Deliminative verbal reduplication in Mandarin Chinese

The current study presents an HPSG analysis for deliminative verbal reduplication in Mandarin Chinese. We provide a detailed description of the phenomenon. After discussing reduplication's interaction with verb classes and aspect markers, we argue that it is better analyzed as a morphological rather than a syntactic process. We put forward a lexical rule for verbal reduplication in Mandarin Chinese, and the different forms of reduplication are captured in an inheritance hierarchy. The interaction between verbal reduplication and aspect marking is handled by multiple inheritance. This analysis covers all forms of deliminative verbal reduplication in Mandarin Chinese and has none of the shortcomings of previous analyses.

Keywords: verbal reduplication, Mandarin Chinese, HPSG, Minimal Recursion Semantics

1. Introduction

In Mandarin Chinese, verbs can be reduplicated to express a delimitative aspectual meaning (e.g. Chao 1968: 204–205; Li & Thompson 1981: 232; Li 1996: 14; Dai 1997: 70; Zhu 1998: 382–383; F. Xing 2000: 420–421; Q. Chen 2001: 48; Tsao 2001: 288; Yang 2003: 11–12; Xiao & McEnery 2004: Sec. 4.3). This means that the event or state denoted by the verb happens in a short duration and/or a low frequency (Xiao & McEnery 2004: 155), such as illustrated in (1).[1] Thus, verbal reduplication in Mandarin Chinese is often translated as doing something "a little bit/for a little while".

(1) (a) qǐng nǐ cháng zhè dào cài.
please you taste this CLF dish
'Please taste this dish.'

(b) qǐng nǐ *cháng-chang* zhè dào cài.
please you taste-taste this CLF dish
'Please taste this dish a little bit.'

The current study tries to determine a suitable formal and unified analysis for the structure of verbal reduplication in Mandarin Chinese. It contributes more empirical evidence and offers a novel analysis in the theoretical framework of Head-driven Phrase Structure Grammar (HPSG; Pollard & Sag 1994, Sag 1997, Müller et al. 2024) to this phenomenon using Minimal Recursion Semantics (MRS; Copestake et al. 2005) as the semantic

[1] Reduplications in the example sentences will be set in italics.

representation formalism. This new account of reduplication avoids the problems of previous approaches and explains more forms of deliminative verbal reduplication in Mandarin Chinese.

This paper is organized as follows: after this introduction, we will present in Section 2 the forms and syntactic distribution as well as the semantics of verbal reduplication in Mandarin Chinese. Importantly, we restrict the object of this study to the AA, A-*yi*-A, A-*le*-A, A-*le*-*yi*-A, ABAB and AB-*le*-AB forms of verbal reduplication in Mandarin Chinese. We will also discuss in this section, with the help of corpus data, the question of whether the reduplication is better analyzed as a morphological or a syntactic process. In Section 3, we will discuss the advantages and drawbacks of previous approaches. Section 4 will present a new HPSG account for verbal reduplication in Mandarin Chinese. Finally, Section 5 will conclude the paper.

The data in this paper was drawn from several sources. In addition to introspection, the Modern Chinese subcorpus of the corpus of the *Center for Chinese Linguistics of Peking University* (CCL; Zhan et al. 2003, 2019) and the BCC corpus (Xun et al. 2016) were also consulted. Further, examples from novels and plays written by native speakers were considered. Corpus data provides natural and contextualized examples, and contains a variation of linguistic properties (Meurers & Müller 2009: 921). This can help us discover relevant constraints that can otherwise go unnoticed through introspection.

2. The phenomenon

This section introduces the fundamental grammatical behaviors of verbal reduplication in Mandarin Chinese. After illustrating its forms, syntactic distribution and semantics, we discuss the questions of whether it is better analyzed as a morphological or a syntactic phenomenon.

2.1. Forms

There is no general agreement on the forms of verbal reduplication in Mandarin Chinese. We adopt a broad definition in terms of the forms of verbal reduplication in Mandarin Chinese and list in (2)–(4) all the forms commonly discussed in the literature.

(2) for monosyllabic verbs: *shuō* 'say'

(a) shuō-shuo — AA
say-say
'say a little bit'

(b) shuō-yi-shuō — A-*yi*-A
say-one-say
'say a little bit'

(c) shuō-le-shuō — A-*le*-A
say-PFV-say
'said a little bit'

(d) shuō-le-yi-shuō — A-*le-yi*-A
say-PFV-one-say
'said a little bit'

(e) shuō-shuō-kàn — AA-*kàn*
say-say-look
'try to say a little bit'

(f) shuō-kàn-kàn — A-*kàn-kàn*[2]
say-look-look
'try to say a little bit'

(3) for disyllabic verbs: *lái-wǎng* come-go 'come and go/communicate'

(a) lái-wǎng-lái-wǎng — ABAB
come-go-come-go
'communicate a little bit'

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[2] One reviewer points out that this form is not acceptable for him/her. The acceptability of the A-*kàn-kàn* form seems to vary among Mandarin Chinese speakers. Cheng (2012: 73) suggests that unlike AA-*kàn*, A-*kàn-kàn* is an emerging construction that is still undergoing grammaticalization. He found in the Academia Sinica Balanced Corpus of Modern Chinese (Sinica Corpus; Huang & Chen 1998) 23 tokens of A-*kàn-kàn* but 141 tokens of AA-*kàn* (p. 64). This shows that the former is less common than the latter. (2a) below is an example of A-*kàn-kàn* from the Sinica Corpus.

(a) jiù shùn-zhe běi-fēng-de chuī-shì, *shì-kàn-kàn* néng fǒu jiāng hǎi-shā lán-xiàlái ba! (Sinica Corpus)
just follow-DUR north-wind-DE blow-direction try-look-look can not make sea-sand block-down PTC
'Let's just follow the north wind, try and see if we can block the sand!'

