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ORIGINAL ARTICLE

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), that is, [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, that is, Num and Clf 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. A proposed explicit account for this N-intervening construction in Maonan (Tai-Kadai) 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.

1 | Introduction

The three elements, that is, 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.

This paper is a substantially revised version of the first author's MA thesis with the corresponding author as the adviser.

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(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 et al. 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) and 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 and 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 Section 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, Section 2.2 first introduces U-20A,

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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 Section 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 and 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

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bag that holds the apples, that is, 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) ($2 \times x =$ 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"

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(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, that is, 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, for example, Bhattacharya (1999, 2001), Croft (1994), Greenberg (1975/1990), Her (2012), Her and Tsai (2020), and Hsieh (2008). As noted by Her and 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* × *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 < 10 (the first *base*). In other words, *liu-shi si* "sixty-four" is the combination of $[[6 \times 10] + 4]$. 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 and 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 et al. 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, for example, 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"

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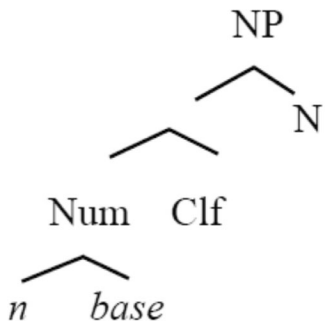

FIGURE 1 | Left-branching structure of the classifier phrase (Her and Tsai 2020).

The base-Clf harmonization is also true in Clf-initial languages, for example, 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 (Figure 1)

Her and 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 5 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 (Figure 2)

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 (Figure 3)

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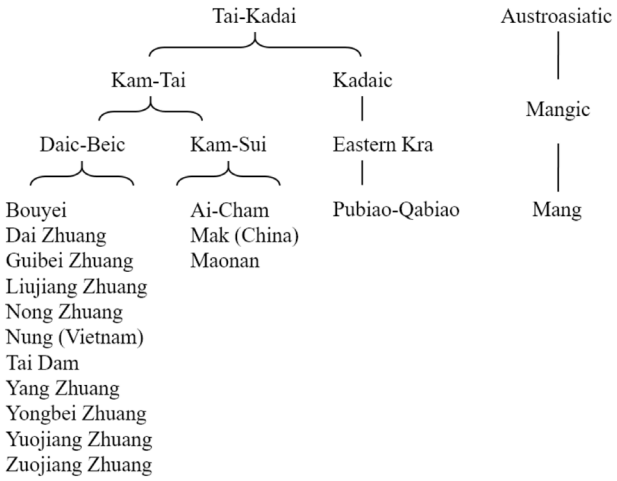

FIGURE 2 | Genealogical classification of 16 putative N-intervening languages in Asia.

