DEFENDING GREENBERG'S UNIVERSAL 20A:
ON THE PUTATIVE [CLASSIFIER NOUN NUMERAL] CONSTRUCTION IN TAI-KADAI*

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Abstract

This paper investigates the putative N-intervening word order among Numeral (Num), Classifier (Clf), and Noun (N), i.e., [Clf N Num], where the numeral is the indigenous *one*, found in 16 Asian languages, 15 Tai-Kadai and one Austroasiatic, whose canonical word order is otherwise [Num Clf N]. This peculiar word order violates Greenberg's Universal 20A, i.e., Num and Cl must be adjacent. Thus, the two N-intervening orders, [Clf N Num] and [Num N Clf], are allegedly ill-formed among the six mathematically possible word orders. Her (2017a, 2017b) proposed an explicit account for this N-intervening construction in Maonan (Tai-Kadai) and argued that the putative numeral *one* is, in fact, a grammaticalized indefinite article instead, like *a/an* in English. The putative [Clf N Num] construction is thus [Clf N *a/an*]. The goal of this study is to examine the relevant data from the other 15 languages with the same putative violation to Universal 20A comprehensively and extend this indefinite article account to resolve all such putative violations. We then demonstrate that in Tai-Kadai languages with [N Num Clf] as the canonical order, the indigenous numeral *one* has likewise been grammaticalized as an indefinite article in the [N Clf *a/an*] construction. Universal 20A is thus intact.

Keywords: language universal, 20A, Tai-Kadai, word order, numeral, one

1. Introduction

The three elements, i.e., numeral (Num), numeral classifier (Clf), and noun (N), in a classifier phrase logically have six possible word orders, as in (1a-f); yet, prominent typological studies such as Greenberg (1972/1990:185) and Aikhenvald (2000:104-105) claim that only the first four, (1a-d), are attested in numeral classifier languages. The

remaining two, (1e-f), both have N intervening between Num and Clf and shall thus be called the 'N-intervening' orders in this paper.

(1) a.   [Num Clf N]
     b.   [N Num Clf]
     c.   [Clf Num N]
     d.   [N Clf Num]
     e.   *[Num N Clf] (unattested)
     f.   *[Clf N Num] (unattested)

Based on Greenberg's work on numeral classifiers and word order universals, Her (2017a, 2017b) has put together a universal statement, dubbed Greenberg's Universal 20A (hereafter U-20A), as in (2).

(2) Greenberg's Universal 20A (U-20A)
     Part 1: Of the three elements, Num, Clf, and N, any order is possible as long as N does not come between Num and Clf.
     Part 2: There are many more languages with Num > Clf orders than languages with Clf > Num orders.

However, an alleged violation of U-20A has been widely reported. In the World Atlas of Classifier Languages (WACL) (Her, Hammarström & Allassonnière-Tang 2022), 21 languages are found with the putative N-intervening (1f) word order, 16 of which are in Asia and five in Africa. The 16 Asian languages include 15 Tai-Kadai languages (Ai-Cham, Bouyei, Dai Zahung, Guibei Zhuang, Liujiang Zhuang, Mak, Maonan, Nong Zhuang, Nung, Pubiao-Qabiao, Tai Dam, Yang Zhuang, Youjiang Zhuang, Yongbei Zhuang, and Zuojiang Zhuang), one Austroasiatic language (Mang), and the five African languages are all in the Niger-Congo family: Denya, Ejagham, Ibibio, Isu, and Mungaka. It is important to note that while all such violations involve the [Clf N Num] order, in the 16 Asian languages Num in this construction is always a numeral of 'one', thus [Clf N *one*], never any other numeral. In the five African languages, Num in this construction has no such restrictions.

In this paper, we focus on the 15 Tai-Kadai languages and one Austroasiatic language. Our goal is to demonstrate that the apparent numeral in [Clf N *one*] is in fact an indefinite article, not a numeral and thus this construction is not a violation of U-20A at all. Her (2017a, 2017b) proposes an analysis based on data of Maonan and argues that the overt 'one' in the N-intervening construction is a grammaticalized indefinite article and the real numeral 'one' is omitted in the construction; thus, the superficial N-intervening order in the language should be a representation of [(Num) Clf N D] construction instead of a genuine N-intervening construction as in (1f). While Her further submits that the

superficial N-intervening construction in all Tai-Kadai languages is the same condition as the case in Maonan, a comprehensive inspection and verification are still needed.

This paper, following Her's (2017a, 2017b) syntactic analysis, aims to reveal the true state of the alleged [Clf N Num] construction in question. In section 2, the paper introduces Her & Hsieh's (2010) mathematical properties of classifiers and the constituency of [Num Clf] and [Clf Num] by which the relation among Num, Clf and N is established. Also, to check the data of the discussed languages, the paper reviews the syntactic analysis of the superficial N-intervening construction in Maonan proposed by Her (2017a, 2017b). In section 3, a brief introduction of the 16 putative N-intervening languages is made, including their genealogical relationships and geographical distribution. In section 4, data of the 16 languages collected from previous studies are presented. The paper thoroughly inspects these data and argues that none of them is an N-intervening language. Section 5 concludes the paper.

2. Word Orders of Num, Clf, and N

This paper adopts a mathematical perspective to identify two subcategories of classifiers in Mandarin Chinese. They are sortal classifiers (C) and mensural classifiers (M). The subtle relation among numerals, classifiers, and nouns can be elaborated from this perspective. To do this, it is necessary to first clarify syntactic and semantic distinctions between C and M; thus, in 2.1, we will review the C/M distinction and the multiplicative relation between numerals and classifiers. The mathematical property can be associated with syntactic structures and word orders of numerals and classifiers as it is an inherent property of [Num Clf] and [Clf Num] constituents. Then, 2.2 first introduces U-20A, which predicts linguistically possible word orders of numerals, classifiers, and nouns, and then a synchronization between complex numeral structures (*n-base* structures) and the [Num Clf] constituents. The prediction of U-20A rules out two N-intervening word orders, [Num N Clf] and [Clf N Num]. However, the latter is found in some Asian languages with the numeral 'one'. In 2.3, the paper will briefly introduce these languages, and the analysis of this superficial N-intervening construction based on Maonan proposed by Her (2017a, 2017b) will be reviewed.

2.1. *Numeral Classifiers as Multiplicands*

C and M exhibit different syntactic behaviors due to their semantic differences. The semantic distinction between C and M in (3) represents the different scope of numeral modification. In (3a), the numeral *yi* 'one' denotes the number of boxes, and *shi* 'ten' denotes the number of apples, while in (3b), both numerals denote the number of M, not of apples. In (3c), the double modification leads to an ungrammatical structure. In (3d),

the numeral modification of *yi* 'one' modifies both C and M *bao* 'pack,' thus resulting in a semantically ill-formed sentence.

(3) a. 一 箱 十 顆 蘋果
     yi xiang shi ke pingguo
     one M   ten C   apple
     'one box of ten apples'

   b. 一 箱 十 包 蘋果
     yi xiang shi bao pingguo
     one M   ten M   apple
     'one box of ten packs of apples'

   c. *一 個 十 顆 蘋果
     yi ge shi ke pingguo
     one C   ten C   apple

   d. *一 個 十 包 蘋果
     yi ge shi bao pingguo
     one C   ten M   apple

Examples in (4) show different scopes of adjective modification between NPs with C and M. We can see that it is M to be modified by the adjective *da* 'big' when M occurs between the adjective and N, as in (4a), while the same adjective modifies the noun head when C occurs between them, as in (4b).

(4) a. 一 大 箱 蘋果   ≠   一 箱 大 蘋果
     yi da xiang pingguo   *yi xiang da pingguo*
     one big M   apple   one M   big apple
     'one big box of apples'   'one box of big apples'

   b. 一 大 顆 蘋果   =   一 顆 大 蘋果
     yi da ke pingguo   *yi ke da pingguo*
     one big C   apple   one C   big apple
     'one big apple'   'one big apple'

In addition to the syntactic tests previously mentioned, Her & Hsieh (2010) further point out that C always highlights an inherent feature of nouns, but M adds extra information that is not inherent to nouns. The classifier in (5a) characterizes the round shape of the apple and it is a common and natural state of it; on the contrary, the classifier in (5b) shows that apples are in a bag. As one can put the apples in any other container that is large enough, it does not have to be a bag that holds the apples, i.e., being in the bag is not an inherent feature of the apples, but a piece of additional information. Examples in (6) reveal the semantic redundancy of C by removing classifiers in (5). We can see that

(5a) and (6a) have the same meaning with or without C, but this is not true for M, as in (6b).