Cheng's (2012) study is based on the Mandarin spoken in Taiwan. We might assume that A-*kàn-kàn* is more widely used in Taiwan than in Mainland China. But we also found the following examples of A-*kàn-kàn* in the BCC corpus, which includes mostly data from Mainland China. This suggests that A-*kàn-kàn* is acceptable for and used by at least some Mainland Chinese Mandarin speakers as well.

(a) nàme, nǐ dào *shuō-kàn-kàn*, nǐ huì yǒu shénmeyàngde gǎibiàn… (BCC)
then you just say-look-look you will have what.kind.of change
'Then you just try and say what kind of changes you will have.'

(b) wǒ děi *tīng-kàn-kàn* nǐde tiáojiàn zài shuō… (BCC)
I have.to listen-look-look your condition then say
'I'll have to listen to your conditions first before talking about it/deciding.'

A statistical comparison of the acceptability and the productivity of A-*kàn-kàn* among speakers of different varieties of Mandarin Chinese has to be left for future studies.

(b) lái-wǎng-le-lái-wǎng — AB-*le*-AB
come-go-PFV-come-go
'communicated a little bit'

(c) lái-lái-wǎng-wǎng — AABB
come-come-go-go
'coming and going'

(4) for V-O compounds: *shuō-huǎng* tell-lie 'lie'

(a) shuō-shuō-huǎng — AAB
tell-tell-lie
'lie a little bit'

(b) shuō-yi-shuō-huǎng — A-*yi*-AB
tell-one-tell-lie
'lie a little bit'

(c) shuō-le-shuō-huǎng — A-*le*-AB
tell-PFV-tell-lie
'lied a little bit'

Fan (1964), Arcodia et al. (2014) and Xie (2020) compare the AA, ABAB and AABB forms of reduplication and find a number of differences between the AA, ABAB forms compared to the AABB form in terms of their semantics, productivity, syntactic distribution and origin. Specifically, Fan (1964: 277) proposes that AA, ABAB originated from the verb-measure word combination from Middle Chinese, while AABB developed from the reiterative rhetoric from Old Chinese. Arcodia et al. (2014: 17–18), Melloni & Basciano (2018: 144) and Xie (2020: 90) identify that AA and ABAB have a diminishing meaning, namely that the event happens for a short duration or to a small extent. By contrast, AABB expresses an increasing meaning, which indicates a repetition or an action in progress (compare (3a) and (3c)). Xie (2020: Sec. 3.1) also finds a number of differences between AA, ABAB vs. AABB forms, which we will discuss in detail in Section 2.4. These differences seem to suggest that there is a fundmental difference between these two groups of verbal reduplication. The current study will only focus on the AA, A-*yi*-A, A-*le*-A, A-*le*-*yi*-A, ABAB and AB-*le*-AB forms of verbal reduplication in Mandarin Chinese. AA-*kàn*, A-*kàn*-*kàn*, AAB, A-*yi*-AB, A-*le*-AB will also be mentioned occasionally to provide further arguments. In what follows, the term *reduplication* will be used to refer specifically to the AA, A-*yi*-A, A-*le*-A, A-*le*-*yi*-A, ABAB and AB-*le*-AB forms, if not specified otherwise.

2.2. Syntactic distribution

The reduplication has a similar syntactic distribution as an unreduplicated verb (5)–(9).

(5) Intransitive verb:

(a) tā xiào-le.
he laugh-PFV
'He laughed.'

(b) tā *xiào-le-xiào*.
he laugh-PFV-laugh
'He laughed a little bit.'

(6) Transitive verb:

(a) nǐ wèn tā.
you ask him
'Ask him.'

(b) nǐ *wèn-(yi)-wèn* tā.
you ask-(one)-ask he
'Try to ask him.'

(7) In a *ba*-construction:

(a) gòu-mǎi zhīqián zhēn gāi bǎ qíngkuàng
purchase-buy before really should BA situation
mō-qīngchǔ.
touch-clearly
'(I) should really check the situation clearly before I make the purchase.'

(b) gòu-mǎi zhīqián zhēn gāi bǎ qíngkuàng
purchase-buy before really should BA situation
mō-mō-qingchǔ.[3] (CCL)
touch-touch-clearly
'(I) should really quickly check the situation clearly before I make the purchase.'

(8) With modal verb:

(a) yǒu liǎng běn shū nǐ-men kěyǐ kàn …
there.be two CLF book you-PL can read
'There are two books that you can read …'

(b) yǒu liǎng běn shū nǐ-men kěyǐ *kàn-kan* … (CCL)
there.be two CLF book you-PL can read-read
'There are two books that you can read a little bit …'

(9) In a Serial Verb Construction (SVC):

[3] As a reviewer comments, this example also involves the reduplication of V1 of a resultative compound. This runs counter to exiting literature on this subject which consistently maintains that resultative compounds are not amenable to reduplication.

(a) tā … qǐng shīfu bāngmáng kàn nǎlǐ chū-le
she ask master help look where come.out-PFV
wèntī.
problem
'She … asked the master to help have a look at where went wrong.'

(b) tā … qǐng shīfu bāngmáng *kàn-kan* nǎlǐ
she ask master help look-look where
chū-le wèntī. (CCL)
come.out-PFV problem
'She … asked the master to help have a quick look at where went wrong.'

Sui & Hu (2016) claim that the syntactic distribution of the deliminative reduplication is subject to the following constraints. First, Sui & Hu (2016: 319, 332) claim that reduplication cannot appear in a relative clause without a modal verb or a verb with a modal or mood meaning, such as *dǎsuàn* 'plan', *ràng* 'let' and *jiào* 'ask', providing the contrast in (10) as an example.

(10) (a) [[tóngxué-men tǎolùn de] zhè gè wèntí] fēicháng
student-PL discuss DE this CLF question very
zhòngyào.
important
'The question that the students discussed is very important.'

