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## On the discovery and interpretation of overcounting in Orkhon Inscriptions

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### Abstract

The discovery of overcounting in Orkhon Inscriptions has been an important contribution by historical comparative linguistics during the nineteenth century. However, the initial interpretation of overcounted numerals in Orkhon Inscriptions by Thomsen and Radloff was not correct, resulting in serious difficulties in reconstructing old Turkic history. It was Bang and Marquart who worked out the true semantics of overcounted numerals. This article aims to present a historical overview on the discovery and interpretation of overcounted numerals in Orkhon Inscriptions. Considering that Bang and Marquart did not explicitly spell out their evidence for reaching the true semantics of these numerals, this article presents a series of arguments proving the existence of overcounting in Old Turkic based on language per se, historical facts, logical reasoning, and bilingual translation.

**Keywords:** Overcounting; Orkhon Inscriptions; discovery; interpretation

### Introduction

The numeral systems in natural languages are special subsystems that are vulnerable to outside impacts. For example, language contact has fundamentally changed the numeral systems of many languages, demonstrated in the decimal undercounting system that is prevalent in most of the civilised world. In a decimal undercounting system, numbers are perceived as points, from smaller ones to larger ones, based on *ten*-interval in the number line. For example, the number 17 is perceived as the seventh point after ten in the number line. Linguistically the number 17 is expressed as *ten seven* in Chinese or *seven-teen* in English or other forms in other languages.<sup>1</sup> However, cross-linguistically, the numeral systems of natural languages are not so uniform and regular, featuring many peculiarities and oddities in their numeral formation, especially in the earlier development of numeral systems. As early as the nineteenth century, German historical linguists discovered a special form of counting in Old Turkic texts. It is a different counting system, in which, say, *yeti yegirmi*—‘seven twenty’—refers to, intuitively, the seventh point within the interval from ten to 20 or seven on the way to 20, that is 17, but not to 27 by addition or 13 by subtraction. It is to count by looking forwards (anticipating) in the number line,

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<sup>1</sup> Undercounting can also be applied to other systems such as the vigesimal system. Thus, in a vigesimal undercounting system, numbers are also perceived as points, from smaller ones to larger ones, but based on *twenty*-interval in the number line. For example, the number 27 is perceived as the seventh point after twenty in the number line. Linguistically the number 27 is expressed as *twenty seven* in, for example, Danish, which is a vigesimal language.

compared to undercounting which counts by looking backwards in the number line. This form of counting is named as *Oberstufenzählung* (over-step-counting) in historical linguistics.<sup>2</sup> In general linguistics, it is more commonly referred to as *overcounting*, translated from *Oberstufenzählung*, while *undercounting* is translated from *Unterstufenzählung* (under-step-counting),<sup>3</sup> although it has also been given other different terms, such as grading method of counting,<sup>4</sup> anticipatory counting,<sup>5</sup> anticipative counting,<sup>6</sup> going-on counting,<sup>7</sup> and 響數法(*xiǎng shù fǎ*).<sup>8</sup>

The discovery of overcounting has been an important contribution of historical comparative linguistics during the nineteenth century and has been widely known and studied in Altaic linguistics and philology.<sup>9</sup> It has been observed that in Old Turkic, overcounting applied globally to 11–19...21–29...91–99 and larger numbers ending in them such as 111–119, etc. The Orkhon Inscriptions featured overcounting only up to 40, for example, *bir qırq* ‘one forty = 31’ in Kül Tegin Inscription, while overcounting for larger numbers can be found in later Uighur Buddhist texts, for example, *iki yüz bir toquz on* ‘two hundred one nine ten = 281’, *iki yüz iki toquz on* ‘two hundred two nine ten = 282’, and *iki yüz üç toquz on* ‘two hundred three nine ten = 283’ in *Hasen–Jātaka* (兔王本生). Overcounting for numbers 91–99 is not formed on the basis of *yüz* ‘hundred’ because *iki yüz* means 200 not 92. Old Turkic used a special formation by adding *örki* ‘upward’ to the digits, for example, *tokuz örki* ‘nine upward = 99’, which can be found in *Altun Yaruq Sudur* (金光明经). Although overcounting has been shown as the prevalent way of counting in Old Turkic, it has been basically lost in modern Turkic languages, having given way to the decimal undercounting system and only remaining in the Siberian Yakut and Modern West Yugur in China. In Yakut, overcounting can count up to 100, while in Modern West Yugur overcounting only applies to 11–19 (and 21–29 for older people), as shown below in the data (1) for Yakut<sup>10</sup> and (2) for Modern West Yugur.<sup>11</sup> In addition, overcounting may also exist in the Tungusic languages of the Altaic family, as shown in (3) for some dialects of Evenki, whose structure is the same as that of Yakut.<sup>12</sup>

<sup>2</sup> O. S. Reuter, ‘Urnordischer und eurasischer Zählbrauch’, *Mannus-Zeitschrift für Vorgeschichte* 25 (1933), pp. 353–383.

<sup>3</sup> K. Menninger, *Number Words and Number Symbols: A Cultural History of Numbers* (Dover, 1969), p. 76.

<sup>4</sup> S. Yoshitake, ‘The grading method of forming numerals’, *Transactions of the Philological Society* 39 (1940), pp. 53–61.

<sup>5</sup> D. Stampe, ‘Cardinal number systems’, in *Papers from the Twelfth Regional Meeting, Chicago Linguistic Society*, (eds) S. Muwfuno et al. (Chicago, 1976), pp. 594–609.

<sup>6</sup> T. Kaufman, *Tzeltal Grammar*, unpublished PhD dissertation, University of California, Berkeley, 1963, p. 157.

<sup>7</sup> J. H. Greenberg, ‘Generalizations about numeral systems’, in *Universals of Human Language*, (eds) J. H. Greenberg et al. (Stanford, 1978), Vol. 3, pp. 249–295.

<sup>8</sup> 落合泉 (Izumi Ochiai), ‘北・中央ヴァヌアツ諸語の響數法とその分佈について’ (Overcounting in North-Central Vanuatu languages and its distribution), 『京都大學言語學研究』 (*Kyoto University Linguistic Research*) 33 (2014), pp. 229–252.

<sup>9</sup> See, for example, the following works. 泉井久之助 (Izumi Hisanosuke), ‘突厥語における數詞の組織について’ (On the composition of Turkic numerals), 『言語研究』 (*Gengo Kenkyu: Journal of the Linguistic Society of Japan*) 1 (1939), pp. 54–59; A. von Gabain, ‘Inhalt und magische Bedeutung der alttürkischen Inschriften’, *Anthropos* Bd. 48, H. 3/4 (1953), pp. 537–556; A. von Gabain, *Altürkische Grammatik* (Leipzig, 1950), pp. 104, Nachträge 104, 13u; G. Clauson, ‘The Turkish numerals’, *Journal of the Royal Asiatic Society* 1–2 (1959), pp. 19–31; G. Ehlers, ‘Notabilia zur alttürkischen Oberstufenzählung’, *UJb*, N.F. 3 (1983), pp. 81–87; L. Clark, ‘The early Turkic and Sarig Yugur counting system’, in *Turfan, Khotan and Dunhuang*, (eds) R. E. Emmerick et al. (Berlin, 1996), pp. 17–49; M. Erdal, *A Grammar of Old Turkic* (Leiden, 2004), pp. 220–221.