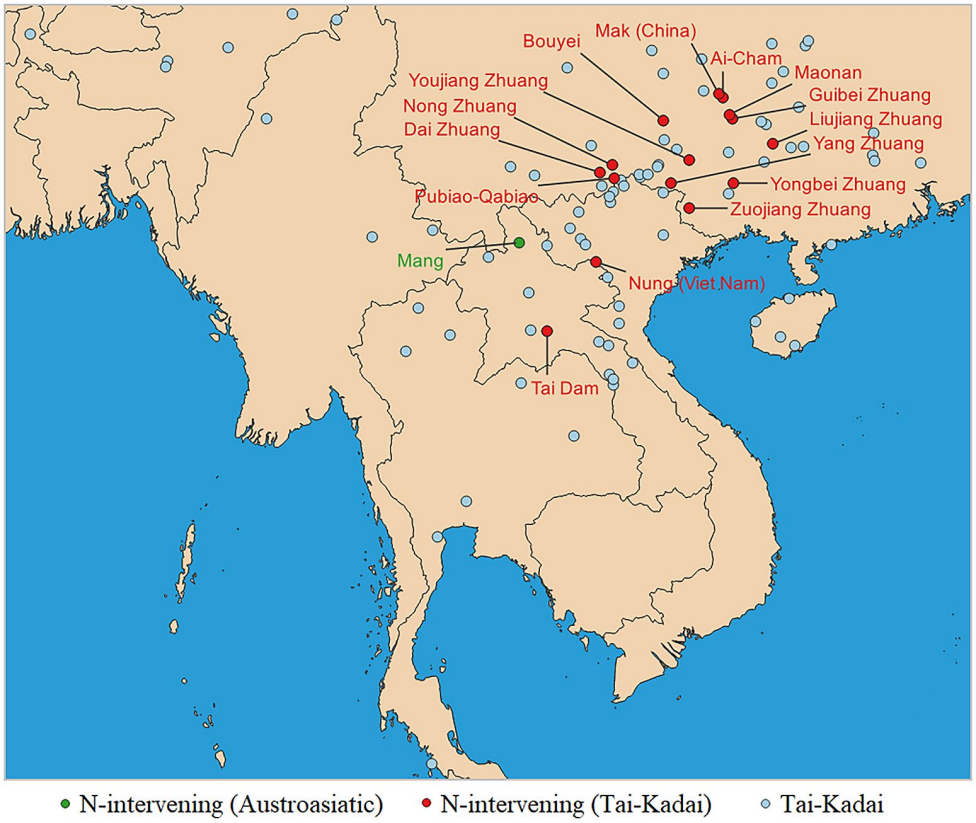

FIGURE 3 | General distribution of the alleged violations. [Colour figure can be viewed at wileyonlinelibrary.com]

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 (Figure 4)

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.

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FIGURE 4 | Distribution of the alleged violations with genealogical classification. [Colour figure can be viewed at wileyonlinelibrary.com]

Previous studies suggested that the syntactic category of *dɛu*^{231} "one" in the discussed construction [Clf N *one*] in Maonan, for example, *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}*/t*^{h}*jen*^{42}
two/three hundred/thousand
'200/300; 2000/3000'

d. **pɛk*^{55}*/t*^{h}*jen*^{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.

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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, for example, 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*^{h}*jen*^{42}		(*dɛu*^{231})
		hundred/thousand		one
		"100/1000"		
	d.	**dɛu*^{231}	*pɛk*^{55}/*t*^{h}*jen*^{42}	
		one	hundred/thousand	

Jiang (2007) thus rejected *dɛu*^{231} as a numeral and argued that it 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 are 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 *naːi* "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}	*naːi*^{2}/*ka*^{2}
		CLF	person	tall	DEM.PROX/DEM.DIST
		"this/that tall person"			
	b.	**ai*^{1}	*zən*^{1}	*dɛu*^{231}	*naːi*^{2}/*ka*^{2}
		CLF	person	one	DEM.PROX/DEM.DIST
	c.	**ai*^{1}	*zən*^{1}	*naːi*^{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, that is, [(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 the 16 Asian languages in (13) by applying Her's (2017a, 2017b) analysis of the superficial N-intervening in Maonan.

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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," *deu*^{1}, which occurs at the final position in NPs and does not co-occur with demonstratives. In addition, *it*^{7} "one" is a loanword from Chinese and it never occurs in the superficial N-intervening construction (Yang 2000, 96; Yang and 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 *it*^{7} "one" cannot replace the native *deu*^{1} "one."

(21) *saːm*^{1} *nuŋ*^{1} *əu*^{3}
three CLF rice
"three tubes of rice" (Yang 2000, 92)

(22) *to*^{2} *məu*^{5} *təi*^{3} *naːi*^{6} *ju*^{3} *laːu*^{4} *han*^{5}
CLF pig little DEM.PROX grow big very
"This little pig grows very quickly." (Yang 2000, 134)

(23) *paːk*^{7} *mit*^{8} *deu*^{1}
CLF knife one
"a knife" (Yang 2000, 92)

(24) **paːk*^{7} *mit*^{8} *it*^{7}
CLF knife one

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

(25) *həi*^{5}*!* *phi*^{1} *naŋ*^{1} *ŋ*^{1} *naŋ*^{1} *to*^{2} *djaːk*^{9} *təeŋ*^{5}
EXCLAM tip nose 2S COP CLF locust still
"Hey! There is still a grasshopper on your nose tip!" (Yang 2000, 120)

(26) *to*^{2} *m̥a*^{1} *ɗam*^{3} *to*^{2} *meu*^{4} *ja*^{1} *ŋam*^{1}
CLF dog bite CLF cat two CLF
"A dog bites a cat twice." (Yang 2000, 95)

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Besides the unique distribution of *deu*[1] 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 *deu*[1] occurs in a different position from the borrowed form *it*[7] (Yang 2000, 85–87). For example, numbers that are larger than ten with *deu*[1] as their *n* must be *base*-initial, see (27). Note that in this example *zəp*[8] *it*[7] means eleven, not ten. In addition, when a complex numeral uses *ja*[1] (native)/*ɲəi*[6] (borrowed) "two," or a larger number (*three* and above) as *n*, it must be *base*-final; *ja*[1] usually occurs with a larger *base* such as hundred, thousand, and ten-thousand, see (28).