(b) * [[tóngxué-men *tǎolùn-tǎolùn* de] zhè gè wèntí]
student-PL discuss-discuss DE this CLF question
fēicháng zhòngyào.
very important

(c) [[tóngxué-men xūyào (zài) *tǎolùn-tǎolùn* de] zhè gè
student-PL need again discuss-discuss DE this CLF
wèntí] fēicháng zhòngyào.
question very important
'The question that the students need to discuss (again) is very important.'

This claim can be falsified by corpora examples such as (11), where reduplication occurs in relative clauses without modal or mood verbs. We thus consider the contrast in (10) a matter of providing a proper context.

(11) (a) [[nǐ *kàn-kan* de] zhèngwù-wēibó] … zhuǎnfā-le
you look-look DE government.affairs-Weibo repost-PFV
jǐ-shí tiáo wēibó! (BCC)
several-ten CLF Weibo
'The government affairs Weibo account that you look at …

reposted dozens of Weibo posts.'

(b) tāmen shì [[guàng jìnlái *tīng-ting* de] juéshìyuè-mí].
they be wander enter listen-listen DE jazz-fan
(BCC)
'They are jazz fans who wandered in to have a listen.'

Secondly, Sui & Hu (2016: 319) show that the reduplication cannot co-occur with a duration or a frequency phrase (12).

(12) (a) zhè gè wèntí dàjiā hái yào tǎolùn yí
this CLF question everybody still need.to discuss one
huìer/jǐ cì.
while/several CLF
'As for this question, everybody still needs to discuss it for a while/several times.'

(b) * zhè gè wèntí dàjiā hái yào *tǎolùn-tǎolùn*
this CLF question everybody still need.to discuss-discuss
yí huìer/jǐ cì.
one while/several CLF

As we will show in Section 2.3.4, this can be explained by the redundant semantics of the reduplication and duration and frequency phrases.

Thirdly, Sui & Hu (2016: 319) note that reduplicated verbs cannot be aspect marked (13).

(13) (a) wǒ kàn-le/guo/zhe zhè běn shū
I read-PFV/EXP/DUR this CLF book
'I read/have read/am reading this book.'

(b) * wǒ *kàn-kàn-le/guo/zhe* zhè běn shū
I read-read-PFV/EXP/DUR this CLF book

However, as shown in (5b), *le* can occur in between the reduplicated verb and expresses the perfective aspectual meaning, that the event denoted by the sentence is realized. Thus, we argue that the reduplication can in fact be aspect marked, but only by *le* 'PFV' but not the other aspect markers. As we will argue in Section 2.3.3, this is also not a syntactic but a semantic constraint.

Sui & Hu (2016: 319) further claim that the reduplication cannot be embedded under negation. But (14) shows that this is not the case.

(14) (a) nǐ-men zhǐ zhīdào zébèi rénjiā, quán bù *xiǎng-xiang* zìjǐ.
you-PL only know blame others at.all not think-think self
(CCL)
'You only blame others, not thinking about yourselves at all.'

(b) jiàoyuán … bù *fān-fan* shū, jiù yǒuxiē wēixiǎn de
lecturer not flip-flip book just somewhat dangerous DE
jiù shì. (CCL)
just be
'If lecturers do not read a bit of books, then it is somewhat dangerous.'

(c) huāerjiàng jiǎnzhí bù guǎn shì le, … shénme dōngxi
florist at.all not care thing PTC what thing
yě bù *shōushi-shōushi*. (CCL)
also not tidy-tidy
'The florist did not care about anything at all, did not tidy up anything.'

Finally, Sui & Hu (2016: 322) claim that a reduplicated verb cannot combine with a quantized object. However, examples in (15) prove otherwise.

(15) (a) tā … *kàn-kan* sān gè rén hé nà liàng chēzi …
he look-look three CLF person and that CLF car
(CCL)
'He took a look at the three people and that car …'

(b) wǒ xiǎng zhuózhòng *shuō-shuo* liáng gè hùxiāng
I want emphasize say-say two CLF each.other
liánxì-zhe de zhòngyào chéngguǒ: …
connect-DUR DE important outcome
'I want to highlight two important interconnected outcomes.'

One reviewer suggests that Sui & Hu's (2016: 322) claim only holds true for accomplishments, not activities. Since a quantized object only make accomplishments but not activities telic, the acceptability of (15) is expected (more on the semantics of reduplication will be discussed in Section 2.3). However, we also find examples of reduplicated accomplishments followed by quantized objects in CCL and BCC, as shown in (16).

(16) (a) qíshí tā yìzhí xiǎng *xiě-xiě* liǎng wèi lǎoshī …
actually he always want write-write two CLF teacher
(CCL)
'Actually, he has always wanted to write a bit about two teachers.'

(b) nánrén gēn nánrén de gōutōng bǐjiào kuài, …
man and man DE communication relatively fast
hē-he liǎng bēi jiù xíng le. (BCC)
drink-drink two cup just ok PTC
'The communication between men is relatively fast, … they just need to drink two cups together.'

In sum, we consider that the reduplication has a similar syntactic distribution as an unreduplicated verb, and the incompatibility of the reduplication with duration and frequency phrases as well as aspect markers other than *le* can be explained semantically, as we will show in the next section.

2.3. Semantics

As shown in Section 1, the reduplication seems to be connected to certain aspectual properties. The current study adopts the two-component aspect model proposed by Xiao & McEnery (2004) based on Smith (1991). The general term "aspect" is considered to encompass the following two components: situation aspect, i.e. "aspectual information conveyed by the inherent semantic representation of a verb or an idealized situation" (Xiao & McEnery 2004: 21); and viewpoint aspect, i.e. "the aspectual information reflected by the temporal perspective the speaker takes in presenting a situation" (Xiao & McEnery 2004: 21). Situation aspect can be further modeled as verb classes at the lexical level and situation types (the interaction of verb classes and other constituents, such as adjuncts) at the sentential level (Xiao & McEnery 2004: 33). The verb classes are determined with verbs in a neutral context (preferably in a perfective viewpoint aspect, with a simple object only when it is obligatory), where everything that might change the aspectual value of a verb is excluded and only the inherent features of the verb itself are considered (see Xiao & McEnery 2004: 52 for more details). This does not rule out the fact that the same verb may express different aspectual properties in other contexts, but its verb class remains the same, as the aspectual change can be attributable to other components at the sentential level.