<sup>10</sup> O. Pritsak, ‘Die Oberstufenzählung im Tungusischen und Jakutischen’, *ZDMG* 105 (1955), pp. 184–191.

<sup>11</sup> Z.-Z. Chen and X.-C. Lei, *Xibu Yuguyu Jianzhi* (A Grammar Sketch of West Yugur) (Beijing, 1985), pp. 74–75.

<sup>12</sup> Pritsak, ‘Die Oberstufenzählung im Tungusischen und Jakutischen’, pp. 184–191.

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|---|---|---------------------------------------|
| (1) a. sätte uommut-tan ikki<br>seven ten-ABL two<br>'62' | b. ayis uommut-tan sätta <sup>13</sup><br>eight ten-ABL seven<br>'77' |                                       |
| (2) a. bər jiyərmə<br>one twenty<br>'11'                  | b. şige jiyərmə<br>two twenty<br>'12'                                 | c. uş jiyərmə<br>three twenty<br>'13' |
| (3) a. d'ür-d'ā-kin umūn<br>two-ten-ABL one<br>'11'       | b. d'ür-d'ā-kin dūr<br>two-ten-ABL two<br>'12'                        |                                       |

Overcounting seems to be a rare and unfamiliar manner of counting: Menninger comments that it is 'a remarkable manner of counting, which once prevailed in two areas of the world, the Germanic north of Europe [in Old Norse] and ancient Mexico [in Mayan languages]'.<sup>14</sup> However, linguistic fieldwork and documentation during the twentieth century have shown that overcounting is more widespread than earlier believed. In addition to Altaic, Indo-European, and Mayan, it existed, or exists, in Sino-Tibetan, Ural, Austronesian, Niger-Congo, and Dravidian language families. Considering the geographical distance between these language families, the widespread existence of overcounting may not be due to language contact, but instead be the earliest common form of human counting, which has been altered by the undercounting system.

In any sense, the discovery of overcounting in Old Turkic should be a proud and important contribution made by historical comparative linguistics during the nineteenth century, which may be able to reveal the true situation of how our ancestors counted. However, the initial interpretation of overcounting in Old Turkic by Thomsen and Radloff was mistaken, giving rise to serious difficulties in reconstructing the old Turkic history. It was not until 1898 that Bang and Marquart finally revealed the true semantics of Old Turkic numerals. This article provides an overview of the history of the discovery and interpretation of overcounting in Orkhon Inscriptions by historical linguists during the nineteenth century. Since Bang and Marquart did not explicitly spell out what kind of evidence they had for reaching the correct values of overcounted numerals, this article will present a series of arguments to prove the existence of overcounting in Old Turkic from the perspectives of language per se, historical facts, logical reasoning, and bilingual translation.

### Interpreting the overcounted numerals in the Orkhon Inscriptions

The numerals in the Orkhon Inscriptions include those for digits and round integer numbers (tens, hundreds, and thousands) such as *yeti yaş-da* '7 years old', *yegirmi kün* '20 days', *älig yıl* '50 years', *yeti yüz är* '700 people', *äki biñ* '2,000', *beş tümän sü* '50,000 army', and so on. These numerals are monomorphemic or multiplicative, featuring a simple structure and transparent semantics. In addition, there are two forms of juxtaposed compound numerals in the Orkhon Inscriptions. One of them takes on the form of *decade + digit* connected with *artuqi* 'more, in addition to', in-between, such as *qırq artuqi yeti* 'forty more

<sup>13</sup> Abbreviations in this article are as follows: ABL: ablative case marker; CAUSE: causativity marker; ACC: accusative case marker; ConV: converb; DAT: dative case marker; INSTR: instrumental case marker; LOC: locative case marker; ORD: ordinal marker; PART: partitive case marker; PAST: past tense; PAST-1PL: first person plural past tense; PAST-1SG: first person singular past tense; PAST-3PL: third person plural past tense; PAST-3SG: third person singular past tense; PRES: present tense; PRT: participle; 1SG.POSS: first person singular possessive; 3SG.POSS: third person singular possessive.

<sup>14</sup> Menninger, *Number Words and Number Symbols*, p. 76.

seven = 47'.<sup>15</sup> This type of additive numeral is common, featuring a simple structure and transparent semantics too. The other type takes on the form of *digit + decade* without any linking morpheme in-between, for example, *bir yegirmi* 'one twenty'. The latter form of juxtaposed numerals is also widely attested in European languages, for example, the German *acht-zehn* 'eight-ten = 18' and classical Greek *oktō-kai-deka* 'eight-and-ten = 18'. Both Thomsen and Radloff, the two pioneers in deciphering the Orkhon Inscriptions, analysed them as ordinary additive numerals, so the value expressed by *bir yegirmi* is 21, and so on.

When translated as additive numerals, the values of some of these juxtaposed numerals cannot be verified by history, and they do not provide a key figure in reconstructing the history of Turkic people. Consider the following sentence (4) from the texts of the Kül Tegin and the Bilgä Qayan Inscriptions;<sup>16</sup> (5) is the French translation by Thomsen, and (6) and (7) are the German translation by Radloff.

- (4) Qaŋ-īm            qayan    **yeti**    **yegirmi**        är-in            tašiq-miš.  
 father-1SG.POSS Qayan    **seven**    **twenty**        man-INSTR        leave-PAST  
 'My father Qayan left with 17 men.'
- (5) Mon père le kagan partit avec **vingt-sept** hommes.<sup>17</sup>  
 'My father Qayan left with 27 men.'
- (6) Mein Vater, der Chan, und **sieben und zwanzig** Helden zogen aus.<sup>18</sup>  
 'My father Qayan left with 27 men.'
- (7) Mein Vater, der Chan, zog mit **sieben und zwanzig** Helden aus.<sup>19</sup>  
 'My father Qayan left with 27 men.'

This does not seem to leave any historical evidence, and whether 'my father Qayan' left with 17 or 27 people (after being defeated by Tang's army) seems a rather trivial fact and does not seem particularly important to the Turkic history. Today we know that Qayan left with 17 people, which is known to us from the true meaning of the numeral *yeti yegirmi* 'seven twenty'.

However, the interpretation of some numerals is especially important to Turkic history, particularly those stating the ages of Turkic leaders and the dates of important events. If misinterpreted, they might bring considerable inconsistency, or even contradiction, in reconstructing Turkic history. And there are even some numerals, if interpreted as additive, that would be inconsistent with common sense. For example, both the Kül Tegin and Bilgä Qayan Inscriptions contain the dates of the deaths and funerals of the protagonists, as shown below.