(5) a. 一   顆   蘋果
     yi *ke*   *pingguo*
     one C.ROUND apple
     'one apple'

    b. 一   袋   蘋果
     yi *dai*   *pingguo*
     one M.BAG   apple
     'one bag of apples'

(6) a. 一   顆   蘋果   =   一   蘋果
     yi *ke* *pingguo*   *yi* *pingguo*
     one C   apple   one apple
     'an apple'

    b. 一   袋   蘋果   ≠   一   蘋果
     yi *dai* *pingguo*   *yi* *pingguo*
     one M   apple   one apple
     'a bag of apples'   'an apple'

The semantic redundancy of C is associated with the mathematical value of classifiers. Her (2012) proposed a formula that describes a multiplicative relation of [Num Clf] structure and different mathematical values possessed by classifiers, see (7).

(7) Her's (2012) Formula for C/M Distinction
    [Num K N] = [Num $\times$ x N], where K = C *iff x = 1*, otherwise K = M

In this formula, a numeral and a classifier compose a multiplication, where the numeral serves as a multiplier and the classifier as a multiplicand. Furthermore, the mathematical value of C equals 1, while M is not necessarily a value of 1. When the multiplicand is 1, it does not give additional value to the operation, so the product of the numeral and C is still the very same value as the numeral itself. In (8a) and (8b), the quantity of N with C is $3 \times 1 = 3$ and $4 \times 1 = 4$, respectively. Their numbers entirely depend on the numeral. However, the mathematical value of M is variable, so the quantity of N in [Num M N] is decided by both the numeral and M. Because M is a factor that changes the product through the operation, we may or may not know the quantity of N, as in (9a) $(1 \times 2 = 2)$ and (9b) $(2 \times x = \text{unknown})$. This mathematical perspective exactly reflects the linguistic feature of C/M as semantically redundant or substantive.

(8) a. 三   枝   筷子
     san   *zhi*   *kuaizi*

three C chopstick

'three chopsticks'

b. 四　　枝　　筷子

si　　zhi　　kuaizi

four　C　　chopstick

'four chopsticks'

(9) a. 一　　雙　　　筷子

yi　　shuang　　kuaizi

one　M　　　chopstick

'a pair of chopsticks'

b. 兩　　把　　筷子

liang　ba　　kuaizi

two　　M　　chopstick

'two handfuls of chopsticks'

2.2. *Constituency of Numerals and Numeral Classifiers*

There is sufficient support for U-20A, i.e., N does not intervene between Num and Clf, from linguistic, mathematical, formal, and cognitive perspectives. Linguistically, the first part of U-20A implies the constituency of numerals and classifiers because, essentially, a constituent refuses any other elements to intervene in its construction. This is favored by left-branching analyses of syntactic studies, e.g., Bhattacharya (1999, 2001), Croft (1994), Greenberg (1990[1975]), Her (2012), Her & Tsai (2020), Hsieh (2008), etc. As noted by Her & Tsai (2020), a constituent composed of numerals and classifiers does not need further syntactic derivation to obtain the four attested word orders because it naturally rules out unattested orders. Therefore, the constituency of [Num Clf] is much more favorable.

Although, as previously mentioned, it seems that mathematical permutations do not represent linguistic word orders, the mathematical connection between numerals and classifiers does play a role in their formation. It will not be adventurous to attribute the constituency to the underlying mathematics since the rigid operation [*multiplier* $\times$ *multiplicand*] does not allow N to break it (Her 2017a). In addition, a numeral system adopted by a language does represent its word order of the [Num Clf] structure in that language. Comrie's (2013) typological study of complex numerals provides an approach to compare word orders with numeral systems of languages. For example, in Mandarin Chinese, a complex numeral can be divided into multiple operations including multiplication and addition and following specific orientations, as $n \times base + m$, where $m < base$ and usually $n < b,$ or $n \leq b$. To get *liu-shi si* 'sixty-four', we first multiply ten (*base*) by six (*n*), then add four, which multiplies one (*n* = four, *base* = one; *m* = four times one), where four (*m*) is less than ten (the first *base*). In other words, *liu-shi si* 'sixty-

four' is the combination of [[6 × 10] + 4]. This numeral system (or the orientation of the numeral system) is called base-final; therefore, the internal structure of [Num Clf N] is [[[*multiplier* × *multiplicand*] × *multiplicand*] N] (Her & Tsai 2020). Thus, there are also languages with base-initial multiplicative numerals (Her et al. 2024).

It has been found that the orientation of a numeral system and the orientation of classifiers are correlated as a statistical universal (Her, Tang & Li 2019). Such a harmonization was first noted by Greenberg (1978/1990:292) and then restated by Her (2017a, 2017b) as "synchronization between *base*-parameter and Clf-parameter". The orientation of *base* and classifiers in a language should be the same, e.g., a Clf-final language such as Mandarin has a *base*-final numeral system as well, as shown in (10).

(10) Harmonization of base and classifier in Mandarin
三十　　　尾　魚
san-shi　　*wei*　*yu*
three-ten　C　fish
'thirty fish'

The base-Clf harmonization is also true in Clf-initial languages, e.g., in Kilivila, an Austronesian language, the numeral system is *base*-initial, thus the [Clf Num] structure is [*multiplicand* × [*multiplicand* × *multiplier*]], as shown in (11), where *luwa-tolu* denotes (10×3) (Senft 2000: 18-21).

(11) Harmonization of base and classifier in Kilivila
na-luwa-tolu　*yena*
C-10-3　　　fish
'thirty fish'

He (2015) argued that a multiplicative complex numeral in Mandarin is a constituent; therefore, an *n*-initial multiplier and a *base*-final multiplicand combine to form a constituent, and it further combines with a classifier which also functions as a multiplicand, as in (12).

(12) [n base] and [Num Clf] as constituents in the classifier phrase
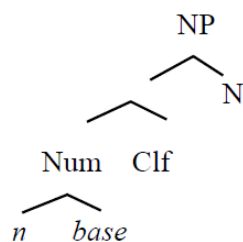
Her & Tsai (2020) likewise demonstrate that the numeral and the classifier form an immediate constituent, thus allowing either a head-initial [Clf Num] or a head-final [Num Clf] order. U-20A is thus accounted for, given that the head-final order is more frequent. The multiplicative relation between numerals and classifiers and the synchronization between *base* and classifiers imply a harmony between cognition and linguistic form.

2.3. *Sixteen Alleged Violations of U-20A and Analysis based on Maonan*

According to the largest database of classifier languages, the World Atlas of Classifier Languages (WACL), the superficial N-intervening construction, [Clf N Num(=1)], has been found in 16 Asian and five African languages. For languages in Asia, as mentioned in Section 1, most are Tai-Kadai languages, but only one is an Austroasiatic language. A summary of their genealogical relationships is presented in (13). There are 14 TK languages categorized as Kam-Tai, and only one TK language is Kadaic, which is Pubiao-Qabiao. Eleven out of 14 Kam-Tai languages are further categorized as Daic-Beic (Bouyei, Dai Zhuang, Guibei Zhuang, Liujiang Zhuang, Nong Zhuang, Nung, Tai-Dam, Yang Zhuang, Yongbei Zhuang, Youjiang Zhuang, and Zuojiang Zhuang), and the other three are Kam-Sui languages (Ai-Cham, Mak, and Maonan).

(13) Genealogical Classification of 16 Putative N-intervening Languages in Asia

		Tai-Kadai			Austroasiatic
	Kam-Tai		Kadaic		Mangic
Daic-Beic	Kam-Sui		Eastern Kra		
Bouyei	Ai-Cham		Pubiao-Qabiao		Mang
Dai Zhuang	Mak (China)				
Guibei Zhuang	Maonan				
Liujiang Zhuang					
Nong Zhuang					
Nung (Vietnam)					
Tai Dam					
Yang Zhuang					
Yongbei Zhuang					
Yuojiang Zhuang					
Zuojiang Zhuang					
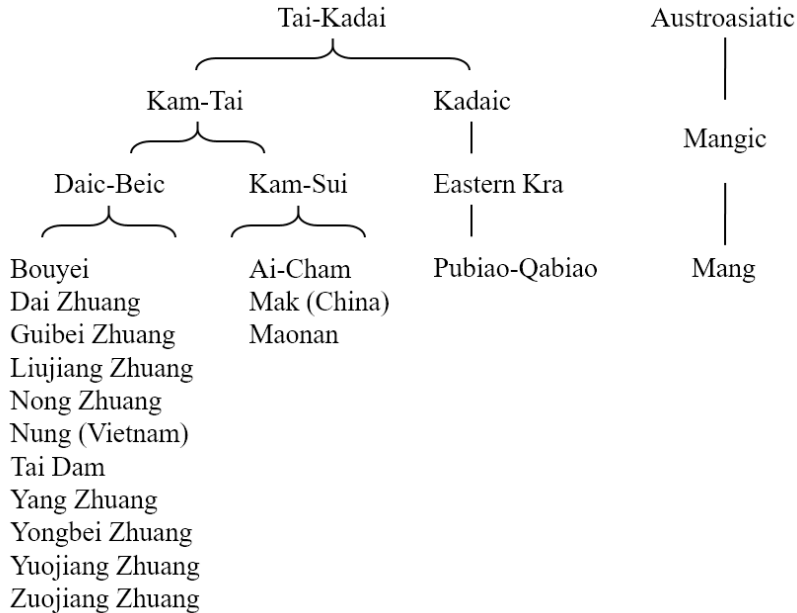
The overall distribution of the putative N-intervening languages is shown in (14), which marks the location of all the alleged violations and the other TK languages.