In this section, we will first discuss the core meaning of the reduplication as well as the meaning of its different forms (Section 2.3.1). We will then investigate the interaction of the reduplication with verb classes (Section 2.3.2), aspect markers (Section 2.3.3) and other sentential components (Section 2.3.4) .

2.3.1. Core meaning

The reduplication has a *delimitativeness* meaning (e.g. Chao 1968: 204–205; Li & Thompson 1981: 232; Li 1996: 14; Dai 1997: 70; Zhu 1998: 382–383; F. Xing 2000: 420–421; Q. Chen 2001: 48; Tsao 2001: 288; Yang 2003: 11–12; Xiao & McEnery 2004: Sec. 4.3). To be specific, the reduplication of [+durative] verbs reduces the duration of the events, and the reduplication of [−durative] verbs reduces the iteration frequency of the events (Li 1996: 14; Xiao & McEnery 2004: 149–150). Besides delimitativeness, Chao (1968: 204), Fan (1964: 276), Smith (1991: 356; 1994: 199–120), Li (1996: 14) and Tsao (2001: 290–291) suggest that the

reduplication signifies *tentativeness*, which can be used "to refer modestly to one's own activities, or for mild imperatives" (Smith 1991: 356), or "trying to" do something (Li & Thompson 1981: 234). *Frequentativeness* or *habitualness*, that the event denoted by the verb happens frequently or habitually, is mentioned by Fan (1964: 276), Li (1996: 15) and Qian (2000: 1) as the meaning of reduplication as well. Fan (1964: 276) further proposes a meaning of *slightness* or *casualness* for reduplication, which implies that the event is unimportant or conveys a casual attitude of the speaker. Zhu (1998: Sec. 3.1.3) suggests that the main function of reduplication is to *increase the agency* of the action or the change denoted by the verb.

In general, all of the above cited research agree that the reduplication expresses a short duration and/or a low frequency, which fits the definition of delimitativeness. Xiao & McEnery (2004: 152–154) and Yang (2003) argue that the core meaning of reduplication is delimitativeness, while all other meanings are merely pragmatic extensions in specific contexts. Xiao & McEnery (2004: 152–154) points out that tentativeness and casualness are constrained by a number of contextual elements such as the reduplicated verb must be volitional and the subject of the sentence must be animate. But these constraints are only necessary but not sufficient conditions for a tentative or casual meaning of reduplication. Among all instances of verbal reduplication they found in a corpus, all of them have a delimitative reading, while only some of them convey tentativeness or casualness. Yang (2003) compares the sentence pairs with reduplicated verbs and their unreduplicated counterparts, and shows that the reduplication itself does not add a tentative, frequentative, casualness or increased agency meaning to the sentence. Rather, these additional meanings arise from the sentences or the contexts as a whole. She concludes that these additional meanings are results of meaning extensions of delimitativeness in specific contexts. We follow Xiao & McEnery (2004) and Yang (2003) and treat delimitativeness as the central meaning of reduplication, and the other meanings as pragmatic extensions.

The semantics of the reduplication has the properties of transitoriness, holisticity and dynamicity (Dai 1997: 70–79; Xiao & McEnery 2004: 155–159). It presents the situation as a transitory and non-decomposable whole. A situation expressed by a sentence with the reduplication involves changes not only in the initiation and termination of an event, but also in the transitory process itself. Compared to (17a), which could mean that the protagonist kept staring at the the footprint, (17b) indicates that the protagonist took a brief look or several brief looks at the footprint and looked away in the end, which is a process full of changes.

(17)	(a)	Wú	Xùmáng	kàn-le	zuò-àn	shí	liúxià	de
		Wu	Xumang	look-PFV	commit-crime	when	leave	DE

jiǎoyīn … (Xiao & McEnery 2004: 158)
footprint
'Wu Xumang looked at the footprint left when the crime was committed.'

(b) Wú Xùmáng *kàn-le-kàn* zuò-àn shí liúxià de
Wu Xumang look-PFV-look commit-crime when leave DE
jiǎoyīn … (Xiao & McEnery 2004: 158)
footprint
'Wu Xumang looked a little bit at the footprint left when the crime was committed.'

The semantics of A-*le*-A can be deduced compositionally from its structure. It is a hierarchical combination of the perfective aspect and delimitativeness, "conveying a transitory event which has been actualized" (Xiao & McEnery 2004: 151).

As for A-*yi*-A, Fan (1964: 273) compares examples found in novels and plays and concludes that A-*yi*-A has exactly the same meaning as its AA counterpart. She thus assumed that AA is merely a form of A-*yi*-A, where the *yi* is omitted phonologically. F. Xing (2000: Sec. 5) considers that the major difference between AA and A-*yi*-A lies in the speaker's attitude. The former conveys a casual attitude whereas the latter sounds more serious. However, he stresses that there is no difference in the delimitative semantics of both forms, and that the variance in meaning is a pragmatic one. The difference is also not absolute and often only shows a tendency. Xu (2002) finds out that compared to A-*yi*-A, one tends to use AA in contexts with strong emotional attitudes, urgent, casual, timid or uncertain contexts. But he also states that these differences are pragmatic rather than semantic, as he argues that AA and A-*yi*-A can be used interchangeably in most cases, and the differences in meaning only arise from specific contexts as a whole. Yang (2003: 15) suggests that AA and A-*yi*-A have the same core meaning, while A-*yi*-A implies a slightly more serious attitude than AA due to its length. We assume A-*yi*-A to be a form of reduplication and that it has the same core semantics as AA.