(27) *vaːn*[1] *deu*[1] *ɕin*[1] *deu*[1] *pek*[7] *deu*[1] *zəp*[8] **deu*[1]/*it*[7]
ten-thousand one thousand one hundred one ten one/one
"11,111" (Yang 2000, 86)

(28) *ja*[1]/*ɲəi*[6] *vaːn*[1] *ja*[1]/*ɲəi*[6] *ɕin*[1] *ja*[1]/*ɲəi*[6] *pek*[7]
two/two ten-thousand two/two thousand two/two hundred
**ja*[1]/*ɲəi*[6] *zəp*[8] **ja*[1]/*ɲəi*[6]
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 *mu*[1] "pig" in (32) is a post-nominal modifier.

(29) *soŋ*[1] *dak*[7] *zin*[1]
two CLF rock
"two pieces of rock" (*Literary Data Collection* 1983, 104)[1]

(30) *ɦa*[3] *ɕaːŋ*[2] *no*[6]
five CLF meat
"five taels of meat" (*Literary Data Collection* 1983, 83)

(31) *soŋ*[1] *lɯk*[8]*koi*[2] *pu*[4]*kwaːŋ*[1] *tɛ*[5]
two CLF-son-in-law rich-man DEM.DIST
"two rich sons-in-law" (*Literary Data Collection* 1983, 88)

(32) *ɕip*[8] *kaːi*[5] *no*[6] *mu*[1] *pi*[2]
ten CLF meat pig fatty
"ten pieces of fatty pork" (*Literary Data Collection* 1983, 87)

"One" in Bouyei has a native form (*diau*[1]/*deu*[1]) and a borrowed form from Chinese (*it*[7]/*ʔit*[7]) (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 "*-ta*[2]" 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).

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(33) *dɛn*^{1} *kaːm*^{3} *deu*^{1}
CLF cave one
"a cave" (*Literary Data Collection* 1983, 75)

(34) *kaːŋ*^{1} *ŋan*^{2} *deu*^{1}
CLF silver coin one
"a vat of silver coins" (*Literary Data Collection* 1983, 95)

(35) *pi*^{1} *ta*^{2}*ʔit*^{7}
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 *deu*^{1} cannot co-occur, so their syntactic distribution is complementary (Cao 1994; Liang 1986; Zhou and Sun 2014).

(36) *dɛn*^{1} *dɔŋ*^{4} *laːu*^{4} *deu*^{1}
CLF dustpan big one
"a big dustpan" (*Literary Data Collection* 1983, 75)

(37) *tɕɔŋ*^{5} *pɯə*^{6} *va*^{1}*/fon*^{4} *deu*^{1}
CLF cloth patterned/black one
"a patterned/black cloth" (*Literary Data Collection* 1983, 100–101)

(38) *dak*^{7} *zin*^{1} *tɛ*^{5}
CLF rock DEM.DIST
"that piece of rock" (*Literary Data Collection* 1983, 91)

(39) (*lɯk*^{8}) *koi*^{2} *pu*^{4}*ɦo*^{3} *tɛ*^{5}
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) *tɕoŋ*^{5} *pɯ*^{6} *tɕoŋ*^{5} *vin*^{3}
CLF cloth CLF skirt
suan^{5} *ma*^{1}*la*^{3} *sat*^{7} *ɕip*^{3} *man*^{2} *ɕen*^{2} *tau*^{5} *deu*^{1}
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 *diau*^{1} as *n* only occurs in *base*-initial numbers (including hundreds, thousands, ten-thousand, and larger), and only *diau*^{1}, not *it*^{7}, 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.