(14) Overall Distribution of the Alleged Violations
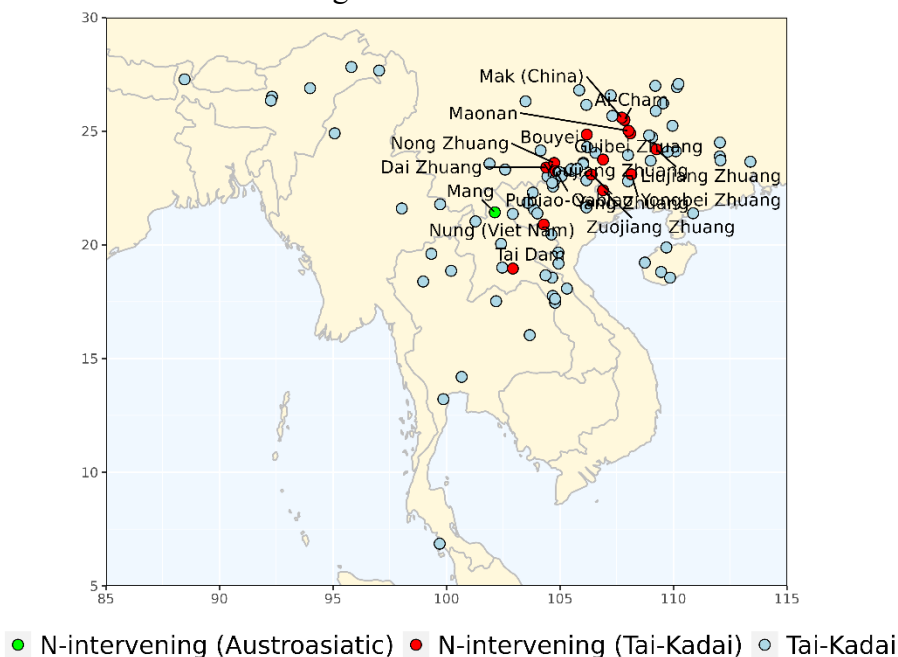
The map in (15) shows the more specific location of the 16 languages and their genealogical classifications. These languages are clearly concentrated in an area that connects the south of China and the northeast of Mainland Southeast Asia. More specifically, all of them are mainly located around the boundaries of China, Vietnam, and Laos, instead of being scattered in a much wider range with the other TK and AA languages.

(15) Distribution of the Alleged Violations with Genealogical Classification

The fact that the N-intervening languages involving the numeral for 'one' are areally grouped indicates they share a common areal feature for this behavior, which we will explore in section 4.

Previous studies suggested that the syntactic category of $dɛu^{231}$ 'one' in the discussed construction [Clf N *one*] in Maonan, e.g., $ai^1 zən^1 dɛu^{231}$ [C person one] 'one person', was not numeral. Before we examine this putative violation of U-20A, let's first illustrate the canonical classifier construction and its multiplicative numerals in Maonan. As shown in (16a), numerals for 'two', 'three', or any other number, cannot appear in [Clf N Num], and the normal order is [Num Clf N], as in (16b). Likewise, in a complex numeral formed with a simple numeral and a numeral base, the order is [n base], as in (16c), not [base n], as in (16d). In short, the normal orders are base-final and Clf-final, if $dɛu^{231}$ is not involved.

(16) a.   *ai^1 $zən^1$ $ja^{42}/saːm^{42}$
       CLF   person   two/three

     b. $ja^{42}/saːm^{42}$ ai^1 $zən^1$
       two/three   CLF   person
       '2/3 people'

     c. $ja^{42}/saːm^{42}$ $pɛk^{55}/tʰjen^{42}$
       two/three   hundred/thousand
       '200/300; 2,000/3,000'

     d.   *$pɛk^{55}/tʰjen^{42}$ $ja^{42}/saːm^{42}$
       hundred/thousand   two/three

The number 'one' can be expressed by three different words, $dɛu^{231}$, $tɔ^{231}$, and jit^{55}; only $dɛu^{231}$ is native, and the other two are loan words. As for the putative numeral $dɛu^{231}$ 'one' in the [Clf N *one*] construction, a summary of its behavior is given in Her (2017a, 2017b), shown in (17).

(17) Analysis of the superficial N-intervening construction in Maonan
     a.   N-intervening is restricted to the native word for 'one', i.e., $dɛu^{231}$.
     b.   *Base*-initial numerals are also restricted to $dɛu^{231}$ as n in [base n].
     c.   The omission of the numeral 'one' in [~~Num~~ Clf N] is obligatory.
     d.   Adjectives follow a nominal head and precede the native $dɛu^{231}$ 'one'.
     e.   The native $dɛu^{231}$ 'one' cannot co-occur with a determiner.

Example (18a) shows that only $dɛu^{231}$ is compatible with the N-intervening construction. Yet, in the canonical [Num Clf N] construction, Num cannot be any of the three words for 'one', as in (18b). Note that the occurrence of the numeral 'one' in other classifier languages, e.g., Cantonese and Mandarin, is often optional (Cheng and Sybesma 2005); it is prohibited in Maonan. Finally, while $dɛu^{231}$ is optional in a [base n] numeral (18c), it is likewise banned in [n base], as in (18d).

(18) a. ai^1 $zən^1$ ($dɛu^{231}$/*$tɔ^{231}$/*jit^{55})
      CLF   person   one
      '1 person'

    b. *$dɛu^{231}$/*$tɔ^{231}$/*jit^{55} ai^1 $zən^1$
      one   C person

    c. $pɛk^{55}$/t^hjen^{42} ($dɛu^{231}$)
      hundred/thousand   one
      '100/1,000'

    d. *$dɛu^{231}$ $pɛk^{55}$/t^hjen^{42}
      one   hundred/thousand

Jiang (2007) thus rejected $dɛu^{231}$ as a numeral and argued that is an adjective. Her (2017a, 2017b) proposed instead that $dɛu^{231}$ is a singular indefinite determiner that already underwent grammaticalization from a genuine numeral 'one.' Furthermore, he submitted that all native words of 'one' in the superficial N-intervening construction in the other Asian languages is in the same situation as in Maonan. There is evidence to favor $dɛu^{231}$ as a determiner in [Clf N $dɛu^{231}$], not an adjective.

    Adjectives occur after N, as in (19a), but $dɛu^{231}$does not occur in the same position as adjectives. It follows adjectives instead, as in (19b). In fact, definite demonstratives ka^2 'that' and $na:i$ 'this' also occur after adjectives, as in (20a), and it is ungrammatical for the native word for 'one' and demonstratives to co-occur, as in (20b) and (20c).

(19) a. ai^1 $zən^1$ $voŋ^1$ $dɛu^{231}$
      CLF   person   tall   one
      'a tall person'

    b. *ai^1 $zən^1$ $dɛu^{231}$ $voŋ^1$
      CLF   person   one   tall

(20) a. ai^1 $zən^1$ $voŋ^1$ $na:i^2$/ka^2
      CLF   person   tall   DEM.PROX/DEM.DIST
      'this/that tall person'

    b. *ai^1 $zən^1$ $dɛu^{231}$ $na:i^2$/ka^2
      CLF   person   one   DEM.PROX/DEM.DIST

    c. *ai^1 $zən^1$ $na:i^2$/ka^2 $dɛu^{231}$
      CLF   person   DEM.PROX/DEM.DIST   one

These features show that the native $dɛu^{231}$'one' has the same syntactic distribution as demonstratives instead of numerals or adjectives. Consequently, the NP may consist of a silent 'one', a classifier, a noun head, and an indefinite determiner, i.e., [(Num) Clf N D]. Therefore, [Clf N $dɛu^{231}$]is not an N-intervening violation of U-20A at all. We shall now further examine the relevant data of the16 Asian languages in (13) by applying Her's (2017a, 2017b) analysis of the superficial N-intervening in Maonan.