AA-*kàn* and A-*kàn-kàn* are described to express a "try … and find out" meaning (Cheng 2012: 63). Tsao (2001: 290) also observes that the tentative meaning is particularly prominent when the reduplication is followed by *kàn* 'look'. We still consider the tentativeness implied by these two forms to be a pragmatic extension of delimitativeness. The tentative meaning is made prominent by the verb *kàn* 'look', and the whole structure can be understood as "do A a little bit and see".

2.3.2. Interaction with verb classes

Previous research often claims that the reduplication can only be used for certain verb classes, while it is infelicitous for other ones. Li & Thompson

(1981: 234–235) and Hong (1999: 277–278) suggest that reduplication is only possible for volitional activity verbs. Dai (1997: 70–71) and Tsao (2001: 290) both consider that reduplication can only be used in dynamic situations. The former further claims that achievement verbs cannot be reduplicated. Xiao & McEnery (2004: 155), Arcodia et al. (2014: 20) and Basciano & Melloni (2017: 145) propose that only [+dynamic] and [−result] verbs can be reduplicated. This means that the reduplication can only interact with dynamic situations which encode no results and is consequently only compatible with activities and semelfactives, but not with states and achievements.

Q. Chen (2001: 53) and Yang (2003: 10–11) acknowledge that the reduplication of non-volitional verbs is more restricted than that of volitional ones. But Zhu (1998: 381–382) lists a number of non-volitional predicates that can be reduplicated. We found the examples shown in (18) in CCL where non-volitional verbs *wěiqū* 'feel wronged', *rèn-xìng* 'be willful' and *diào* 'drop' are reduplicated.[4]

(18) (a) kěshì xiànmùjīn, dàjiā yě zhǐhǎo
but now everybody also can.only
wěiqū-wěiqū le. (CCL)
feel.wronged-feel.wronged PTC
'But now, everybody can only feel wronged a little bit.'

(b) tā-men néng zuò de búguò shì
she-PL can do DE just be
rèn-rèn-xìng, shuǎ diǎn'er xiǎo píqì,
be.willful-be.willful-temperament play a.little small temper
diào-diao yǎnlèi shénmede. (CCL)
drop-drop tear what
'What they can do is just to be a little bit willful, to lose their temper a little bit and to drop a little bit of tears or something.'

It is true that the reduplication of stative and achievement verbs is not as easily acceptable as that of activities and semelfactives. Xiao & McEnery (2004: 155) classify *bìng* 'be sick' as a stative verb. Indeed, compared to the questionable reduplication of *bìng* 'be sick' in (19a), the reduplication of the activity verb *kàn* 'watch' in (19b) and that of the semelfactive verb *késòu* 'cough' in (19c) are readily acceptable.

[4] A reviewer notes that verbs depicting events not controlled by an agent sometimes can undergo reduplication, especially in imperative, conditional, or causative sentences. It is worthwhile to delve into why such sentence structures enable reduplication for these verbs. It is also worth noting that the sentences in (18) are not imperative, conditional or causative sentences. This shows that non-volitional verbs can also be reduplicated outside of the aforementioned sentence structures

(19) (a) ? tā *bìng-bing* jiù hǎo le.
he be.sick-be.sick then well PTC
(Xiao & McEnery 2004: 155)
Intended: 'He was sick for a little while and then got well.'

(b) tā *kàn-le-kàn* nà chǎng bǐsài.
he watch-PFV-watch that CLF competition
'He watched that competition for a little while.'

(c) tā *késòu-késòu* jiù hǎo le.
he cough-cough then well PTC
'He coughed a little bit and then got well.'

However, examples such as (20) can be found where *bìng* 'be sick' is reduplicated.

(20) wǒ zhēn xiǎng *bìng-yi-bìng*, xiē tā ge shí tiān bàn yuè. (Q. Chen 2001: 54)
I really want be.sick-one-be.sick rest it CLF ten day half month
'I really want to be sick for a little while and rest for ten days or half a month.'

As a reviewer points out, Tham (2013: Sec. 3.3) considers *bìng* 'be sick' to be a basic change of state (COS) verb, i.e. 'become sick'. In contrast, she uses *xǐhuān* 'like' and *xiāngxìn* 'believe' as examples of stative verbs. Peck et al. (2013: 680) also list *xǐhuān* 'like' and *xiāngxìn* 'believe' as stative verbs. For these two verbs, examples such as (21) and (22) can be found.

(21) zhè chē hǎo xíng a! zěnme le, wǒ jiù *xǐhuān-xǐhuān* bùxíng me? (BCC)
this car so cool PTC what PTC I just like-like cannot PTC
'This car is so cool! What? I can't just like it for a little bit?'

(22) shéi ràng wǒ lái *xiāngxìn-xiāngxìn* (CCL)
who let I come believe-believe
'Who lets me believe him/her?'

On the other hand, as the reviewer and indeed Tham (2013: 669–670) herself note, verbs expressing psychological states such as these can have a COS interpretation (but not necessarily), let us look at other examples of stative verbs listed by Peck et al. (2013: 680) which do not express psychological states, and examples in Xiao & McEnery (2004: Sec. 3.3.3) of individual-level states (ILSs) which only have stative interpretation, as opposed to stage-level states (SLSs) which can have both

stative and dynamic interpretations.[5] The following examples contain the reduplication of *xiàng* 'look like' and *zài-chǎng* 'be present on the scene'.

(23) Context: Wáng Shèngdí is the actor of the character Gù Miǎo in a TV series. Wáng Ānyǔ is another actor in the series.

Wáng Shèngdí … tài xiàng Gù Miǎo le. Wáng Ānyǔ
Wang Shengdi very look.like Gu Miao PTC Wang Anyu
nǐ kuàidiǎn yě *xiàng-yi-xiàng* ba![6]
you fast also look.like-one-look.like PTC
'Wang Shengdi … really looks like Gu Miao. Wang Anyu, you too should just look like (your character) already!'