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(41) *pa:ʔ^{7}/ʑiaŋ^{1}/va:n^{6}* *diau^{1}/*it^{7}*
hundred/thousand/ten-thousand one/one
"100/1000/10,000" (Yu 1983, 27)

(42) **diau^{1}/suaŋ^{1}* *pa:ʔ^{7}/ʑiaŋ^{1}/va:n^{6}*
one/two hundred/thousand/ten-thousand
"200/2000/20,000" (Yu 1983, 27)

When *it^{7}* occurs after *tsip^{8}* "ten," *pa:ʔ^{7}* "hundred," *ʑiaŋ^{1}* "thousand," and *va:n^{6}* "ten-thousand," it is in the next digit to express a smaller number instead of *n* of those larger *bases*, see (43). When *diau^{1}* and *it^{7}* occur as *n* in a complex numeral respectively, they are actually on different levels in the structure, that is, 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) *tsip^{8}/pa:ʔ^{7}/ʑiaŋ^{1}/va:n^{6}* **diau^{1}/it^{7}*
ten/hundred/thousand/ten-thousand one
"11/110/1100/11,000" (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, *ʔde:u^{1}(ʔdeu^{1})* "one" follows the noun head, thus forming the superficial N-intervening construction, see (46) and (47). Yang and Hao (2017) noted that this word for "one" does not occur with demonstratives. The other form, *ʔit^{5}(ʔit^{7S})*, 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) *ra^{1}* *ʔai^{3}* *ʔd̥in^{1}*
two CLF chicken
"three chickens" (Ni 1988, 96)

(45) *sa:m^{1}* *wun^{3}* *na:n^{4}*
three CLF meat
"three bowls of meat" (Ni 1988, 96)

(46) *tə^{2}* *ma^{4}* *ʔdeu^{1}*
CLF horse one
"a horse" (Ni 1988, 99)

(47) *k'ui^{1}* *ŋ̊an^{2}* *ʔde:u^{1}*
CLF silver one
"a case of silver" (Li 1943/2005, 22)

(48) *ŋ̊əi^{6}* *rip^{8S}* *ʔit^{7S}*
two ten one
"twenty-one" (Ni 1988, 99)

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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) *ha*^{3} *tə*^{2} *məu*^{5} *laːu*^{4} *si*^{5} *kwən*^{5}
kill CLF pig big DEM.PROX first
"kill that big pig first" (Ni 1988, 98)

(50) *t'au*^{5} *dun*^{5}*k'un*^{6} *hai*^{6} *k'ui*^{6} *taŋ*^{6} *ʔdom*^{6}
till halfway open case to see
me^{2} *sə* *k'ui*^{6} *ɳan*^{2}
NEG be CLF silver
"Halfway there, (they) open the case and see, not a case of silver." (Li 1943/2005, 22)

(51) *tau*^{6} *saːp*^{4} *ɳan*^{2} *.ʐo*^{4} *tai*^{2} *.paːi*^{6}
3SG cut silver PRT bring to
.tə *ma*^{4} *tau*^{6} *siːn*^{6}
CLF horse 3SG eat
"She cuts silver coins (and) brings them for her horse to eat." (Li 1943/2005, 23)

Note that *deu*^{1} in a complex numeral occurs after the base for "hundred," "thousand," and "ten-thousand," as in (52). However, though *ʔit*^{7S} also appears after a numeral base, as in (53), crucially, the meaning is not the same, as the relation between the base and *ʔit*^{7S} is not multiplication; it is addition, as indicated by the translations. Incidentally, the native *ra*^{1} "two" only occurs as a simple numeral and never in a complex numeral, while the borrowed *ɳəi*^{6} counterpart does occur in a base-final [n base] complex numeral (Ni 1988, 99).

(52) *pek*^{7L}/*sin*^{1}/*vaːn*^{6} *deu*^{1}
hundred/thousand/ten. thousand one
"100/1000/10,000" (Ni 1988, 99)

(53) *pek*^{7L}/*sin*^{1}/*vaːn*^{6} *ʔit*^{7S}
hundred/thousand/ten. thousand one
"110/1100/11,000" (Ni 1988, 99)

3.4 | Maonan

The numeral "one" in Moanan has three words: they are *tɔ*^{231} (*tɔ*^{2}), *jit*^{55} (*ʔjit*^{7}), and *dɛu*^{231} (*dɛu*^{2}); *dɛu*^{231} is native but *jit*^{55} is a loanword from Chinese. General numerals occur in the [Num Clf N] construction, while the native "one," *dɛu*^{231}, occurs in [Clf N 1], see (54) and (55).