3. Reexamining the Putative N-intervening Construction

Data presented in this section includes 16 putative N-intervening languages and other TK languages with a putative numeral 'one' in the final position of an NP. To verify Her's (2017a, 2017b) analysis, the data of 16 violations show (1) examples of the marked order, [Clf N 1] and the unmarked order, [Num Clf N], (2) relative positions of N and nominal modifiers, especially adjectives, demonstratives, and numerals, and (3) examples of complex numerals. To demonstrate that the grammaticalization of the native word for 'one' is not a unique phenomenon in the putative N-intervening languages, the data of general TK languages show examples of two constructions of NPs with 'one': singular NPs with general word orders with/without the numeral 'one' (usually, they are [N (1) Clf] and [(1) Clf N]), and the restricted order with the native word for 'one', which functions as a determiner and occurs in the final position of the phrase ([Clf N 1] and [N Clf 1]).

3.1. *Ai-Cham*

Ai-Cham is closely related to the Mak language. Yang (2000) in fact considers Mak language as having two dialects, Ai-Cham and Mak. Examples here are all collected from Ai-Cham, not Mak. The word order of NPs in Ai-Cham is [Num Clf N A Pro Loc Dem] except for the native 'one', *deu¹*, which occurs at the final position in NPs and does not co-occur with demonstratives. In addition, *it⁷* 'one' is a loanword from Chinese and it never occurs in the superficial N-intervening construction (Yang 2000:96, Yang & Hao 2017). Examples from (21) to (23) show [Num Clf N], [Clf N A D], and [Clf N 1], respectively, and (24) shows that the loan *it⁷* 'one' cannot replace the native *deu¹* 'one'.

(21) *sa:m¹*   *nuŋ¹*   *əu³*
     three   CLF   rice
     'three tubes of rice'   (Yang 2000:92)

(22) *to²*   *məu⁵*   *təi³*   *na:i⁶*   *ju³*   *la:u⁴*   *han⁵*
     CLF   pig   little   DEM.PROX   grow   big   very
     'This little pig grows very quickly.'   (Yang 2000:134)

(23) *pa:k⁷*   *mit⁸*   *deu¹*
     CLF   knife   one
     'a knife'   (Yang 2000:92)

(24) **pa:k⁷*   *mit⁸*   *it⁷*
     CLF   knife   one

'One' can be omitted when the NP has a singular reading, thus the [Clf N] construction, as (25) and (26).

(25) *həi⁵!*   *phi¹ naŋ¹*   *ŋ¹*   *naŋ¹ to² dja:k⁹*   *təeŋ⁵*
      EXCLAM tip nose   2S   COP CLF locust   still
      'Hey! There is still a grasshopper on your nose tip!'   (Yang 2000:120)

(26) *to²*   *m̥a¹ tam³ to²*   *meu⁴*   *ja¹ ŋam¹*
      CLF dog bite CLF cat   two CLF
      'A dog bites a cat twice.'   (Yang 2000:95)

Besides the unique distribution of *deu¹* in NPs, its behavior as *n* in the mathematical structure of complex numerals is also similar to the restriction on the base order of complex numerals in Maonan. The native *deu¹* occurs in a different position from the borrowed form *it⁷* (Yang 2000:85-87). For example, numbers that are larger than ten with *deu¹* as their *n* must be *base*-initial, see (27). Note that in this example *zəp⁸ it⁷* means eleven, not ten. In addition, when a complex numeral uses *ja¹* (native) / *ŋəi⁶* (borrowed) 'two', or a larger number (*three* and above) as *n*, it must be *base*-final; *ja¹* usually occurs with a larger *base* such as hundred, thousand, and ten-thousand, see (28).

(27) *va:n¹*   *deu¹*   *ɕin¹*   *deu¹*   *pek⁷*   *deu¹ zəp⁸ *deu¹/it⁷*
      ten-thousand one   thousand one   hundred one ten one/one
      '11,111'   (Yang 2000:86)

(28) *ja¹/ŋəi⁶*   *va:n¹*   *ja¹/ŋəi⁶*   *ɕin¹*   *ja¹/ŋəi⁶*   *pek⁷*
      two/two   ten-thousand two/two   thousand two/two   hundred
      **ja¹/ŋəi⁶*   *zəp⁸*   **ja¹/ŋəi⁶*
      two/two   ten   two/two
      '22,222'   (Yang 2000:86)

3.2. *Bouyei*

Liang (1986) notes that the word order of NPs is [Num Clf N Mod Pro Dem/1]. General numerals occur in [Num Clf N] construction, as in (29) and (30). Modifiers such as adjectives occur after the noun head, and demonstratives occur in the final position, as in (31) and (32). Note that *mu¹* 'pig' in (32) is a post-nominal modifier.

(29) *soŋ¹*   *dak⁷*   *zin¹*
      two   CLF   rock
      'two pieces of rock'   (*Literary Data Collection* 1983:104)[1]

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[1] *Literary Data Collection* refers to this reference: The Fifth Research Room, the Research Institute of Minority Languages, Minzu College of China [中央民族学院少数民族语言研究所

(30) *ħa³*   *ɕa:ŋ²*   *no⁶*
    five   CLF   meat
    'five taels of meat'   (*Literary Data Collection* 1983:83)

(31) *soŋ¹*   *luk⁸koi²*   *pu⁴kwa:ŋ¹*   *tɛ⁵*
    two   CLF-son-in-law   rich-man   DEM.DIST
    'two rich sons-in-law'   (*Literary Data Collection* 1983:88)

(32) *ɕip⁸*   *ka:i⁵*   *no⁶*   *mu¹*   *pi²*
    ten   CLF   meat   pig   fatty
    'ten pieces of fatty pork'   (*Literary Data Collection* 1983:87)

'One' in Bouyei has a native form (*diau¹* / *deu¹*) and a borrowed form from Chinese (*it⁷*/*ʔit⁷*) (Wu 1984). Examples (33) and (34) show that the native form is in the N-intervening construction. The borrowed form only occurs with a prefix '-*ta²*' as an ordinal numeral, as in (35) but never as a simple cardinal numeral in either the N-final or the superficial N-intervening construction (Boonsawasd 2012:115, Yu 1983:27).

(33) *dɛn¹*   *ka:m³*   *deu¹*
    CLF   cave   one
    'a cave'   (*Literary Data Collection* 1983:75)

(34) *ka:ŋ¹*   *ŋan²*   *deu¹*
    CLF   silver coin   one
    'a vat of silver coins'   (*Literary Data Collection* 1983:95)

(35) *pi¹*   *ta²ʔit⁷*
    year   first
    'the first year'   (*Literary Data Collection* 1983:87)

Examples (36) and (37) show examples of adjectives in the superficial N-intervening construction. Items (38) and (39) show examples of demonstratives in singular NPs, either being alone or occurring with an adjective. Note that demonstratives and *deu¹* cannot co-occur so their syntactic distribution is complementary (Cao 1994, Liang 1986, Zhou & Sun 2014).

(36) *dɛn¹*   *dɔŋ⁴*   *la:u⁴*   *deu¹*
    CLF   dustpan   big   one
    'a big dustpan'   (*Literary Data Collection* 1983:75)

(37) *tɛɔŋ⁵*   *puə⁶*   *va¹/fon⁴*   *deu¹*
    CLF   cloth   patterned/black   one
    'a patterned/black cloth'   (*Literary Data Collection* 1983:100-1)

(38) *dak⁷*   *zin¹*   *tɛ⁵*

第五研究室]. (1983). 壯侗語族語言文學資料集 [Literary Data Collection of Tai-Kadai Languages], (1983). Chengdu: Sichuan Nationalities Publishing House.

      CLF   rock   DEM.DIST

      'that piece of rock'   (*Literary Data Collection* 1983:91)

(39) *(luk⁸)*   *koi²*   *pu⁴ɦo³*   *tɛ⁵*

      CLF   son-in-law   poor man   DEM.DIST

      'that poor son-in-law'   (*Literary Data Collection* 1983:88)

The numeral 'one' can be optionally omitted, hence the [Clf N] construction (Wu 1984, Yu 1983:152), see (40).

(40) *tɕoŋ⁵*   *pu⁶ ,*   *tɕoŋ⁵*   *vin³,*

      CLF   cloth   CLF   skirt

      suan⁵   *ma¹la³* *sat⁷*   *ɕip³ man²*   *ɕen²*   *tau⁵ deu¹*

      count   go-down seven   ten dollar   money   CLF one

      'a cloth and a skirt as a set (cost) seventy dollars'   (Wu 1984:191)

Moreover, Bouyei complex numerals have a similar structure to Maonan, as *diau¹* as *n* only occurs in *base*-initial numbers (including hundreds, thousands, ten-thousand, and larger), and only *diau¹*, not *it⁷*, occurs in *base*-initial numerals; in contrast, other numerals only occur in *base*-final numerals (Boonsawasd 2012:114-115, Wang 1987, Wu 1984, Yu 1983:26-27). See (41) and (42) for examples.

