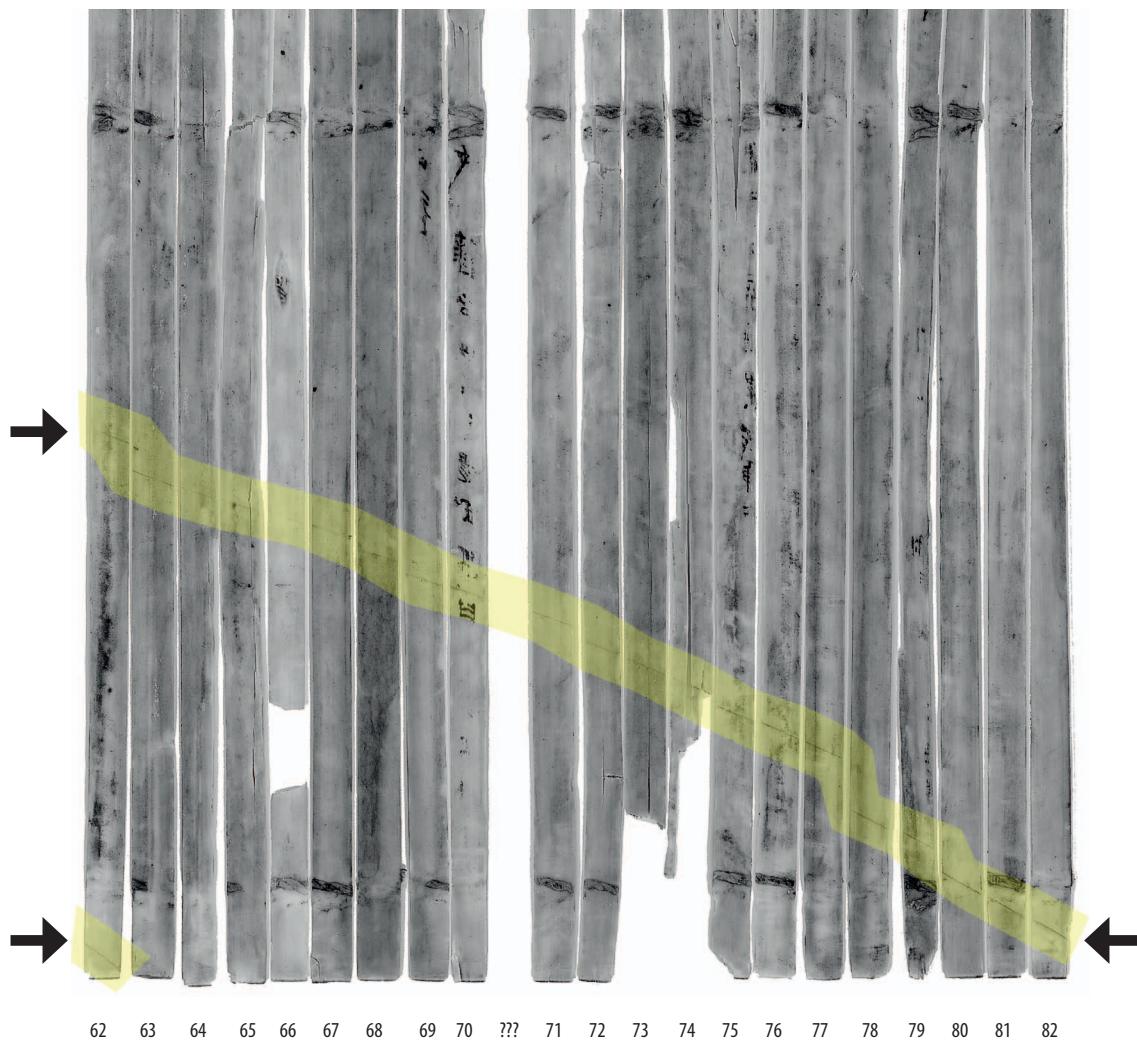
¹³⁶ For photographs of the slips see Zhu Hanmin and Chen Songchang 2010, 76–87.

Fig. 14: Yuelu Academy *Zhuang si zhong* MS 1 set 1 (slips 1 to 18).¹³⁷



¹³⁷ For photographs of the slips see Zhu Hanmin and Chen Songchang 2013, 92.

Fig. 15: Yuelu Academy *Zhuang si zhong* MS 1 set 6 (slips 62 to 82).¹³⁸



¹³⁸ For photographs of the slips see Zhu Hanmin and Chen Songchang 2013, 89–90.

Appendix B: Complex verso line situations¹³⁹Fig. 16: Verso lines on Tsinghua University *Liangchen* and *Zhuci*.¹⁴⁰

¹³⁹ For fig. 16 and 17 the photographs of individual slips were assembled using Adobe Photoshop CS5.

¹⁴⁰ The figure shows (from left to right) *Liangchen* slips 1 to 11 and *Zhuci* slips 1 to 5. For photographs of the slips see Li Xueqin and Qinghua daxue chutu wenxian yanjiu yu baohu zhongxin 2012, 17, 19. Verso lines are marked in red, because they are barely visible with the naked eye on this scale.

Fig. 17: Examples of ‘verso stripes’.¹⁴¹



¹⁴¹ The figure shows (from left to right) *Zhuang si zhong* MS 1 slips 106, 116 and 125 as well as *Zhiri* 35 slips 12 and 33. For photographs of the slips see Zhu Hanmin and Chen Songchang 2013, 87–88 and Zhu Hanmin and Chen Songchang 2010, 95, 102. For further examples of ‘verso stripes’ see slips 11, 12, 15 and 28 of the *Zun de yi* 尊德義 from Guodian 郭店 tomb no. 1 (Wuhan daxue jianbo yanjiu zhongxin and Jingmen shi bowuguan 2011, plate 72, cf. Huang Jie 2013) as well as slips 2, 43, 96, 105, 186, etc. of the Yuelu Academy *Shu* 數 (Zhu Hanmin and Chen Songchang 2011, 33, 54, 84, 88, 134; cf. He Jin 2013, 459 with footnote 3).

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