(54) *ja*^{42}/*saːm*^{42} *ai*^{1} *ʐən*^{1}
two/three CLF person
"two/three persons" (Her 2017a, 272)

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(55) *ai*^{1} *zən*^{1} *dɛu*^{231}/**tɔ*^{231}/**jit*^{55}
CLF person one/one/one
"a person" (Her 2017a, 272)

Adjectives and demonstratives, *naːi* "this" and *ka*^{2} "that," follow the noun head. When *dɛu*^{231} or demonstratives occur with adjectives, they follow the adjective, see (56) and (57). Furthermore, *dɛu*^{231} and demonstratives are in complementary distribution, see (58) and (59).

(56) *ai*^{1} *zən*^{1} *voŋ*^{1} *naːi*^{2}/*ka*^{2}
CLF person tall DEM.PROX/DEM.DIST
"this/that tall person" (Her 2017a, 274)

(57) *ai*^{1} *zən*^{1} *voŋ*^{1} *dɛu*^{231}
CLF person tall one
"a tall person" (Her 2017a, 274)

(58) **ai*^{1} *zən*^{1} *dɛu*^{231} *naːi*^{2}/*ka*^{2}
CLF person one DEM.PROX/DEM.DIST (Her 2017a, 274)

(59) **ai*^{1} *zən*^{1} *naːi*^{2}/*ka*^{2} *dɛu*^{231}
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. *dɛu*^{2} (*dɛu*^{231}) is only placed after *pɛk*^{7} "hundred," *tshjen*^{1} "thousand," and *vaːn*^{6} "ten-thousand" to denote "100," "1000," and "10,000," see (60). However, when the borrowed *ʔjit*^{7} (*jit*^{55}) "one" or *ŋ̍i*^{6} "two" is used with these *bases*, it is in a smaller digit to denote "10/20," "100/200," and "1000/2000" see (61). Note that *dɛu*^{2} cannot be used with *zəp*^{8} "ten," but *ʔjit*^{7} is allowed to occur with it. The native form of "two," *ja*^{1} (*ja*^{42}) and other numerals only occur in the *base*-final structure, see (62) (Liang 1980, 45–47).

(60) *pɛk*^{7}/*tshjen*^{1}/*vaːn*^{6} *dɛu*^{2}
hundred/thousand/ten.thousands one
"100/1000/10,000" (Liang 1980, 47)

(61) *pɛk*^{7}/*tshjen*^{1}/*vaːn*^{6} *ʔjit*^{7}/*ŋ̍i*^{6}
hundred/thousand/ten.thousands one/two
"110/1100/11,000/120/1200/12,000" (Liang 1980, 47)

(62) *ja*^{1}/*saːm*^{1} *pɛk*^{7}/*tshjen*^{1}/*vaːn*^{6}
two/three hundred/thousand/ten.thousand
"200/2000/20,000/300/3000/30,000" (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 and 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 *nɯhng* and

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tọc "one." Modifiers can be adjectives, nouns, ordinal numerals, and quantifiers (Saul and 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* *tế*
two CLF child that
"those two children" (Saul and Wilson 1980, 27)

(64) *slóng* *áhn* *slèng* *tế*
two CLF province that
"those two provinces" (Saul and Wilson 1980, 30)

"One" in Nung has three words, *nưhng, 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. *nưhng* "one" follows the noun head and adjectives and occupies the position of possessive or demonstratives, see (65) and (66). Simpson (2005) clearly notes that *nưhng* 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 *nưhng* and *tọc* when the quantity is "1."