(41) *paː²⁷/ziaŋ¹/vaːn⁶*   *diau¹/*it⁷*

      hundred/thousand/ten-thousand   one/one

      '100/1,000/10,000'   (Yu 1983:27)

(42) **diau¹/suaŋ¹*   *paː²⁷/ziaŋ¹/vaːn⁶*

      one/two   hundred/thousand/ten-thousand

      '200/2,000/20,000'   (Yu 1983:27)

When *it⁷* occurs after *tsip⁸* 'ten', *paː²⁷* 'hundred', *ziaŋ¹* 'thousand', and *vaːn⁶* 'ten-thousand', it is in the next digit to express a smaller number instead of *n* of those larger *bases*, see (43). When *diau¹* and *it⁷* occur as *n* in a complex numeral respectively, they are actually on different levels in the structure, i.e., they belong to different constituents. Therefore, quantities denoted by numerals in (41) and (43) are totally different although their linear orders are the same.

(43) *tsip⁸/paː²⁷/ziaŋ¹/vaːn⁶*   **diau¹/it⁷*

      ten/hundred/thousand/ten-thousand   one

      '11/110/1,100/11,000'   (Yu 1983:27)

3.3. *Mak*

According to Li (1943/2005) and Ni (1988), numerals occur in the [Num Clf N] construction, as shown in (44) and (45). However, *ʔdeːu¹(ʔdeu¹)* 'one' follows the noun head, thus forming the superficial N-intervening construction, see (46) and (47). Yang & Hao (2017) noted that this word for 'one' does not occur with demonstratives. The other form, *ʔit⁵(ʔit⁷ˢ)*, is used in complex numerals that are larger than *ten*, see (48). It could be a loanword from Chinese due to its similarity to the borrowed numeral *one* in other Tai-Kadai languages.

(44) *ra¹*   *ʔai³*   *ʔɖin¹*
two   CLF   chicken
'three chickens'   (Ni 1988:96)

(45) *saːm¹*   *wun³*   *naːn⁴*
three   CLF   meat
'three bowls of meat'   (Ni 1988:96)

(46) *tə²*   *ma⁴*   *ʔdeu¹*
CLF   horse   one
'a horse'   (Ni 1988:99)

(47) *k'ui¹*   *ŋan²*   *ʔdeːu¹*
CLF   silver   one
'a case of silver'   (Li 1943/2005:22)

(48) *ŋəi⁶*   *rip⁸ˢ*   *ʔit⁷ˢ*
two   ten   one
'twenty-one'   (Ni 1988:99)

Adjectives and demonstratives follow the noun, [Clf N A D], as in (49). NPs with a singular meaning but without an overt 'one' are also found, as (50) and (51).

(49) *ha³*   *tə²*   *məu⁵*   *laːu⁴*   *si⁵*   *kwən⁵*
kill   CLF   pig   big   DEM.PROX   first
'kill that big pig first'   (Ni 1988:98)

(50) *t'au⁵*   *dun⁵k'un⁶*   *hai⁶*   *k'ui⁶*   *taŋ⁶*   *ʔdom⁶,*
till   halfway   open   case   to   see
me² *sə*   *k'ui⁶*   *ŋan²*
NEG be   CLF   silver
'Halfway there, (they) open the case and see, not a case of silver.' (Li 1943/2005:22)

(51) *tau⁶*   *saːp⁴*   *ŋan²*   *.ʐo⁴*   *tai²*   *.paːi⁶*
3SG   cut   silver   PRT   bring   to
.tə   *ma⁴*   *tau⁶*   *siːn⁶*
CLF   horse   3SG   eat
'She cuts silver coins (and) brings them for her horse to eat.'   (Li 1943/2005:23)

Note that *deu¹* in a complex numeral occurs after the base for 'hundred', 'thousand', and 'ten-thousand', as in (52). However, though *ʔit⁷ˢ* also appears after a numeral base, as in (53), crucially, the meaning is not the same, as the relation between the base and *ʔit⁷ˢ* is not multiplication; it is addition, as indicated by the translations. Incidentally, the native *ra¹* 'two' only occurs as a simple numeral and never in a complex numeral, while the borrowed *ŋɕi⁶* counterpart does occur in a base-final [n base] complex numeral (Ni 1988:99).

(52) *pek⁷ᴸ/sin¹/va:n⁶*   *deu¹*
     hundred/thousand/ten.thousand   one
     '100/1,000/10,000'   (Ni 1988:99)

(53) *pek⁷ᴸ/sin¹/va:n⁶*   *ʔit⁷ˢ*
     hundred/thousand/ten.thousand   one
     '110/1,100/11,000'   (Ni 1988:99)

3.4. *Maonan*

The numeral 'one' in Moanan has three words: they are *tɔ²³¹* (*tɔ²*), *jit⁵⁵* (*ʔjit⁷*), and *dɛu²³¹* (*dɛu²*); *dɛu²³¹* is native but *jit⁵⁵* is a loanword from Chinese. General numerals occur in the [Num Clf N] construction, while the native 'one', *dɛu²³¹*, occurs in [Clf N 1], see (54) and (55).

(54) *ja⁴²/sa:m⁴²*   *ai¹*   *zən¹*
     two/three   CLF   person
     'two/three persons'   (Her 2017a:272)

(55) *ai¹*   *zən¹*   *dɛu²³¹/*tɔ²³¹/*jit⁵⁵*
     CLF   person   one/one/one
     'a person'   (Her 2017a:272)

Adjectives and demonstratives, *na:i* 'this' and *ka²* 'that', follow the noun head. When *dɛu²³¹* or demonstratives occur with adjectives, they follow the adjective, see (56) and (57). Furthermore, *dɛu²³¹* and demonstratives are in complementary distribution, see (58) and (59).

(56) *ai¹*   *zən¹*   *voŋ¹*   *na:i²/ka²*
     CLF   person   tall   DEM.PROX/DEM.DIST
     'this/that tall person'   (Her 2017a:274)

(57) *ai¹*   *zən¹*   *voŋ¹*   *dɛu²³¹*
     CLF   person   tall   one
     'a tall person'   (Her 2017a:274)

(58) **ai¹ zən¹*   *dɛu²³¹*   *na:i²/ka²*

CLF person one DEM.PROX/DEM.DIST (Her 2017a:274)

(59) *ai¹ zən¹ naːi²/ka² dɛu²³¹

CLF person DEM.PROX/DEM.DIST one (Her 2017a:274)

The *base*-order of complex numerals varies depending on which form of *n* is used. *dɛu²* (*dɛu²³¹*) is only placed after *pɛk⁷* 'hundred', *tshjen¹* 'thousand', and *vaːn⁶* 'ten-thousand' to denote '100', '1,000' and '10,000', see (60). However, when the borrowed *ʔjit⁷* (*jit⁵⁵*) 'one' or *ŋi⁶* 'two' is used with these *bases*, it is in a smaller digit to denote '10/20', '100/200', and '1,000/2,000', see (61). Note that *dɛu²* cannot be used with *zəp⁸* 'ten', but *ʔjit⁷* is allowed to occur with it. The native form of 'two', *ja¹* (*ja⁴²*) and other numerals only occur in the *base*-final structure, see (62) (Liang 1980:45-47).

(60) *pɛk⁷/tshjen¹/vaːn⁶* *dɛu²*
hundred/thousand/ten.thousands one
'100/1,000/10,000' (Liang 1980:47)

(61) *pɛk⁷/tshjen¹/vaːn⁶* *ʔjit⁷/ŋi⁶*
hundred/thousand/ten.thousands one/two
'110/1,100/11,000/120/1,200/12,000' (Liang 1980:47)

(62) *ja¹/saːm¹* *pɛk⁷/tshjen¹/vaːn⁶*
two/three hundred/thousand/ten.thousand
'200/2,000/20,000/300/3,000/30,000' (Liang 1980:45, 47)

3.5. *Nung*

The term 'Nung' is used in this paper for the Daic-Beic language referred to as 'Nùng proper' in Saul & Wilson (1980) and 'Tay-Nung' in Đoàn (1996). The word order in an NP in Nung is [Num Clf N Mod Poss Dem] except for *nưhng* and *tọc* 'one'. Modifiers can be adjectives, nouns, ordinal numerals, and quantifiers (Saul & Wilson 1980:14, 21-22, 25). Thus, an NP with a numeral and a demonstrative is the [Num Clf N D] construction, as in examples (63) and (64).