- (8) Kül tegin    qoñ yil-qa            **yeti yegirmi-kä**    uç-d-ï  
 Kül Tegin    sheep year-DAT **seven twenty-DAT**    fly-PAST-3SG

<sup>15</sup> The form these numerals take is clearly undercounting, which continues in modern Turkic languages, usually without the linking morpheme *artuqi*. See Clauson, 'The Turkish numerals', p. 25.

<sup>16</sup> The Old Turkic transliteration of (4) is based on S. M. Geng, *Gudai Tujuewen Beiming Yanjiu* (Studies on Old Turkic Inscriptions) (Beijing, 2005), p. 123, with my Leipzig annotation. All the other transliterations of Orkhon Inscriptions of (8-9), (13-14), (20-21), and (26-46) in the following text are based on the same book, with my Leipzig annotation. However, some modifications have been made to the spelling of Professor Geng's original transliteration according to the more recent criteria of transliterating Old Turkic. For example, *yiti yigirmi* in Geng's book is spelled as *yeti yegirmi* in this article.

<sup>17</sup> V. Thomsen, *Inscriptions de l'Orkhon Déchiffrées* (Helsingfors, 1896), p. 101.

<sup>18</sup> V. Radloff, *Die Altürkischen Inschriften der Mongolei* (St Petersburg, 1895), p. 440.

<sup>19</sup> V. Radloff, *Die Altürkischen Inschriften der Mongolei*. Neute Folge (St Petersburg, 1897), p. 133.

toquz-inč ay **yeti otuz**-qa yoy är-tür-t-imiz  
 nine-ORD month **seven thirty**-DAT funeral make-CAUSE-PAST-1PL  
 barq-i-n bädiz-i-n bitig taš-i-n  
 building-3SG.POSS-ACC painting-3SG.POSS-ACC book stone-3SG.POSS-ACC  
 bičin yil-qa yeti-nč ay  
 monkey year-DAT seven-ORD month  
**yeti otuz**-qa qop alq-d-imiz.  
**seven thirty**-DAT all complete-PAST-1PL

'Kül Tegin died in **17** of the sheep year, we held the funeral in September **27**. Temples, paintings and inscription stones were completed in July **27** of the monkey year.'

- (9) Qaŋ-ïm qayan it yil on-unč ay **altı otuz**-qa  
 father-1SG.POSS Qayan dog year ten-ORD month **six thirty**-DAT  
 uç-a bar-d-ï layzın yil beš-inč ay **yeti otuz**-qa  
 fly-ConV go-PAST-3SG pig year five-ORD month **seven thirty**-DAT  
 yoq är-tür-t-üm.  
 funeral be-CAUSE-PAST-1SG  
 'My father Qayan died in October **26** of the dog year, the funeral was held in May **27** of the pig year.'

In both sentences, Thomsen translated all the numerals as additive, that is, *yeti yegirmi* 'seven twenty' into *vingt-septième* '27th', *altı otuz* 'six thirty' into *trente-sixième* '36th', and *yeti otuz* 'seven thirty' into *trente-septième* '37th', as shown below.

- (10) Kül tégin trépassa dans l'année du mouton, le **vingt-septième** jour. Au neuvième mois, le **trente-septième** jour, nous fimes les funéraires. Sa salle, sa statue et sa pierre à inscriptions, nous les avons inaugurés, (en assistant) en grand nombre, dans l'année du singe, au septième mois, le **trente-septième** jour.<sup>20</sup>
- (11) Mon père le kagan est mort dans l'année du chien, au dixième mois, le **trente-sixième** jour. Dans l'année du porc, au cinquième mois, le **trente-septième** jour, je fis faire les funéraires.<sup>21</sup>

Translating *yeti yegirmi* 'seven twenty' into *vingt-septième* '27th' seems fine in terms of common sense because we do have the 27th day in a given month. However, it is obviously impossible to have *trente-sixième* '36th' and *trente-septième* '37th' as dates in a month. Thomsen surely noticed such striking values of these numerals for designating dates and attempted to give an explanation in two long footnotes. Thomsen explained that to comprehend such dates, it is necessary to compare the Chinese text in the same Inscription and to utilise the ancient Chinese sexagesimal calendar notation system. The Kül Tegin Inscription contains a passage written in Chinese stating when the monument was erected:

- (12) 大唐开元廿年岁次壬申十二月辛丑朔七日丁未书  
 Chinese Pinyin: Dàtáng kāiyuán niàn nián suìcì réns hēn shí'èr yuè xīnchǒu shuò  
 qī rì dīngwèi shū  
 English translation: written in the seventh day (*Dīngwèi*) of the twelfth month (*Xīnchǒu*) of the twentieth year (*Réns hēn*) in Kaiyuan Period of the Great Tang Dynasty

<sup>20</sup> V. Thomsen, *Inscriptions de l'Orkhon Déchiffrées* (Helsingfors, 1896), pp. 119–120.

<sup>21</sup> *Ibid.*, p. 130.

In the Chinese text (12), the numerals for the year, month, and date are followed by special terms used in the ancient Chinese sexagesimal calendar notation system, for example, ‘the seventh day’ is followed by *Dīngwèi*, which means that the seventh day of that month of that year is the *Dīngwèi* day, that is, the 44th day in the Chinese sexagesimal system. Thomsen thus speculated that the numbers 36 and 37 in fact refer to the 36th and 37th day in the sexagesimal cycle, only expressed in Turkic numerals *altı otuz* (supposedly 36) and *yeti otuz* (supposedly 37). This seems to be a reasonable explanation, but Thomsen encountered many difficulties. The Kül Tegin Inscription was erected in the twentieth year in the Kaiyuan Period of the Great Tang Dynasty (that is, AD732), and Thomsen found that the 37th day (corresponding to the Chinese *Gēngzi* day) does not occur in either July or September. Similarly, in the Bilgä Qayan Inscription, the 36th day does not occur in October and the 37th day does not occur in May of the relevant year. In the end, Thomsen admitted that he did not understand exactly the meanings of the two numerals *yeti otuz* and *altı otuz*, which are presumably expressions for the numbers 36 and 37. He suspected that these were spelling mistakes or that the Turks were not good at counting by the Chinese sexagesimal cycle notation. He said:

Les chiffres forts qui se présentent ici (37 ici et dans II N 10; en ce dernier endroit, aussi 36) montrent qu’ils ne peuvent pas désigner le quantième de tel mois même, mais qu’ils indiquent le jour d’après sa place dans la semaine sexagésimale mentionnée plus haut. Il faut donc que, chez les Turcs, les singuliers caractères cycliques des chinois soient tout simplement remplacés par des nombres cardinaux. Cependant, l’identification exacte de ces dates avec le calendrier chinois, présente diverses difficultés qui ne s’expliquent que par la négligence des Turcs dans le manement du calendrier.<sup>22</sup>

‘The high figures presented here (37 here and in II N 10; in the last place, also 36) show that they cannot designate the date of a given month, but that they indicate the day according to its place in the sexagesimal system mentioned above. It is therefore necessary that, among the Turks, the singular cyclic characters of the Chinese are quite simply replaced by the cardinal numbers. However, the exact identification of dates with the Chinese calendar presents various difficulties which can only be explained by the negligence of the Turks in handling the calendar.’