(65) *tú* *má* *nưhng*
CLF dog one
"a dog" (Saul and Wilson 1980, 21)

(66) *tú* *vai* *đọhng* *nưhng*
CLF buffalo white one
"a white buffalo" (Saul and Wilson 1980, 14)

(67) *mưhn* *hểht* *bạt* *tọc*
3SG do time one
"He did it one time." (Saul and Wilson 1980, 22)

(68) *mưhn* *hēhng* *áu* *áhn* *tọc*
3SG just take CLF one
"He just took one." (Saul and 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 and 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 and Wilson 1980, 22)

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(71) *éht/nhị* *slíhp*
one/two ten
"10/20" (Saul and Wilson 1980, 22)

3.6 | Pubiao-Qabiao

Chen (1984) notes that in Pubiao-Qabiao, numerals and classifiers precede N, while adjectives, demonstratives, and *tɕa*^{33} "one" follow it. When numerals and classifiers occur with the noun head, the word order is [Num Clf N], see (72) and (73).

(72) *vai*^{33} *ʔan*^{51} *ɕe*^{51} *pən*^{213} *ɕə*^{51}
younger brother have two CLF book
"younger brother has two books." (Chen 1984, 69)

(73) *tau*^{51} *mai*^{45} *ʐuŋ*^{33}
three CLF river
"three rivers" (Chen 1984, 66)

In this language, "one" has only one word, that is, *tɕa*^{33} (*tɕa*^{44}/*tɕia*^{33}/*cja*^{3}) (Chen 1984; Liang et al. 2007, 202; Wei et al. 2019, 466). It could not be a loanword from Chinese because it is similar to a native word. *tɕiã*^{33} "one," in another TK language called Laichi, while it is dissimilar to the common borrowed form, *ʔit*^{7} "one," in TK languages (Liang 1989). When *tɕa*^{33} and a classifier occur, the superficial N-intervening [Clf N 1] is obtained, see (74). An NP without *tɕa*^{33} 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) *liŋ*^{51} *tai*^{51} *tɕa*^{33}
CLF tree one
"a tree" (Chen 1984, 75)

(75) *ɳ̊'uak*^{33} *tai*^{51} *ʔan*^{51} *ba*^{33} *ɳ̊uk*^{45}
on tree have CLF bird
"There is a bird on the tree." (Chen 1984, 70)

(76) *mi*^{33} *məi*^{33} *liŋ*^{33} *kieu*^{51} *nai*^{45}
2S take CLF long DEM.PROX
"You take this long one." (Chen 1984, 70)

(77) *liak*^{45} *ta*^{33}*diau*^{22} *nai*^{45}
CLF person DEM.PROX
"This person" (Chen 1984, 74)

According to Chen's (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.

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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 *niŋ*^{44} "one" or *diəw*^{22} "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) *mɨ*^{31} *niŋ*^{55} *ʔaːj*^{21} *ʔem*^{55} *man*^{55} *bɔʔ*^{22}
day one father mother 3SG instruct
paj^{22} *liəŋ*^{31} *pet*^{22} *nɔj*^{31} *kɛm*^{55} *xaŋ*^{21} *nɔŋ*^{22} *niŋ*^{55}
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) *laːŋ*^{55} *tup*^{22} *nɔj*^{31} *niŋ*^{44} *muŋ*^{55} *bəw*^{22} *kuəj*^{21}
CLF shelter small one roof leaf banana
tʰoj^{22} *bəw*^{22} *tɔŋ*^{22} *naŋ*^{21} *paːˀ*^{45} *nan*^{31} *tʰoj*^{22}
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) *man*^{55} *tɕaŋ*^{45} *to*^{55} *səw*^{45} *to*^{22} *mɛw*^{55} *kɛŋ*^{45} *to*^{22} *maːˀ*^{22}
3.SG then tell to CLF cat and CLF dog
"Then she told the cat and the dog, ..." (Edward Edwards 2011, 188)

niŋ^{44} and *diəw*^{22} could occupy the same position as demonstratives *ni*^{31} "this/these" and *nan*^{31} "that/those" since they also occur after adjectives, see (81).

(81) *tɕaŋ*^{45} *məj*^{55} *tʰaw*^{21} *ni*^{31} *miə*^{55} *naŋ*^{22}
then invite old this go sit
naŋ^{21} *kaːŋ*^{22} *laːŋ*^{55} *hiən*^{55} *luəŋ*^{22} *saw*^{22} *nan*^{31}
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, and 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, that is, [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 and Qin 1993, 48; Yang and Hao 2017). While Zheng (1996, 255) and Huang (2010, 26) mention that *neːu*^{2} "one" in Jingxi Zhuang can occur with demonstratives, other researchers (Liang 1986; Qin 2013; Zhang and Qin 1993, 48; Yang and Hao 2017) assert that in Zhuang languages, the native word for "one" cannot occur with a demonstrative.