(63) *slóng* *óhng* *đéhc* *tẽ́*
two CLF child that
'those two children' (Saul & Wilson 1980:27)

(64) *slóng* *áhn* *slèng* *tẽ́*
two CLF province that
'those two provinces' (Saul & Wilson 1980:30)

'One' in Nung has three words, *nɯhng, tọc,* and *éht*; the first two are native, and the last one is a loanword from Chinese.[2] The borrowed *éht* never occurs in the N-intervening construction. *nɯhng* 'one' follows the noun head and adjectives and occupies the position of possessive or demonstratives, see (65) and (66). Simpson (2005) clearly notes that *nɯhng* is used as an indefinite determiner. And *tọc* can follow either classifiers in [Clf *tọc*] or follow N in [N *tọc*], but not in [Clf N 1]; see (67) and (68). Examples (67) and (68) indicate that *tọc* could be an adjective with the meaning of 'single' (instead of a numeral) since adjectives can modify classifiers which can be used as N. (69) shows that an NP can still be grammatical without *nɯhng* and *tọc* when the quantity is '1'.

(65) *tú   má   nɯhng*
    CLF   dog   one
    'a dog'   (Saul & Wilson 1980:21)

(66) *tú   vai   đọhng   nɯhng*
    CLF   buffalo   white   one
    'a white buffalo'   (Saul & Wilson 1980:14)

(67) *mɯhn   hểht   bạt   tọc*
    3SG   do   time   one
    'He did it one time.'   (Saul & Wilson 1980:22)

(68) *mɯhn   hēhng   áu   áhn   tọc*
    3SG   just   take   CLF   one
    'He just took one.'   (Saul & Wilson 1980:22)

(69) *mu'hn   khàu   hehn   áhn bộ   pây dụ*
    3SG   enter   side   CLF mine   go   stay
    'He entered the side of the mine and stayed.'   (Saul & Wilson 1980:28)

Examples of complex numerals in Nung show a similarity to other putative N-intervening languages. When *éht* 'one' or *nhị* 'two' appear after a *base*, they cannot be in the same constituent with that *base*, but fill in a smaller digit, see (70). The [*n base*] structure is the only way for them to construct multiplication with a *base*, see (71).

(70) *slíhp   éht/nhị*
    ten   one/two
    '11/12'   (Saul & Wilson 1980:22)

(71) *éht/nhị   slíhp*
    one/two   ten
    '10/20'   (Saul & Wilson 1980:22)

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[2] Saul & Wilson (1980:21) note that *nɯhng* 'one' has three variants, *nổng, nủng,* and *nɯhng*. Wei et al. (2019:466) note that Nung also has *ʔdeu¹* 'one', but this is not mentioned in Saul & Wilson (1980) or Simpson (2005).

3.6. *Pubiao-Qabiao*

Chen (1984) notes that in Pubiao-Qabiao, numerals and classifiers precede N, while adjectives, demonstratives, and *tɕa³³* 'one' follow it. When numerals and classifiers occur with the noun head, the word order is [Num Clf N], see (72) and (73).

(72) *vai³³*   *ʔan⁵¹*   *ɕe⁵¹*   *pən²¹³*   *ɕə⁵¹*
     younger brother   have   two   CLF   book
     'younger brother has two books.'   (Chen 1984:69)

(73) *tau⁵¹*   *mai⁴⁵*   *ʐuŋ³³*
     three   CLF   river
     'three rivers'   (Chen 1984:66)

In this language, 'one' has only one word, i.e., *tɕa³³* (*tɕa⁴⁴*/*tɕia³³*/*cja³*) (Chen 1984, Liang, Zhang & Li 2007:202, Wei, Yan & Li 2019:466). It could not be a loanword from Chinese because it is similar to a native word. *tɕiã³³* 'one', in another TK language called Laichi, while it is dissimilar to the common borrowed form, *ʔit⁷* 'one', in TK languages (Liang 1989). When *tɕa³³* and a classifier occur, the superficial N-intervening [Clf N 1] is obtained, see (74). An NP without *tɕa³³* can still denote the quantity '1', see (75) (Chen 1984, Liang et al. 2007:36). When adjectives and demonstratives occur with a classifier and N, the word order is [Clf N A D], see (76) and (77). Demonstratives always occur in the final position in NPs (Li 2006:274).

(74) *liŋ⁵¹*   *tai⁵¹*   *tɕa³³*
     CLF   tree   one
     'a tree'   (Chen, 1984, p. 75)

(75) *ŋ̥'uak³³*   *tai⁵¹*   *ʔan⁵¹*   *ba³³*   *ŋuk⁴⁵*
     on   tree   have   CLF   bird
     'There is a bird on the tree.'   (Chen 1984:70)

(76) *mi³³*   *məi³³*   *liŋ³³*   *kieu⁵¹*   *nai⁴⁵*
     2s   take   CLF   long   DEM.PROX
     'You take this long one.'   (Chen 1984:70)

(77) *liak⁴⁵*   *ta³³diau²²*   *nai⁴⁵*
     CLF   person   DEM.PROX
     'This person'   (Chen 1984:74)

According to Chen (1984) and Zhang's (2004) description of the construction of complex numerals, the multiplicative complex numerals must be [*n base*]. When numerals occur after a *base*, the relation between them is addition, not multiplication.

3.7. Tai-Dam

Edwards (2011:20) specifically notes that the word order of NPs in Tai Dam is [Qnt Clf N Mod Poss Dem Rel]. Here, quantifiers also include Num (although some quantifiers, such as *many*, can appear after the noun head). The unmarked order of numerals, classifiers, and nouns is [Num Clf N]. However, it is noted that either *niŋ⁴⁴* 'one' or *diəw²²* 'only one' occurs after the noun head, and they could be determiners instead of numerals, see (78) and (79). 'One' can be omitted when the noun head is singular, see (80).

(78) *mɨ³¹ niŋ⁵⁵ ʔaːj²¹* *ʔem⁵⁵* *man⁵⁵* *bɔʔ²²*
     day one father   mother   3SG   instruct
     paj²² liəŋ³¹ *pet²²* *nɔj³¹* *kɛm⁵⁵* *xaŋ²¹* *nɔŋ²²* *niŋ⁵⁵*
     go raise   duck   small   near   CLF   lake   one
     'One day, her parents told her to go raise some small ducks near the lake.'
                                                              (Edwards 2011:198)

(79) *laːŋ⁵⁵* *tup²²* *nɔj³¹* *niŋ⁴⁴* *muŋ⁵⁵* *bəw²²* *kuəj²¹*
     CLF   shelter   small   one   roof   leaf   banana
     tʰoj²² *bəw²²* *tɔŋ²²* *naŋ²¹* *paː⁴⁵* *nan³¹* *tʰoj²²*
     only   leaf   big_leaf   on/at   forest   that   only
     '(It is) just a shelter made from banana leaves and other big leaves from the forest!'
                                                              (Edwards 2011:186)

(80) *man⁵⁵* *tɕaŋ⁴⁵* *to⁵⁵* *səw⁴⁵* *to²² mɛw⁵⁵* *kɛŋ⁴ ⁵* *to²² maː²²*
     3.SG   then   tell   to   CLF cat   and   CLF dog
     'Then she told the cat and the dog, ……'   (Edward 2011:188)

niŋ⁴⁴ and *diəw²²* could occupy the same position as demonstratives *ni³¹* 'this/these' and *nan³¹* 'that/those' since they also occur after adjectives, see (81).

(81) *tɕaŋ⁴⁵* *məj⁵⁵* *tʰaw²¹* *ni³¹* *mɨə⁵⁵* *naŋ²²*
     then   invite   old   this   go   sit
     naŋ²¹ *kaːŋ²²* *laːŋ⁵⁵* *hɨən⁵⁵* *luəŋ²²* *saw²²* *nan³¹*
     on/at   middle   CLF   house   big   3.POSS   that
     'So (they) invited this old man to go and sit in the middle of that big house of theirs'
                                                              (Edwards 2011:205)

3.8. Zhuang Languages

This section presents eight Zhuang languages mainly spoken in Guangxi Province and Yunnan Province, China, including Dai Zhuang, Guibei Zhuang, Liujiang Zhuang, Nong Zhuang, Yang Zhuang, Yongbei Zhuang, Youjiang Zhuang, Zuojiang Zhuang. Liang (1986) discusses various word orders of NPs in Tai-Kadai languages. He notes that,

Bouyei, Kam, Sui, Mulam, Maonan, and Zhuang languages have a similar word order, i.e., [Num Clf N Mod Pro Dem/1]. Modifiers include adjectives, verbs, nouns, and relative clauses. It is mentioned that 'one' in these languages occurs in the same position as demonstratives. In addition, in Bouyei, Maonan, Thai, Zhuang, and some Tai languages, 'one' and demonstratives do not cooccur; therefore, they are in complementary distribution (Liang 1986, Qin 2013, Zhang & Qin 1993:48, Yang & Hao 2017). While Zheng (1996:255) and Huang (2010:26) mention that *neːu²* 'one' in Jingxi Zhuang can occur with demonstratives, other researchers (Liang 1986, Qin 2013, Zhang & Qin 1993:48, Yang & Hao 2017) assert that in Zhuang languages, the native word for 'one' cannot occur with a demonstrative.