(24) tā … hèn xūyào mǔqīn *zài-yi-zài-chǎng* … (CCL)
she very need mother be.present-one-be.present-scene
'She … really needs her mother to be present on scene for a little while …'

One might argue that even in the examples above, dynamic rather than stative meaning is conveyed. We argue that the dynamic interpretation does not come from the verb but from reduplication. The use of reduplication affects the situation aspect at the sentential level. And as we describe in Section 2.3.1, the semantics of reduplication has the property dynamicity. Verbs such as *xiàng* 'look like' and *zài-chǎng* 'be present on the scene' are stative in a neutral context and thus, we consider the intrinsic feature of these verbs to be stative and they should be classified as stative verbs. The dynamic interpretation only arises when they are used in specific contexts, in this case, when they are reduplicated.

Similar to stative verbs, the reduplication of achievement verbs is also not readily acceptable, as shown in (25) with reduplication of *yíng* 'win'.

(25) ? tā *yíng-le-yíng* ná chǎng bǐsài.
he win-PFV-win that CLF competition
(Xiao & McEnery 2004: 155)
Intended: 'He won that competition a little bit.'

However, examples such as those in (26a–c) can be found. Here, achievement verbs like *wàng* 'forget' and *shēng* 'give birth to' are reduplicated.

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[5] Note that most examples of ILSs in Xiao & McEnery (2004: Sec. 3.3.3) are adjectives. Since in Mandarin Chinese, adjectives have a different reduplication pattern (see e.g. Tsao 2001: Sec. 2.2, Fan et al. 2015: Sec. 4.1, Sui 2018: Sec. 3), and further, COS verbs can be systematically derived from adjectives (Tham 2013: Sec. 3), these predicates are not included in our examples.

[6] https://www.163.com/dy/article/FS1FKUC30534DZO1.html (Accessed 26th March 2024).

(26) (a) děng rén-men ba zhè jiàn shì *wàng-wang* zài shuō
wait people-PL BA this CLF incident forget-forget then talk
ba.[7]
PTC
'Let's wait until people forget this incident a little bit and then talk about it.'

(b) wómen nǚrén … zhǐ néng *shēng-shēng*
we women only can give.birth.to-give.birth.to
háizi… (BCC)
child
'We women can only give birth to children …'

(c) jiào tā *shēng-shēng* xiǎohái, jiù zhīdào zuò
let she give.birth.to-give.birth.to child then know COP
mǔqīn de gān-kǔ le. (L. Chen 2005: 112)
mother DE sweet-bitter PTC
'Let her try to give birth to a child and then she will know the bittersweetness of being a mother.'

The examples presented in this section show that although the reduplication does have a tendency to interact with volitional verbs and with activities and semelfactives due to its dynamic meaning, this is by no means a rigid constraint, and non-volitional verbs, states and achievements can be reduplicated in appropriate contexts as well, contrary to common beliefs in the literature. Thus, a theoretical account of reduplication should not restrict its use to only certain verb classes.

2.3.3. Interaction with aspect markers

As mentioned in Section 2.2, the reduplication can only be marked by the perfective aspect marker *le* but not other aspect markers.[8] We believe this incompatibility to be for semantic reasons.

Xiao & McEnery (2004: Ch. 4) consider *le*, *guo* and reduplication to indicate perfective aspects, as they all view the situation as an inseparable whole. The perfective aspect marker *le* is compatible with reduplication while the experiential aspect marker *guo* is not. Xiao & McEnery (2004: 128–131) state that *le* has the semantic feature of dynamicity, since it "can focus on both heterogeneous internal structures and changing points" (Xiao & McEnery 2004: 129). It can be combined with a situation with a

[7] Liú, Zhēn. 1963. *Cháng cháng de liúshuǐ [Long long water]*, 72. Beijing: The Writers Publishing House.

[8] There is no consensus on which elements exactly are considered aspect markers in Mandarin Chinese. We only discuss the most commonly recognized ones here.

dynamic internal structure, such as crying in (27a). It can also co-occur with a situation with a change at a certain time point, such as getting to know in (27b). As shown in Section 2.3.1, reduplication can also express dynamicity of both a time point and a time period, just like *le* illustrated here. Therefore, *le* is compatible with reduplication.

(27) (a) wèicǐ, Dèng Lìjūn shāngxīnde kū-le sān tiān.
for.this Deng Lijun sadly cry-PFV three day
(Xiao & McEnery 2004: 129)
'For this reason, Deng Lijun cried sadly for three days.'

(b) tā zhīdào-le zhè shì de nèi-qíng.
he know-PFV this matter DE inside-information
(Xiao & McEnery 2004: 130)
'He got to know the inside information on this matter.'

In comparison, the experiential aspect marker *guo* cannot co-occur with a reduplicated verb, because its dynamicity attributes to an "experiential change" (Xiao & McEnery 2004: 148), namely that a situation has been experienced historically and that "the final state of the situation no longer obtains" at the reference time (Xiao & McEnery 2004: 144). Compare (28a) and (28b), *guo* in (28a) suggests a change out of the state of being a soldier, whereas *le* in (28b) conveys a change into the state of being a soldier (Xiao & McEnery 2004: 149).

(28) (a) tā dāng-guo bīng. (Xiao & McEnery 2004: 149)
he serve.as-EXP soldier
'He once served as a soldier.'

(b) tā dāng-le bīng. (Xiao & McEnery 2004: 149)
he serve.as-PFV soldier
'He became a soldier.'

It is clear that *guo* only indicates a change at the termination of a situation and cannot express the dynamicity within a situation. Hence, it is incompatible with the semantics of the reduplication.

Due to the holistic semantics of the reduplication, it is incompatible with imperfective aspect markers: the durative aspect marker *zhe* and the progressive aspect marker *zài*, as both only focus on a part of the situation and do not view the situation as a whole (Xiao & McEnery 2004: Ch. 5).

From the illustration above, it seems that due to its semantics, reduplication can only be marked by *le* but not the other aspect markers.