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In Zhuang languages, "one" has four native words, *ʔdeːu*^{1}, *neːu*^{2}, *nəŋ*^{33}, and *he*^{22}, and one loanword from Chinese, *ʔit*^{7} (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) *θaːm*^{1} *tu*^{2} *mu*^{1}
three CLF pig
"three pigs" (Guibei Zhuang—Donglang; Luo et al. 2014, 43)

(83) *saːm*^{1} *ko*^{1} *fai*^{4}
three CLF tree
"three trees" (Liujiang Zhuang; Qin 2013)

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

(85) *łaːm*^{1} *tu*^{1} *kai*^{5}
three CLF chicken
"three chickens" (Yang Zhuang—Jingxi; Huang 2010, 26)

(86) *łan*^{213} *ken*^{35} *hou*^{44}*tɐi*^{24}
three CLF corn
"three corns" (Youjiang Zhuang—Tianyang; Huang 2015)

(87) *tɕit*^{55} *kən*^{33} *lau*^{24}
seven CLF alcohol
"seven catties of alcohol" (Zuojiang Zhuang—Longzhou; Li 1993, 128)

(88) *mi*^{2} *pou*^{4} *vun*^{2} *tau*^{3} *ɣa*^{1} *mɯŋ*^{2}
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) *łaːm*^{33} *me*^{11} *luk*^{21} *łaːu*^{33}
three CLF son female
"three daughters" (Zuojiang Zhuang—Longzhou; Li 1993, 49)

(90) *łoːŋ*^{33} *kən*^{31} *luk*^{21} *dik*^{55} *nai*^{24}
two CLF child DEM.PROX
"These two children" (Zuojiang Zhuang—Longzhou; Li 1993, 56)

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(91) *tu*^{33} *pia*^{33} *deːŋ*^{33} *nai*^{24}
CLF fish red DEM.PROX
"that (this) red fish" (Zuojiang Zhuang—Longzhou; Li 1993, 43)

(92) *tu*^{2} *lok*^{8} *ni*^{4}/*ʔdeːu*^{1}
CLF bird DEM.PROX/one
"this bird/a bird" (Guibei Zhuang—Donglang; Luo et al. 2014, 40)

(93) *faːk*^{8} *it*^{8} *deːu*^{1}
CLF knife one
"a knife" (Liujiang Zhuang; Qin 2013)

(94) *wu*^{2} *kja*^{4} *neːu*^{2}
CLF tea one
"a cup of tea" (Yang Zhuang—Jingxi; Huang 2010, 107)

(95) *ɕek*^{7} *ɕai*^{1} *tən*^{4}
CLF book DEM.DIST
"that book" (Yang Zhuang—Jingxi; Huang 2010, 107)

(96) *tua*^{31} *tɕa*^{213} *he*^{22}
CLF fish one
"a fish" (Youjiang Zhuang—Tianyang; Huang 2015)

(97) *tu*^{33} *pia*^{33} *naiʔ*^{31} *deːŋ*^{33} *nəŋ*^{33}
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: *nəŋ*^{33}, *ŋ*,^{33} and *n*^{33}, 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," "1000," and "10,000," the same as in other languages mentioned earlier. The native word "one" only follows *paːk*^{9} "hundred" *ɕiən*^{1} "thousand," or *faːn*^{6} "ten thousand"; in contrast, *ʔit*^{7} "one" only precedes them, see (98) and (99). If *ʔit*^{7} occurs after them, the mathematical relation between two morphemes changes, see (100) (Zhang et al. 1999, 400–401).