In interpreting the Bilgä Qayan Inscription, Thomsen encountered more severe doubts and difficulties. The Bilgä Qayan Inscription contains the following two statements, describing the age and duration of Bilgä Qayan’s ruling and governance.

- (13) **Tört yegirmi** yaš-ïm-qa tarduš bodun üzä  
**four twenty** age-1SG.POSS-DAT Tardush people above  
 šad är-t-im.  
 viceroy be-PAST-1SG  
 ‘At the age of 14, I became the viceroy of Tardus people.’
- (14) Män **toquz yegirmi** yil šad olur-t-um  
 I **nine twenty** year riceroy sit-PAST-1SG  
**toquz yegirmi** yil qayan olur-t-um.  
 nine **twenty** year Qayan sit-PAST-1SG  
 ‘I have been the viceroy for 19 years and Qayan for 19 years.’

Thomsen translated them into (15) and (16).

<sup>22</sup> *Ibid.*, p. 176.



- (15) Dans ma **vingt-quatrième** année je devins chad.<sup>23</sup>  
 (16) Pendant **vingt-neuf** ans j'ai été chad, pendant **vingt-neuf** (!) ans j'ai été kagan.<sup>24</sup>

According to his interpretation of the numerals, Bilgä became viceroy at the age of 24, after which he was viceroy for 29 years and Qayan for another 29 years, so he was at least 82 years old. But Thomsen inferred from other historical sources that Bilgä Qayan died in AD734 and lived for only 51 years, and so cannot have been the Qayan for 29 years. That is why Thomsen put an exclamation mark behind *vingt-neuf*. Thomsen suggested that *toquz yegirmi* must be a spelling or arithmetic mistake, and commented that the meaning of this numeral should be 19. In fact, Thomsen had almost come to know the true semantic composition of Turkic numerals.<sup>25</sup>

Another pioneer in interpreting the Orkhon Inscriptions, Radloff also translated the above juxtaposed numerals as additive, but he did not say anything about the striking values of 36 and 37 for dates in his monographs of 1895 and 1897.

- (17) Kül - Tegin starb im Schafjahre den **sieben und zwanzigsten**.....im neunten Monat  
 den **sieben und dreissigsten**..... der beschriebene Denkstein ..... im Affenjahre des siebenten Monats am **sieben und dreissigsten**.<sup>26</sup>  
 (18) im Hunde Jahre, im neunten Monate ... am **sechs und dreissigsten** starb (der Chan). Im Algazin Jahre, im fünften Monate, am **sieben und dreissigsten** richtete ich das Begräbniss her.<sup>27</sup>

Due to the authority of Thomsen and Radloff's interpretation of the Orkhon Inscriptions, later scholars, for example Bang<sup>28</sup> and Barthold,<sup>29</sup> also translated these juxtaposed numerals as additives, failing to see their true semantic composition.

Soon the misinterpretation of the juxtaposed numerals in the Orkhon Inscriptions was corrected. Bang pointed out the systematic misinterpretation of these juxtaposed numerals in Orkhon Inscriptions, stating that:

ist *yeti otuz* (37) ohne jeglichen Zweifel ein Fehler für *yeti yegirmi* (27)...dass *bir kirk* in I N 2 ein weiterer durch *yeti otuz* I N 1 veranlasster Fehler für *bir otuz* sei.<sup>30</sup>  
 'yeti otuz (37) should undoubtedly be an error of *yeti yegirmi* (27)... that *bir kirk* in I N 2 is another error caused by *yeti otuz* I N 1 for *bir otuz*'.

It should be pointed out that Bang came to this conclusion through a comparative study of Turkic history, rather than basing it on the Turkic numerals themselves. It is certain that he did not realise, when writing that article, the semantic composition of the Turkic numerals, for he mistakenly thought that *yeti yegirmi* expresses 27 and failed to see that *yeti otuz* is not an error of *yeti yegirmi*; it is the correct numerical form expressing 27.

<sup>23</sup> Ibid., p. 103.

<sup>24</sup> Ibid., p. 129.

<sup>25</sup> Ibid., p. 183.

<sup>26</sup> Radloff, *Die Altürkischen Inschriften der Mongolei*, p. 39.

<sup>27</sup> Ibid., p. 200.

<sup>28</sup> W. Bang, 'Zu den Kök Türk-Inschriften der Mongolei', *T'oung Pao* 7.4 (1896), pp. 325–355, and W. Bang, 'Zu den köktürkischen Inschriften', *T'oung Pao* 9.2 (1898), pp. 117–141.

<sup>29</sup> W. Barthold, 'Die historische bedeutung der alttürkischen inschriften', in Radloff, *Die Altürkischen Inschriften der Mongolei*. Neute Folge.

<sup>30</sup> W. Bang, 'Zur Erklärung der köktürkischen Inschriften', *Wiener Zeitschrift für die Kunde des Morgenlandes* 12 (1898), pp. 34–54, with modification in the spelling of the numerals.

Bang's comment was entertained by Marquart, who, in his *Die Chronologie der alttürkischen Inschriften*, subjected the entire chronology of the Inscriptions, which is based on addition, to a revision by reducing all the values of these juxtaposed numerals by 10. In this book, importantly, Marquart correctly pointed out that *yeti otuz* is not an error of *yeti yegirmi*, and that *bir kırk* is not an error of *bir otuz*. They themselves just express the numerical values of 27 and 31, while *yeti yegirmi* and *bir otuz* express the numerical values of 17 and 21. Marquart said that the Turkic numerals *altı otuz* and *yeti otuz* for dates are not formed by the Chinese sexagésimale system, as suggested by Thomsen, but that they are incorrectly translated into 36 and 37.<sup>31</sup> This indicates that Marquart understood the semantic composition of the Turkic juxtaposed numerals like *altı otuz* and *yeti otuz*. After identifying the semantics of these numerals in Old Turkic, Marquart commented that many of the historical inconsistencies puzzling Thomsen were set right. In the preface to Marquart's book, Bang realised that the numeral such as *tört yegirmi* was not a spelling mistake, but the correct form, expressing *vier auf zwanzig hin, der vor Zwanzig stehende Vierer etc. = 14* (four to twenty, the four in front of twenty etc. = 14). Bang also mentioned that Finnish features similar numerals, which led to cross-linguistic support of a new type of counting discovered in natural languages.<sup>32,33</sup>

Thanks to the works of Bang and Marquart, the mystery of Old Turkic juxtaposed numerals like *altı otuz* and *yeti otuz* in the Orkhon Inscriptions was completely solved and was established as another form of counting that is different from the decimal undercounting. In his 1899 edition of *Die Altürkischen Inschriften der Mongolei*, Radloff comprehensively revised the values of these Old Turkic juxtaposed numerals. Radloff acknowledged in the preface that Marquart's most important result is the correction of the Old Turk numerical expressions composed of digits and tens, which must be reduced by 10 in values. Radloff himself provided a proof for the overcounted interpretation of these numerals. He mentioned that his 1889 dictionary listed Turkic numeral names for months borrowed from a Chinese-Uighur dictionary,<sup>34</sup> in which the numeral for October *onunç ay* (the tenth month) is followed by *bir yegirminç ay*, which, of course, must necessarily mean the eleventh month. He admitted that:

Somit ist es nur meiner Unaufmerksamkeit und Vergesslichkeit zuzuschreiben, wenn ich nicht von Anfang an diesen Zahlausdrücken die richtige Deutung gegeben habe.<sup>35</sup>

'Thus, it is only due to my inattention and forgetfulness, if I have not given the correct interpretation of these numerical expressions from the beginning.'