In Zhuang languages, 'one' has four native words, *ʔdeːu¹*, *neːu²*, *nəŋ³³*, and *he²²*, and one loanword from Chinese, *ʔit⁷* (Huang 2010, Li 1993, Liang 1986, Zhang et al. 1999:384-385, Zheng 1996, 2013). Examples from Zhuang languages are listed below. The canonical order of NPs with a numeral and a classifier is [Num Clf N], as listed from (82) to (87). The [Clf N] construction can indicate quantity 'one' by itself, see (88).

(82) *θaːm¹* *tu²* *mu¹*
     three CLF pig
     'three pigs'   (Guibei Zhuang - Donglang; Luo, Huang & Qin 2014:43)

(83) *saːm¹* *ko¹* *fai⁴*
     three CLF tree
     'three trees'   (Liujiang Zhuang; Qin 2013)

(84) *haj* *aen* *rwnz*
     five CLF house
     'five houses'   (Nong Zhuang; Johnson 2016)

(85) *łaːm¹* *tu¹* *kai⁵*
     three CLF chicken
     'three chickens'   (Yang Zhuang - Jingxi; Huang 2010:26)

(86) *łan²¹³* *ken³⁵* *hou⁴⁴ʨi²⁴*
     three CLF corn
     'three corns'   (Youjiang Zhuang - Tianyang; Huang 2015)

(87) *tɕit⁵⁵* *kən³³* *lau²⁴*
     seven CLF alcohol
     'seven catties of alcohol'   (Zuojiang Zhuang - Longzhou; Li 1993:128)

(88) *mi²* *pou⁴* *vun²* *tau³* *ɣa¹* *muŋ²*
     copular CLF person come find you
     'A person came to find you.'   (Liang 1986:15)

When adjectives and demonstratives occur, they follow the noun head, as from (89) to (91). Demonstratives and the native word for 'one' follow adjectives, as from (90) to (97). Therefore, the word order could be either [Num Clf N (A) D] or [Clf N (A) D/1].

(89) *ła:m³³*   *me¹¹*   *luk²¹*   *ła:u³³*
     three   CLF   son   female
     'three daughters'   (Zuojiang Zhuang - Longzhou; Li 1993:49)

(90) *ło:ŋ³³*   *kən³¹*   *luk²¹ dik⁵⁵*   *nai²⁴*
     two   CLF   child   DEM.PROX
     'These two children'   (Zuojiang Zhuang - Longzhou; Li 1993:56)

(91) *tu³³*   *pia³³*   *de:ŋ³³*   *nai²⁴*
     CLF   fish   red   DEM.PROX
     'that (this) red fish'   (Zuojiang Zhuang - Longzhou; Li 1993:43)

(92) *tu²*   *lok⁸*   *ni⁴/ʔde:u¹*
     CLF   bird   DEM.PROX/one
     'this bird/a bird'   (Guibei Zhuang - Donglang; Luo et al. 2014:40)

(93) *fa:k⁸*   *it⁸*   *de:u¹*
     CLF   knife   one
     'a knife'   (Liujiang Zhuang; Qin 2013)

(94) *wu²*   *kja⁴*   *ne:u²*
     CLF   tea   one
     'a cup of tea'   (Yang Zhuang - Jingxi; Huang 2010:107)

(95) *ɕek⁷*   *ɕai¹*   *tən⁴*
     CLF   book   DEM.DIST
     'that book'   (Yang Zhuang - Jingxi; Huang 2010:107)

(96) *tua³¹tɕa²¹³*   *he²²*
     CLF   fish   one
     'a fish'   (Youjiang Zhuang - Tianyang; Huang 2015)

(97) *tu³³*   *pia³³naiʔ³¹*   *de:ŋ³³*   *nəŋ³³*
     CLF   carp   red   one
     'a red carp'   (Zuojiang Zhuang - Longzhou; Li 1993:40)

Note that the native numeral *one* in Longzhou Zhuang has three variants: *nəŋ³³*, *ŋ³³* and *n³³*, the latter two due to sound reduction in fast speech (Li 1993:19). There are two ways, *base*-initial and *base*-final, to express a quantity such as '100', '1,000', and '10,000', the same as in other languages mentioned earlier. The native word 'one' only follows *pa:k⁹* 'hundred' *ɕiən¹* 'thousand', or *fa:n⁶* 'ten thousand'; in contrast, *ʔit⁷* 'one' only precedes them, see (98) and (99). If *ʔit⁷* occurs after them, the mathematical relation between two morphemes changes, see (100) (Zhang et al. 1999:400-401).

(98) *pa:k⁹/ɕiən¹/fa:n⁶*   *ʔde:u¹*
     hundred/thousand/ten thousand   one
     '100/1,000/10,000'   (Zhang et al. 1999:400)

(99) *ʔit⁷*   *pa:k⁹/ɕiən¹/fa:n⁶*
     one   hundred/thousand/ten thousand
     '100/1,000/10,000'   (Zhang et al. 1999:400-1)

(100)   *pa:k⁹/ɕiən¹/fa:n⁶*   *ʔit⁷*
        hundred/thousand/ten thousand   one
        '110/1,100/11,000'   (Zhang et al. 1999:400-1)

3.9. *Mang*

The word order of nominal phrases is [Num Clf N-mod N-head Adj Pro Prt] (Gao, 2002:98). In Mang, 'one' has two words, *mak⁵⁵* and *mɛ⁵⁵*. The word order of a noun head, *mak⁵⁵*, and a classifier can form [Clf N 1], [N Clf 1], and [Clf 1 N]; see (101), (102), and (103). The [Clf N] construction can be used to express singular meaning, see (104). Other numerals must occur in the unmarked construction, see (105) (Gao 2002:74).

(101)   *ʔu⁵¹ tu⁵¹*   *mak⁵⁵*
        CLF chopstick   one
        'a chopstick'   (Gao 2002:74)

(102)   *laŋ⁵¹*   *nɔ³¹*   *mak⁵¹*
        house   CLF   one
        'a house'   (Gao 2002:74)

(103)   *lan⁵¹*   *mak⁵⁵*   *hai³¹*
        CLF   one   shoe
        'a shoe'   (Gao 2002:74)

(104)   *doŋ³¹*   *mat⁵⁵*
        CLF   eye
        'an eye'   (Gao 2002:74)

(105)   *pe⁵⁵*   *la³⁵*   *mun⁵¹*
        three   CLF   tooth
        'three teeth'   (Gao 2002:99)

The noun head can also be modified by an indefinite pronoun, *mɛ⁵⁵* (*mɛ⁵¹*), which means 'one' or 'only one (of something)', see (106). It is a result of grammaticalization from *mak⁵⁵* 'one' (Gao 2002:74-75, 80) and does not occur with *mak⁵⁵*. Like *mak⁵⁵* and *mɛ⁵⁵*, demonstratives also follow the noun head, see example (107).

(106)   *loŋ³⁵*   *pəl³⁵*   *mɛ⁵⁵*
        CLF   mountain   one/any one
        'a mountain'   (Gao 2002:74)

(107)   *mə³¹θa⁵¹*   *θua³⁵*   *ʔə³¹ʔy⁵¹*
        CLF   cloth   DEM.DIST
        'that cloth'   (Gao 2002:98)

Both *mak^{55}* and *mɛ^{55}* can occur after a *base* in complex numerals in units of digits to express number 'one', see (108) and (109).

(108)   *gi^{31} mak^{55}*
          ten   one
          '11'   (Gao 2002:85)

(109)   *ɣan^{35} lan^{31} mɛ^{55}*
          hundred   zero   one
          '101'   (Gao 2002:85)

3.10. *Other TK Languages*

In the TK family, the classifier construction in the Tai branch generally follows the [N Num Clf]. Interestingly, in many of these languages, the native word for 'one' can occur in either the [N 1 Clf] order like the other numerals or in the [N Clf 1] order like the determiner in putative N-intervening languages. Examples from four such languages are given: Khamti (110), Lao (111), Tai Lue (112), and Thai (113). All the (a) examples follow the canonical order [N Num Clf], and in the (b) examples, the [N 1 Clf] order is followed where the native word 'one' is likely a determiner, not a numeral.