(98) *paːk*^{9}/*ɕiən*^{1}/*faːn*^{6} *ʔdeːu*^{1}
hundred/thousand/ten thousand one
"100/1000/10,000" (Zhang et al. 1999, 400)

(99) *ʔit*^{7} *paːk*^{9}/*ɕiən*^{1}/*faːn*^{6}
one hundred/thousand/ten thousand
"100/1000/10,000" (Zhang et al. 1999, 400–401)

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(100) *paːk*^{9}/*ɕiən*^{1}/*faːn*^{6} *ʔit*^{7}
hundred/thousand/ten thousand one
"110/1100/11,000" (Zhang et al. 1999, 400–401)

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, *mak*^{55} and *mɛ*^{55}. The word order of a noun head, *mak*^{55}, 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) *ʔu*^{51} *tu*^{51} *mak*^{55}
CLF chopstick one
"a chopstick" (Gao 2002, 74)

(102) *laŋ*^{51} *nɔ*^{31} *mak*^{51}
house CLF one
"a house" (Gao 2002, 74)

(103) *lan*^{51} *mak*^{55} *hai*^{31}
CLF one shoe
"a shoe" (Gao 2002, 74)

(104) *doŋ*^{31} *mat*^{55}
CLF eye
"an eye" (Gao 2002, 74)

(105) *pe*^{55} *la*^{35} *mun*^{51}
three CLF tooth
"three teeth" (Gao 2002, 99)

The noun head can also be modified by an indefinite pronoun, *mɛ*^{55} (*mɛ*^{51}), which means "one" or "only one (of something)," see (106). It is a result of grammaticalization from *mak*^{55} "one" (Gao 2002, 74–75, 80) and does not occur with *mak*^{55}. Like *mak*^{55} and *mɛ*^{55}, demonstratives also follow the noun head, see example (107).

(106) *loŋ*^{35} *pəl*^{35} *mɛ*^{55}
CLF mountain one/any one
"a mountain" (Gao 2002, 74)

(107) *mə*^{31}*θa*^{51} *θua*^{35} *ʔə*^{31}*ʔy*^{51}
CLF cloth DEM.DIST
"that cloth" (Gao 2002, 98)

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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} *nɯŋ*^{5} *tuːə*$^{1'}$
chicken one CLF
"a chicken"

b. *kai*^{5} *tuːə*$^{1'}$ *nɯŋ*^{5}
chicken CLF one
"a chicken" (Lao—Qin and Xie 2009, 81)

(112) a. *xiŋ*^{1} *nɯŋ*^{5} *tɔn*^{2}
ginger one CLF
"one piece of ginger"

b. *con*^{1} *muu*^{2} *nɯŋ*^{5}
robber CLF one
"a group of robbers" (Tai Lue—Phillips and Hanna 2019, 16, 19)

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(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 mseaning of "one," while the native word "one" in the [N Clf 1] behaves as an indefinite article (Enfield 2007, 121; Inglis 2007; Phillips and 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.

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, *tɕa*^{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

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	***dɛu***^{231}/*tɔ*^{231}/*jit*^{55}	Indigenous
Nung (Vietnam)	***nưhng (nỏng/nủng/nɯŋ***^{35}***)***/*tọc/éht* (*ɛt*^{35})	Indigenous
Pubiao-Qabiao	***tɕa***^{33} ***(tɕia***^{33}***/cja***^{3}***)***	Indigenous
Tai-Dam	***niŋ***^{44}***/diəw***^{22}	Indigenous
Zhuang languages	***deːu***^{1} ***(ʔdeːu***^{1}***)/nəŋ***^{33} ***(ŋ***^{33}***/n***^{33}***)/he***^{22}***/neːu***^{2}/*ʔit*^{7}	Indigenous
Mang	***mak***^{55}	Indigenous

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other TK languages, such as Lachi (Liang 1989) but entirely dissimilar to common loanwords from Chinese, for example, *ʔit*^{7}, *jit*^{55}, or *it*^{7}, in other putative N-intervening languages. Therefore, *tɕa*^{33} should be a native form. Similarly, the resemblance between two forms of "one" (*niŋ*^{44} and *diəw*^{22}) in Tai-Dam and the native forms in, for example, 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 as 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 support 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 and 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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Conflicts of Interest

The authors declare no conflicts of interest.

Endnotes

[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.

[2] Saul and Wilson (1980, 21) note that *nɯhng* "one" has three variants, *nǒng, nǔng*, and *nɯhng*. Wei et al. (2019, 466) note that Nung also has *ʔdeu*[1] "one," but this is not mentioned in Saul and Wilson (1980) or Simpson (2005).

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