<sup>31</sup> J. Marquart, *Die Chronologie der Altürkischen Inschriften* (Leipzig, 1898), p. 29.

<sup>32</sup> W. Bang, Vorwort, in *Die Chronologie der Altürkischen Inschriften* (Leipzig, 1898), p. vi.

<sup>33</sup> In Old Finnish, 21–29, 31–39, 41–49..., and 91–99 are all formed by overcounting, for example:

(i) a. yksi-toista-kymmentä	b. kaksi-kolmatta-kymmentä	c. viisi-yhdeksättä-kymmentä
one-second-ten.PART	two-third-ten.PART	five-ninth-ten.PART
'11'	'22'	'85'

In Modern Finnish, however, overcounting only remains for numerals 11–19, with *kymmentä* deleted, such as *yksi-toista* '11'. More details on Finnish numerals can be found in, for example, C. Eliot, *A Finnish Grammar* (Oxford, 1890), pp. 48–50.

<sup>34</sup> Radloff's 1889 dictionary refers to the *Versuch eines Wörterbuches des Turk-Dialect* (St Petersburg, 1889), the Chinese-Uighur dictionary refers to *Gāo Chāng Guǎn Zà Zì* (《高昌馆杂字》), one volume of the multilingual materials *Huá Yí Yǔ* (《华夷译语》) compiled during the Ming Dynasty. See the next section for *Gāo Chāng Guǎn Zà Zì*.

<sup>35</sup> V. Radloff, *Die Altürkischen Inschriften der Mongolei*. Zweite Folge (St Petersburg, 1899), p. xx.



In 1916 and 1924, Thomsen published a reinterpretation and German translation of the Orkhon Inscriptions, in which the values of overcounted numerals were all reduced by 10. But Thomsen did not explain the reason for such changes.<sup>36,37</sup>

### Reconstructing the evidence for overcounting in Old Turkic

Since the publication of the works of Bang and Marquart, overcounting has been identified and established as an ancient form of counting. But the two authors did not say what kind of evidence they had to support deriving the correct values. This section will try to fill in this gap by presenting evidence to prove the existence of overcounting in Old Turkic from the perspectives of language per se, historical facts, logical reasoning, and bilingual translation. In order to make the arguments more comprehensive, this section uses not only the Orkhon Inscriptions but also the later Uighur texts.

As stated earlier, the Old Turkic numeral *bir yegirminč ay* was mentioned by Radloff as a key proof of overcounting.<sup>38,39</sup> In fact, this striking numeral was first noticed by the German Orientalist Heinrich Julius Klaproth (1783–1835) who was, perhaps, the first Western scholar to study *Gāo Chāng Guǎn Zǎ Zì*.<sup>40</sup> In 1812, Klaproth published *Abhandlung über die Sprache und Schrift der Uiguren* in Berlin, in which he listed the names of months in Turkic and their German equivalents, including the two names for November. However, there was no comment on the interpretation of the old Turkic *bir yegirminč ay* ‘November’.<sup>41</sup>

(19) <i>bir yegirmi-nč ay</i>	=	eilfter	monat
one twenty-ORD month		eleventh	month

In the new edition of *Abhandlung über die Sprache und Schrift der Uiguren* published in Paris in 1820, Klaproth added a note under the entry *bir yegirminč ay*:

Bedeutet eigentlich den ein und zwantigsten Monat. Der eilfte Monat.-Bei Ulug-Beg, der die Uigurischen Monate giebt, steht wahrscheinlich durch einen Schreibfehler.<sup>42</sup>  
 ‘... actually means the one and twentieth month. The eleventh month—by Ulug-Beg, who gives the Uyghur month name, is probably due to a spelling error.’

This means that Klaproth noticed the striking form of *bir yegirminč ay* in Turkic as expressing the eleventh month (November). Unfortunately, he did not identify that it is a special form of numeral formation, instead stating that *bir yegirminč ay* actually means one and twelfth month, and suggesting that the Old Turkic expression given by Ulug-Beg was probably a spelling mistake.

The Orkhon Inscriptions that Thomsen and Radloff initially interpreted include mainly the Kül Tegin and Bilgä Qayan Inscriptions, both of which do not contain the numeral expression for November. If they did, the striking formation of Turkic numerals would have been worked out immediately by Thomsen and Radloff. However, the numeral

<sup>36</sup> V. Thomsen, ‘Turcica. Études concernant l’interprétation des inscriptions turques de la Mongolie et de la Sibirie’, *MSFOu* XXXVII (1916).

<sup>37</sup> V. Thomsen, ‘Altürkische Inschriften aus der Mongolei in Übersetzung und mit Einleitung’, *Zeitschrift der Deutschen Morgenländischen Gesellschaft* Bd. 78 (1924).

<sup>38</sup> Radloff, *Die Altürkischen Inschriften der Mongolei*. Zweite Folge, p. xx.

<sup>39</sup> Also see Pritsak, ‘Die Oberstufenzählung im Tungusischen und Jakutischen’, pp. 184–191.

<sup>40</sup> See footnote 34.

<sup>41</sup> H. J. Klaproth, *Abhandlung über die Sprache und Schrift der Uiguren* (Berlin, 1812), pp. 15–16.

<sup>42</sup> H. J. Klaproth, *Abhandlung über die Sprache und Schrift der Uiguren* (Paris, 1820), p. 13.

expression for November appears in the Moyan Chor Inscription and many civil documents of the later Uighur period.