2.3.4. Interaction with other sentential components

The reduplication is incompatible with an expression that quantifies the duration or the extent of the event expressed in the sentence (29) (Li 1998: 83–84; L. Chen 2005: 114–115). This is because the reduplication already

contains a quantity meaning (Li 1998: 84; L. Chen 2005: 114–115), namely a short duration or a small extent, which cannot be measured on a concrete scale (Xiao & McEnery 2004: 155; Sui & Hu 2016: 333). This results from the properties of reduplication rather than the verb itself, as the verb itself can be combined with such an expression (29a).

(29) (a) tā yì tiān pǎo shí lǐ. (Li 1998: 83)
he one day run ten mile
'He runs ten miles a day.'

(b) * tā yì tiān *pǎo-pǎo* shí lǐ.
he one day run-run ten mile

2.4. Word vs. phrase

The literature on reduplication makes different assumptions on whether it is a morphological or syntactic phenomenon. Chao (1968: Ch. 4), Li & Thompson (1981: Ch. 3), Dai (1992: Sec. 4.1) and Liao (2014: 4–5) list reduplication under morphological processes. By contrast, Arcodia et al. (2014: 23), Xiong (2016), Basciano & Melloni (2017: 146), Yang & Wei (2017: 229–231), Melloni & Basciano (2018: 330) and Xie (2020) claim it to be syntactic. This section reviews the arguments in Xie (2020), and applies tests from Dai (1992: Sec. 7, 1998: Sec. 2.3–2.4) to distinguish words from phrases in Mandarin Chinese. The results are compatible with a lexical analysis.

Xie (2020) compares the AA and the ABAB forms of reduplication with the AABB form and claims that AA and ABAB are syntactic processes while AABB is morphological. She points out that AA and ABAB behave differently from AABB in their productivity, possibility of *le* insertion, categorial stability, transitivity, and input/output constraints. While AA and ABAB are highly productive, AABB shows low productivity. *Le* can be inserted freely into AA (30) and ABAB (31) but not into AABB (32).

(30) (a) Yáo Míng *kàn-kàn* tā de fānyì Kē Lín …
Yao Ming look-look he DE translator Ke Lin
'Yao Ming looked at his translator Ke Lin a little bit …'

(b) Yáo Míng *kàn-le-kàn* tā de fānyì Kē Lín … (CCL)
Yao Ming look-PFV-look he DE translator Ke Lin
'Yao Ming looked at his translator Ke Lin a little bit …'

(31) (a) tā *héjì-héji*, duì Jiāng Qīng shuō …
he consider-consider to Jiang Qing say
'He considered a little bit, and told Jiang Qing …'

(b) tā *héjì-le-héji*, duì Jiāng Qīng shuō … (CCL)
he consider-PFV-consider to Jiang Qing say
'He considered a little bit, and told Jiang Qing …'

(32) (a) *yáo-yáo-huàng-huàng* jiù bá chūlái le.
shake-shake-sway-sway then pull out PTC
(Xie 2020: 85)
'Shake it a little bit and then it will be pulled out.'

(b) * *yáo-yáo-le-huàng-huàng* jiù bá chūlái le.
shake-shake-PFV-sway-sway then pull out PTC
(Xie 2020: 85)

The output of AA and ABAB does not change the grammatical category of the input (verb), but the output of AABB could have other categories such as adverb (33) or adjective (34).

(33) (a) * diàn-chē *yáo-huàng-yáo-huàng* kāi zǒu …
electric-car shake-sway-shake-sway drive away
(Xie 2020: 86)

(b) diàn-chē *yáo-yáo-huàng-huàng* kāi zǒu …
electric-car shake-shake-sway-sway drive away
(Xie 2020: 86)
'The tram drove away jiggly …'

(34) (a) * … zuò zài *yáo-huàng-yáo-huàng* de chē shàng
sit on shake-sway-shake-sway DE car on
(Xie 2020: 86)

(b) … zuò zài *yáo-yáo-huàng-huang* de chē shàng
sit on shake-shake-sway-sway DE car on
(Xie 2020: 86)
'… sit on the jiggling car'

AA and ABAB do not change the valency of the input verb, but AABB makes a transitive verb intransitive (35).

(35) (a) qiāo-dǎ gān-jīng shì huǎnjiě gān-qì de hǎo
knock-beat liver-channel COP relieve liver-*qi* DE good
bànfǎ. (Xie 2020: 88)
method
'Beating the liver channel is a good method to relieve the stagnation of liver *qi*.'

(b) *qiāo-dǎ-qiāo-dǎ* gān-jīng shì huǎnjiě gān-qì
knock-beat-knock-beat liver-channel COP relieve liver-*qi*
de hǎo bànfǎ. (Xie 2020: 88)
DE good method
'Beating the liver channel a little bit is a good method to relieve the stagnation of liver *qi*.'

(c) * *qiāo-qiāo-dǎ-dá* gān-jīng shì huǎnjiě gān-qì
knock-knock-beat-beat liver-channel COP relieve liver-*qi*
de hǎo bànfǎ (Xie 2020: 88)
DE good method

(d) *qiāo-qiāo-dǎ-dǎ* shì huǎnjiě gān-qì de hǎo
knock-knock-beat-beat COP relieve liver-*qi* DE good
bànfǎ
method
'Knocking around is a good method to relieve the stagnation of liver *qi*.'

The two groups also have different input and output constraints. Xie (2020) claims that only dynamic and volitional verbs can undergo AA or ABAB reduplication (but see Section 2.3.2). In comparison, AABB requires its input to be a complex verb whose constituents are either synonymous, antonymous or logically coordinated (36). Moreover, as can be seen in the translation in (36), the output of AABB has an increasing meaning, i.e. an event happens repeatedly or continuously, as opposed to the delimitative meaning of AA and ABAB.