(110)   a.   *luk^1 leeung^3 koo^1*
                 child   one   CLF
                 'one child'
          b.   *kuun^{4}maau   koo^1 leeung^3*
                 bachelor   CLF   one
                 'a bachelor'   (Khamti – Inglis 2007:8-9)
(111)   a.   *kai^5 nuŋ^5 tu:ə$^{1'}$*
                 chicken   one   CLF
                 'a chicken'
          b.   *kai^5 tu:ə$^{1'}$ nuŋ^5*
                 chicken   CLF   one
                 'a chicken'   (Lao – Qin & Xie 2009:81)
(112)   a.   *xiŋ^1 nuŋ^5 tɔn^2*
                 ginger   one   CLF
                 'one piece of ginger'
          b.   *con^1 muu^2 nuŋ^5*
                 robber   CLF   one
                 'a group of robbers'   (Tai Lue - Phillips & Hanna 2019:16, 19)
(113)   a.   *dek   nung   khon*
                 child   one   CLF
                 'one child'

b. *dek*   *khon*   *nung*
    child   CLF   one
    'a child'   (Thai – Simpson 2005:16)

Different distributions of the native 'one' could represent different meanings. In these languages, the native 'one' in the [N 1 Clf] construction simply expresses the numerical meaning of 'one', while the native word 'one' in the [N Clf 1] behaves as an indefinite article (Enfield 2007:121, Inglis 2007, Phillips & Hanna 2019, Simpson 2005). These data show that a grammaticalized determiner with the form of the native word 'one' is rather common in Tai-Kadai and not limited to the putative N-intervening languages. The only difference is that in most of the putative N-intervening languages, the genuine numeral of 'one' must be omitted when NPs simply express the numeral meaning of one without implying the indefiniteness of the noun.

4. Syntactic Category of the Native 'One'

All putative N-intervening languages in Asia and their data have been shown in the last section. These data serve as direct and indirect evidence of the native word 'one' being an indefinite determiner rather than a numeral (including the borrowed 'one') in these languages because, with respect to the syntactic distribution, they perspicuously show the difference between genuine numerals and the native word 'one', the difference between adjectives and the native word 'one', and the similarity between the native 'one' and determiners. The structure of complex numerals with the native numeral 'one' and other numerals as *n* also differs, as the numeral system of complex numerals with the native 'one' as *n* is *base*-initial, but those with other numerals as *n* are *base*-final.

    First of all, numerals (including the borrowed word for 'one') in all 16 Asian languages only occur with their unmarked order in NPs, while it is the native word 'one' that does not occur with the unmarked order. Simultaneously, the superficial N-intervening construction is found only with the native 'one', no other numerals. Table 1 shows the indigenous forms, marked in bold, and borrowed forms of 'one' in these languages; crucially, only the indigenous forms can appear in the superficial N-intervening classifier construction.

Table 1. 'One' in the putative N-intervening languages

Languages	Words for 'one'	'one' in [Clf N 1]
Ai-Cham	**deu^1** / it^7	Indigenous
Bouyei	**deu^1** / $ʔit^7$	Indigenous
Mak (China)	**$ʔdeu^1$** / $ʔit^{7S}$	Indigenous

Maonan	$d\varepsilon u^{231}$ / $t\mathupsilon^{231}$ / jit^{55}	Indigenous
Nung (Vietnam)	$n\dot{u}hng$ ($n\check{o}ng$ / $n\check{u}ng$ / $nu\dot{u}\eta^{35}$) / $t\underset{.}{o}c$ / $\acute{e}ht$ (εt^{35})	Indigenous
Pubiao-Qabiao	$t\varepsilon a^{33}$ ($t\varepsilon ia^{33}$ / cja^3)	Indigenous
Tai-Dam	$ni\eta^{44}$ / $di\partial w^{22}$	Indigenous
Zhuang languages	$de{:}u^1$ ($\mathrm{?}de{:}u^1$) / $n\partial\eta^{33}$ (η^{33} / n^{33}) / he^{22} / $ne{:}u^2$ / $\mathrm{?}it^7$	Indigenous
Mang	mak^{55}	Indigenous

Note that although previous studies did not specify whether the word for 'one' in Pubiao-Qabiao and Tai-Dam is native or not, their indigenousness can be proved by some indirect evidence. In Pubiao-Qabiao, 'one' only has one form, $t\varepsilon a^{33}$ (Chen 1984, Liang et al. 2007:202, Wei et al. 2019:466, Zhang 2004:55), and it is identical to the native word 'one' in other TK languages, such as Lachi (Liang 1989) but entirely dissimilar to common loanwords from Chinese, e.g., $\mathrm{?}it^7$, jit^{55}, or it^7, in other putative N-intervening languages. Therefore, $t\varepsilon a^{33}$ should be a native form. Similarly, the resemblance between two forms of 'one' ($ni\eta^{44}$ and $di\partial w^{22}$) in Tai-Dam and the native forms in, e.g., Zhuang languages shows that they are also native; both words for 'one' in Tai-Dam do not phonetically resemble the borrowed 'one' from Chinese.

Second, in most languages, the native word 'one' only occurs in the putative N-intervening construction and *base*-initial numerals except for Pubiao-Qabiao, Tai Dam, and Mang. A *base*-final system is adopted in Pubiao-Qabiao and Mang, and Tai Dam's data of complex numerals is the only one that we could not acquire. With respect to word orders of NPs, two unexpected constructions, [N Clf 1] and [Clf 1 N], were reported in Mang by Gao (2002:74) as in (102) and (103). The former one may be the original word order of the language. The latter one may still need further investigation because of the mismatch between the example and the word order of NPs provided by the literature and lack of description of the example.

Third, the [Clf N] construction is used in nearly half of the languages to express the singularity of NPs. Only Zhuang languages allow the borrowed word 'one' in the [Num Clf N] construction. Such data indicates that the omission of the borrowed 'one' in Zhuang languages is optional, while the omission is obligatory in the rest of the languages. Although the situation of Zhuang languages differs slightly from Her's analysis, it does not go against our arguments since the borrowed words for 'one' in the languages are still prohibited in the putative N-intervening construction.

Lastly, the native word 'one' and determiners (usually demonstratives) in the languages, except for Tai-Dam and Pubiao-Qabiao, were affirmed to be in complementary distribution. There is some indirect evidence indicating the difference between the native 'one' and adjectives and the similarity between the native word 'one' and determiners in

Tai-Dam. In Tai-Dam, the native 'one' and determiners always follow adjectives, so it is more likely for the native 'one' to occur in the same syntactic slot as determiners instead of adjectives. The same analysis for Pubiao-Qabiao is thus weaker due to the limited data, as only examples of [Clf N 1] and [Clf N A D] are found, but not [Clf N A 1].

The complementary distribution of the native word 'one' and determiners strongly indicate that they are in the same syntactic category. Examples from other TK languages listed in section 3.10 support Her's analysis as well. At least four TK languages have been reported to have two kinds of native words for 'one' that function as a numeral and a determiner, respectively, depending on their position in the NP. Such data also supports the rejection of the N-intervening construction in TK languages for they prove that the native 'one' can have two syntactic categories, numeral and determiner and that this phenomenon happens not only in languages that have the (N-final) [Num Clf N] order, but also in TK languages eith the (N-initial) [N Num Clf] order.

5. Conclusion

This paper aims to extend Her's (2017a, 2017b) analysis of the superficial N-intervening construction in Maonan to all putative N-intervening languages in Asia. We have found 15 TK languages and one Austroasiatic language, and we examined their data, including the syntactic distribution of the native 'one,' adjectives and determiners, and the numeral system, based on the criteria provided by Her (2017a, 2017b). It turns out that the native 'one' in all cases appears in the same position as other determiners, usually demonstratives, instead of numerals or adjectives. Thus, the native word 'one' actually serves as a determiner and the [Clf N 1] construction should be analyzed as [Clf N D]. Also, data from other TK languages show that it is not a unique usage of languages which have the [Clf N] word order: the native 'one' in TK languages that have the [N Clf] order can occur in the final position of NPs, and it can also serve as a numeral in the unmarked order. These conclusions support the validity of U-20A.

The argumentation provided in this paper dispels the alleged violations of U-20A in Asian languages. This paper thus makes two theoretical contributions. First, the argumentation removes counterexamples to U-20A in Asian languages, and counterexamples in African languages have been shown to be invalid as well (Her & Hsu 2022). These two studies thus support U-20A as an absolute language universal. Second, Her's (2012) mathematical interpretation of numeral classifiers and U-20A indicates a harmony between formal syntactic representations and human cognition. This paper provides further evidence for the harmonization of numeral base and numeral classifier.

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