- (20) **Bir yegirmi-nč** ay säkiz yegirmi-kä yoluq-d-ım  
**one twenty-ORD** month eight twenty-DAT meet-PAST-1SG  
 bolču ügüz-dä üç qarluq-ıy anta toqı-d-ım.  
 Bolchu river-LOC three Qarluq-ACC there defeat-PAST-1SG  
 ‘On 18 November, I met [them], I defeated the Three Qarluq at Bolchu River.’
- (21) **Bir yegirmi-nč** ay yegirmi-kä... čigil tutuq... toıury-uy  
**one twenty-ORD** month twenty-DAT Chigil general Toghurgh-ACC  
 káčür-ü.  
 cross-ConV  
 ‘On 20 November...General Chigil... crossed the Toghurgh (River).’
- (22) İt yıl **bir yegirmi-nč** ay on yaıı-qa män ara tämür  
 dog year one twenty-ORD month ten new day-DAT I Ara Tamur  
 turı-qa bitig bir-ür-män.<sup>43</sup>  
 Turi-DAT contract submit-PRES-1SG  
 ‘On 10 November of the dog year, I, Ara Tamur, submit the contract to Turi.’ (civil document)

The ordinals in Old Turkic are *ajilki* ‘first’, *ikinti* ‘second’, *üç-unč* ‘third’, *tört-unč* ‘fourth’, *beş-unč* ‘fifth’, *altı-nč* ‘sixth’, *yeti-nč* ‘seventh’, *säkiz-inč* ‘eighth’, *toquz-unč* ‘ninth’, *on-unč* ‘tenth’, *bir yegirmi-nč* ‘eleventh’, *iki yegirmi-nč* ‘twelfth’, and so on. They frequently occur in later Uighur texts, used in pagination and to name the order of chapters, sheets, and some other items. For instance, the Uighur Buddhist drama *Maitrisimit* contains many instances of ordinals, used to name the order of chapters, sheets, and other items such as the order of man’s virtues. For example, the tenth chapter is expressed in *on-unč ülüš* and the eleventh chapter in *bir yegirmi-nč ülüš*; the tenth sheet is expressed in *on ptr* and the eleventh sheet in *bir yegirmi-nč ptr*. Further see the following text from *Maitrisimit*:

- (23) Bu **on-unč** boşyutluy tınlıy tit-ir... Bu **bir yegirmi-nč**  
 this **ten-ORD** learning person be-PRES this **one twenty-ORD**  
 boşyutluy tınlıy tit-ir.<sup>44</sup>  
 learning person be-PRES  
 ‘This is the tenth person of learning ... this is the eleventh person of learning.’

The overcounted readings of some numerals can be verified by historical facts. For example, it is a well-known fact in Buddhism that Shakyamuni abandoned his wife and secretly fled from the city of Kapilwastu in order to pursue Buddhism at the age of 29, which is expressed in *toquz otuz* ‘nine thirty’ in *Maitrisimit*, as shown below. So *toquz otuz* expresses 29 by overcounting, not 39 by addition or 21 by subtraction.

- (24) Ol ödün ayayqa tägimlig burxan **toquz otuz** yaš-ı-nta  
 that time honorary buddha **nine thirty** age-3SG.POSS-LOC

<sup>43</sup> S. M. Geng, *Huihuwen Shehui Jingji Wenshu Yanjiu* (Studies on Uighur Socio-economic Documents) (Beijing, 2006), p. 233, with my Leipzig annotation and some modification in spelling; see footnote 16.

<sup>44</sup> Sentences (23) and (24–25) below are based on S. M. Geng, *Huihuwen Hamiben Milehujianji Yanjiu* (Studies on the Hami Version of Uighur *Maitrisimit*) (Beijing, 2008), pp. 33, 51 and 84, with my Leipzig annotation and some modification in spelling; see footnote 16.

- Kapilwastu balıq-tın kürägçüläyü ün-üp.  
 Kapilwastu city-ABL secretly flee-ConV  
 'At that time the honorary Buddha fled from the city of Kapilwastu at age of 29.'
- (25) **Toquz otuz** yaş-i-nta yaşodra marika tarıri qızlar-ı-nga  
**nine thirty** age-3SG.POSS-LOC Yashodra heaven wife-3SG.POSS-DAT  
 ... idala-p.  
 abandon-ConV  
 'At the age of 29, [he] abandoned his wife Yashodra.'

The historical events experienced by the protagonists in the Orkhon Inscriptions are described in an order of increasing ages. In the Kül Tegin Inscription, the main events of Kül Tegin are arranged in the following order of increasing ages: 16 (*altı yegirmi*), 21 (*bir otuz*), 26 (*altı otuz*), 27 (*yeti otuz*), 30 (*otuz*), 31 (*bir qırq*), and 47 (*qırq artuqı yeti*). The actual contexts in which these numerals appear are listed below.

- (26) **Altı yegirmi** yaş-i-ıja äči-m qayan el-i-n  
**six twenty** age-3SG.POSS-DAT uncle-1SG.POSS Qayan state-3SG.POSS-ACC  
 törü-si-n anča qazyan-t-ı.  
 law-3SG.POSS-ACC thus obtain-3SG.PAST  
 'At the age of 16, my uncle Qayan thus obtained his country and laws.'
- (27) **Bir otuz** yaş-i-ıja čača sänün-kä sünüş-d-imiz.  
**one thirty** age-3SG.POSS-DAT Chacha general-DAT fight-PAST-1PL  
 'When he was 21 years old, we fought with General Chacha.'
- (28) Kül tegin **altı otuz** yaş-i-ıja qırqız tapa sülä-d-imiz.  
 Kül Tegin **six thirty** age-3SG.POSS-DAT Qırqız towards march-PAST-1PL  
 'When Kül Tegin was 26 years old, we marched towards Qırqız.'
- (29) Kül tegin **yeti otuz** yaş-i-ıja qarluq bodun  
 Kül Tegin **seven thirty** age-3SG.POSS-DAT Qarluq people  
 yayı bol-t-ı.  
 enemy become-PAST-3PL  
 'When Kül Tegin was 27 years old, the Qarluq people became our enemy.'
- (30) Kül tegin ol sünüş-dä **otuz** yaşa-yur är-t-i.  
 Kül Tegin that war-LOC **thirty** live-PRT be-PAST-3SG  
 'In that war, Kül Tegin was 30 years old.'
- (31) Kül tegin **bir qırq** yaşa-yur är-t-i. alp šalqı aq-ı-n  
 Kül Tegin **one forty** live-PRT be-PAST-3SG brave Shalqı horse-3SG.POSS-ACC  
 bin-ip opla-yu täg-d-i.  
 ride-ConV assault-ConV attack-PAST-3SG  
 'When Kül Tegin was 31 years old, he rode the brave horse Shalqı to assault and attack.'
- (32) Kül tegin öz-i **qırq artuqı yeti** yaş-i-ıja  
 Kül Tegin self-3SG.POSS **forty more seven** age-3SG.POSS-DAT  
 bol-t-ı.  
 be-PAST-3SG  
 'Kül Tegin lived 47 years.'

The overcounted readings of *altı yegirmi*, *bir otuz*, *altı otuz*, *yeti otuz*, and *bir qırq* can give the above logically increasing order of ages, while an additive or subtractive interpretation of them will result in illogical chronological orders \*26, 31, 36, 37, 30, 41, 47 and \*14, 29, 24, 23, 30, 39, 47.

In the Bilgä Qayan Inscription, the main events that happened to Bilgä Qayan are arranged in the following chronological order of ages: 14 (*tört yegirmi*), 17 (*yeti yegirmi*), 18 (*säkiz yegirmi*), 20 (*yegirmi*), 22 (*iki otuz*), 26 (*altı otuz*), 27 (*yeti otuz*), 30 (*otuz*), 31 (*otuz artuqi bir*), 32 (*otuz artuqi iki*), 33 (*otuz artuqi üç*), 34 (*otuz artuqi dört*), 38 (*otuz artuqi säkiz*), and 39 (*otuz artuqi toquz*). The actual contexts in which these numerals appear are listed below. The overcounted readings of *tört yegirmi*, *yeti yegirmi*, *säkiz yegirmi*, *iki otuz*, *altı otuz*, and *yeti otuz* can give the above logically increasing order of ages, while additive or subtractive interpretation will result in an illogical age-increasing order, which is clear to see.

- (33) **Tört yegirmi** yaş-ım-qa tarduş bodun üzä  
**four twenty** age-1SG.POSS-DAT Tardush people above  
 şad är-t-im.  
 viceroy be-PAST-1SG  
 ‘At the age of **14**, I became the viceroy of Tardush people.’
- (34) **Yeti yegirmi** yaş-ım-a tañut tapa sülä-d-im.  
**seven twenty** age-1SG.POSS-DAT Tañut towards march-PAST-1SG  
 ‘At the age of **17**, I marched towards Tangut.’
- (35) **Säkiz yegirmi** yaş-ım-a altı çub soйдақ  
**eight twenty** age-1SG.POSS-DAT six prefecture Soghdaq  
 tapa sülä-d-im.  
 towards march-PAST-1SG  
 ‘At the age of **18**, I marched towards the six-prefecture Soghdaq.’
- (36) **Yegirmi** yaş-ım-a basmıl iduq-qut oyuş-um bodun  
**twenty** age-1SG.POSS-DAT Basmil Iduqut kin-1SG.POSS people  
 är-t-i.  
 be-PAST-3PL  
 ‘At the age of **20**, Basmil Iduqut was my kin.’
- (37) **Iki otuz** yaş-ım-a tabyaç tapa sülä-d-im.  
**two thirty** age-1SG.POSS-DAT Tabghach towards march-PAST-1SG  
 ‘At the age of **22**, I marched towards Tang.’
- (38) **Altı otuz** yaş-ım-a çik bodun qırqız birlä yayı  
**six thirty** age-1SG.POSS-DAT Chik people Qırqız together enemy  
 bol-t-i.  
 become-PAST-3PL  
 ‘When I was **26**, Chik and Qırqız together became our enemies.’
- (39) **Yeti otuz** yaş-ım-a qırqız tapa sülä-d-im.  
**seven thirty** age-1SG.POSS-DAT Qırqız towards march-PAST-1SG  
 ‘At the age of **27**, I marched towards Qırqız.’
- (40) **Otuz** yaş-ım-a beşbaliq tapa sülä-d-im.  
**thirty** age-1SG.POSS-DAT Beshbaliq towards march-PAST-1SG  
 ‘At the age of **30**, I marched towards Beshbaliq.’
- (41) **Otuz artuqi bir** yaş-ım-a qarluq bodun yayı  
**thirty more one** age-1SG.POSS-DAT Qarluq people enemy  
 bol-t-i.  
 become-PAST-3PL  
 ‘When I was **31** years old, Qarluq people became our enemy.’
- (42) **Otuz artuqi iki** yaş-ım-a qarluq bodun tiril-ip  
**thirty more two** age-1SG.POSS-DAT Qarluq people unite-ConV  
 käl-t-i.  
 come-PAST-3PL  
 ‘When I was **32**, Qarluq people were united.’

- (43) Tajri yarliqa-duq üçün öz-üm  
 heaven blessing-PRT because self-1SG.POSS  
**otuz artuqi üç** yaş-ım-a.....  
**thirty more three** age-1SG.POSS-DAT.....  
 ‘Because of the God’s blessing, when I was **33** years old...’
- (44) **Otuz artuqi tört** yaş-ım-a oγuz táz-ip  
**thirty more four** age-1SG.POSS-DAT Oghuz escape-ConV  
 tabyač-qa kir-t-i.  
 Tabghach-DAT enter-PAST-3PL  
 ‘When I was **34** years old, Oghuz escaped and ran to Tang.’
- (45) **Otuz artuqi sákiz** yaş-ım-a qışın  
**thirty more eight** age-1SG.POSS-DAT winter  
 qıtan tapa sülâ-d-im.  
 Qitan towards march-PAST-1SG  
 ‘At the age of **38**, I marched towards Qitan in winter.’
- (46) **Otuz artuqi toquz** yaş-ım-a yazın  
**thirty more nine** age-1SG.POSS-DAT spring  
 tatabı tapa sülâ-d-im.  
 Tatabi towards march-PAST-1SG  
 ‘At the age of **39**, I marched towards Tatabi in spring.’

The old Uighur Buddhist classics are mostly translated from Sanskrit, Tocharian, Tibetan, and Chinese. For example, the Uighur *Xuan Zang Zhuan* was translated from the Chinese *Xuan Zang Zhuan* ‘The life of Hiuen-Tsiang’ in the first half of the tenth century by the Uighur scholar Şingqu Sâli. We compared both versions and found that about 200 decimal numerals (within the required intervals) in Chinese are translated into overcounted numerals in Uighur. For example, the following passage (47) is from the Chinese version which describes the quantity of sutras Xuan Zang (Hiuen-Tsiang) brought from India. In the Uighur version, it was translated as in (48).

- (47) 上座部经律论一十五部，大众部经律论一十五部，三弥底部经律论一十五部，弥沙塞部经律论二十二部，迦叶臂耶部经律论一十七部，法密部经律论四十二部，说一切有部经律论六十七部，因论三十六部，声论一十三部。凡五百二十夹，六百五十七部。以二十匹马负而至。<sup>45</sup>  
 Chinese pinyin: Shàngzuò bù jīng lǜ lùn yīshíwǔ bù, dàzhòng bù jīng lǜ lùn yīshíwǔ bù, sānmídfǒ bù jīng lǜ lùn yīshíqī bù, míshāsāi bù jīng lǜ lùn èrshí’èr bù, jiāyèbiyè bù jīng lǜ lùn yīshíqī bù, fāmì bù jīng lǜ lùn sīshí’èr bù, shuōyīqièyǒu bù jīng lǜ lùn liùshíqī bù, yīnlùn sānshíliù bù, shēnglùn yīshísān bù. Fán wǔbǎi èrshí jiā, liùbǎi wǔshíqī bù. Yǐ èrshí pǐ mǎ fù ér zhì.
- (48) sitaviraki nikay-daqi sudur vinay šastr **beš yegirmi** buu mxa vinay šastr **beš yegirmi** buu mxa sarjik nikay-daqi sudur vinay šastr yana **beš yegirmi** buu samiti nikay-daqi sudur vinay šastr **iki otuz** buu myizaki nikay-daqi sudur vinay šastr **yeti yegirmi** buu kaşyapiyi nikay-daqi sudur vinay šastr **iki älig** buu drmagupta nikay-daqi sudur vinay šastr **yeti yetmiş** buu srvastivadin nikay-daqi sudur vinay šastr **altı qırq** buu inmilun šastr **üç yegirmi** buu şinmiluu atly vignan šastr bu qamay yomqi beş yüz yegirmi qap bitig altı yüz **yeti altmiş** buu nom-uγ ygrmi at-qa yüdür-üp kâl-miş är-d-i.<sup>46</sup>

<sup>45</sup> Dàcǐ’ēn Sì Sānzàng Fǎshī Zhuàn ‘The life of Hiuen-Tsiang’, 《大慈恩寺三藏法师传》(Shanghai, 2000), p. 127.

<sup>46</sup> Y. Cui, *Studies on the Uighur Xuan Zang Zhuan. Volume 6 Stored in Russia*, unpublished PhD dissertation, Minzu University of China, 2017, pp. 24–26, with my modification in spelling.

**Table 1:** Correspondence between some Chinese and Uighur numerals in *The Life of Hiuen-Tsiang*. The numerals in this table are from (47) and (48) cited in footnotes 45 and 46.

Chinese numerals	Uighur numerals	Chinese numerals	Uighur numerals
<i>yī shí wǔ</i> one ten five '15'	<i>beş yegirmi</i> five twenty '15'	<i>èr shí èr</i> two ten two '22'	<i>iki otuz</i> two thirty '22'
<i>yī shí qī</i> one ten seven '17'	<i>yeti yegirmi</i> seven twenty '17'	<i>sì shí èr</i> four ten two '42'	<i>iki älig</i> two fifty '42'
<i>liù shí qī</i> six ten seven '67'	<i>yeti yetmiş</i> seven seventy '67'	<i>sān shí liù</i> three ten six '36'	<i>altı qırq</i> six forty '36'
<i>yī shí sān</i> one ten three '13'	<i>üç yegirmi</i> three twenty '13'	<i>wú bǎi èr shí</i> five hundred two ten '520'	<i>beş yüz yegirmi</i> five hundred twenty '520'
<i>liù bǎi wǔ shí qī</i> six hundred five ten seven '657'	<i>altı yüz yeti altmış</i> six hundred seven sixty '657'	<i>èr shí</i> two ten '20'	<i>yegirmi</i> twenty '20'

(49) English translation of (47) and (48): **15** volumes of sitaviraki sutras, **15** volumes of mxa sutras, **15** volumes of samiti sutras, **22** volumes of myizaki sutras, **17** volumes of kaşyapiyi sutras, **42** volumes of drmagupta sutras, **67** volumes of srvastivadin sutras, **36** inmilun sutras, **13** volumes of šinmiluu sutras. There are a total of **520** cases and **657** volumes, carried in **20** horses.

Table 1 shows the correspondence between the Chinese undercounted numerals and Uighur overcounted numerals in (47) and (48), from which the difference between undercounting in Chinese and overcounting in Uighur can clearly be seen.

## Conclusion

Overcounting, as a remarkable way of counting in a natural language numeral system, has potential value to the linguistic study of numeral systems, and some more general issues in anthropology, cognitive science, and the history of mathematics. In particular, overcounting in Turkic can provide us with ideal source material for a comprehensive and thorough investigation of human counting. Compared to other overcounting languages, the Turkic languages stand in a very unique and incomparable position thanks to the presence of overcounting in modern Turkic languages (West Yugur and Yakut) and the huge availability of continual historical written texts of Old Turkic stretching back more than 1,200 years, which can provide us with large-scale authentic data to investigate the linguistics of natural language numeral systems and some more general issues such as the origin and development of counting.

The purpose of this article is, of course, rather modest in that it reviews the history of the discovery and interpretation of overcounting in the Orkhon Inscriptions by historical linguists during the nineteenth century, and presents a series of arguments to systematically prove the existence of overcounting. Nevertheless, it is hoped that this article has shown that overcounting, discovered a long time ago, deserves due and sufficient attention from different disciplines with regard to its theoretical value and significance. For example, overcounting may reshape our standard compositional view towards form and



meaning in linguistics, for the interpretation of, say, *yeti yegirmi* ‘seven twenty’ as 17 seems non-compositional. We know it expresses something like seven on the way to twenty, that is, 17. However, this is only our intuitive understanding of its meaning, and linguists owe us a formal account of how ‘seven twenty’ generates the value 17.<sup>47</sup>

In a broader and more important sense, overcounting may tell us something about how counting originated in primitive minds and how human counting evolved throughout history. In fact, it has been hypothesised that numbers in primitive minds were not developed in a natural sequential order (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12...), but in a discontinuous order (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 20, 30, 40...) with the interval numbers (11, 12, etc.) developed later.<sup>48</sup> This hypothesis may be confirmed in the counting system of Old Turkic. It can be speculated that the Old Turks initially developed the number concepts of 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 20, 30, 40, and 50. Considering the fact that Old Turkic only featured overcounting in interval numbers in the Yenisei Inscriptions (the earliest written material available to us)<sup>49</sup> and the observed shift from overcounting to undercounting, but not in the opposite direction, it is plausible that primitive people overcounted, or at least the Old Turks did.<sup>50</sup> This issue and many others are very important and await further study. In any case, it should be kept in mind that when counting, ancient people may not have thought in the ways we do today, as Lévy-Bruhl commented:

On admet en général, sans examen, et comme une chose naturelle, que la numération part de l'unité, et que les différents nombres se forment par l'addition successive de l'unité à chaque nombre précédent. C'est là en effet le procédé le plus simple, celui qui s'impose à la pensée logique quand elle prend conscience de son opération. Omnibus ex nihilo ducendis sufficit unum. Mais la mentalité prélogique, qui ne dispose point de concepts abstraits, ne procède pas ainsi.<sup>51</sup>

‘It is generally accepted, without examination, and as a natural thing, that counting starts from 1, and that different numbers are formed by successive addition of 1 to each preceding number. This is in fact the simplest process that requires logical thinking when one becomes aware of its operation. *Omnibus ex nihilo ducendis sufficit unum*. But the prelogic mentality, which does not have abstract concepts, does not do so.’

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<sup>47</sup> See J. Hurford, *The Linguistic Theory of Numerals* (Cambridge, 1975), pp. 237–238, for an initial attempt to compositionally derive the values of overcounted numerals in Mayan languages.

<sup>48</sup> Menninger, *Number Words and Number Symbols*, p. 46.

<sup>49</sup> I consulted L. Bazin, *Les Systems Chronologiques dans le Monde Turc Ancien* (Budapest, 1991), which contains many examples of overcounted numerals in Yenisei Inscriptions, and found only overcounting for numbers up to 100, with the largest one being *toquz sâkiz on* ‘79’.

<sup>50</sup> Professor Larry Clark proposed an opposite hypothesis—the Calender Hypothesis—suggesting that Old Turks at first undercounted in a decimal system with the overcounting system being a foreign intruder, borrowed from the Chinese civil calendar system—that is, the overcounting system is a later development. We may address this hypothesis on a different occasion. See Clark, ‘The early Turkic and Sarig Yugur counting system’, pp. 17–49.

<sup>51</sup> L. Lévy-Bruhl, *Les Fonctions Mentales dans les Sociétés Inférieures* (Paris, 1910), p. 163.

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