(36) (a) duǒ-shǎn → *duǒ-duǒ-shǎn-shǎn* (Xie 2020: 88)
hide-dodge hide-hide-dodge-dodge
'hide and dodge' 'hide and dodge repeatedly'

(b) jìn-chū → *jìn-jìn-chū-chū* (Xie 2020: 88)
enter-exit enter-enter-exit-exit
'enter and exit' 'enter and exit repeatedly'

(c) shuō-xiào → *shuō-shuō-xiào-xiào* (Xie 2020: 88)
talk-laugh talk-talk-laugh-laugh
'talk and laugh' 'talk and laugh continuously'

However, a morphological process can be productive, and it does not necessarily change the category or valency of the input. For instance, the *-able* derivation in English is a productive morphological process. Tense inflections in English such as *-ed* change neither the category nor the valency of the input verb.[9] Further, if *le* is considered to be a morphological element (e.g. Huang et al. 2009: 101–102; Müller & Lipenkova 2013: 246), the insertion of *le* does not have to be viewed as a syntactic process either. It seems that Xie (2020) only shows that AA and ABAB are different processes than AABB, but not necessarily that the former is syntactic while the latter morphological.

A reviewer claims that *le* insertion can be seen as a violation of lexical integrity, because it is never found in between the two constituents of a

[9] We do not claim reduplication to be either inflection or derivation.

compound word, but must be placed after the whole unit. For instance, Her (2006: 1282) claims that the V-*gěi* sequence cannot be separated and uses this as evidence for analyzing it as a single lexical item (*jì-gěi-le tā* 'send-give-PFV he, sent him' vs. ? *jì-le-gěi tā* 'send-PFV-give he'). In non-separable VO compounds, *le* insertion also does not seem to be possible (*guān-xīn-le* 'close-heart-PFV, cared for' vs. ? *guān-le-xīn* 'close-PFV-heart'). The AABB form of reduplication also only accepts *le* to its right but not in between (37).

(37) (a) wǒ … *yáo-yáo-huàng-huàng-le* jǐ xià … (CCL)
I shake-shake-sway-sway-PFV several time
'I shook and swayed several times …'

(b) * wǒ … *yáo-yáo-le-huàng-huǎng* jǐ xià …
I shake-shake-PFV-sway-sway several time

In respond to this, we found counter-examples that show *le* insertion in between V-*gěi* (38) as well as *guān-xīn* 'close-heart, care for' (39) is possible.

(38) … xǔduō nǚzǐ, jiāng zìjǐde xiàngpiān … jì-le-gěi tā.
many women take own photo send-PFV-give he
(CCL)
'Many women … sent him photos of themselves.'

(39) xǔduō tóngzhì … zìdòngde duì bìngyuán guān-le-*xīn*.
many comrade voluntarily to patient close-PFV-heart
(CCL)
'Many comrades … voluntarily cared for the patients.'

In any case, since reduplication is not compounding (Sui 2018: 149–150; Gao et al. 2021 provide psycholinguistic evidence), and the patterns discussed here constitute a different process than the AABB pattern (see the discussions above, also Deng 2013: Sec. 4.3, Sui & Hu 2016: Sec. 2, Sui 2018 and Wang 2023), it is not surprising that *le* occurs at a different position.

It is, therefore, necessary to resort to other tests that are intended to distinguish words from phrases in Mandarin Chinese. For this purpose, Dai (1992: 32–33, 1998: 117–120) proposes the modification and the expansion tests.

First, the modification test suggests that subparts of a word cannot be modified at a phrasal level. This is possible for a VP (40), as the NP inside of the VP can be modified by e.g. an AP.

(40) kāi hóngsède mén
open red door
'open the red door'

In contrast, the individual verbs in reduplication cannot be modified by an e.g. AdvP. (41) is ungrammatical whether the AdvP is interpreted to

modify the first or the second verb. This shows that it has nothing to do with the relative position of the verb and the AdvP.[10]

(41) * kàn tōutōude kàn
look secretly look

Second, the expansion test suggests that a phrasal dependent (either a modifier or an argument) cannot be inserted into a word. This is possible for a verbal classifier phrase (42), as the object can occur after or in between.

(42) (a) kāi mén sān cì
open door three CLF
'open the door three times'

(b) kāi sān cì mén
open three CLF door
'open the door three times'

For reduplication, this is also not possible (43), as the object cannot be inserted between the two verbs.

(43) (a) *kāi-(le)-kāi* mén
open-PFV-open door
'open the door for a little while'

(b) * *kāi-(le)-mén-kāi*
open-PFV-door-open

The above two tests seem to indicate a lexical analysis for reduplication.

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[10] A reviewer questions the rationale for inserting an adverb within the reduplication, since an adverb also cannot be inserted into a VP consisting of a verb and its object, as shown below in (1).

(1) * kāi qiāoqiāode mén
open quietly door

The ungrammaticality of (1) can be explained by the fact that almost all Mandarin Chinese adverbials are obligatorily pre-verbal (Ernst 2014: 50), as illustrated in the example below in (2).

(2) (a) tā qiāoqiāode zǒu-le.
he quietly go-PFV
'He quietly went away.'

(b) * tā zǒu-le qiāoqiāode.
he go-PFV quietly

Ernst (2014: 50) mentions that the only possible post-verbal adverbials are participant PPs (*with somebody*), manner or resultative V-de constructions as well as duration and frequency expressions. (42b) shows a case of inserting a frequency expression into a VP. This suggests that it is possible to insert adverbials into a VP.

This word order constraint is not a problem for the test in (41), as the adverb can, in principle, be interpreted as modifying the second verb.

Cross-linguistically, verbal reduplication in Mandarin Chinese patterns more with morphological reduplication (below as *reduplication*) in other languages than syntactic reduplication (below as *repetition*; Gil 2005: 31, Forza 2016: 1–2).[11] Gil (2005: 35–36) considers non-iconicity and having only two (but not more) copies as sufficient but not necessary conditions for reduplication. He further proposes building one intonational group as sufficient and necessary condition for reduplication (p. 36). All three conditions are true for verbal reduplication in Mandarin Chinese (see Sui 2018: 154 on the intonation of verbal reduplication in Mandarin Chinese). Forza (2016: 9) argues that the substantial difference between reduplication and repetition lies in the fact that only the former affects grammatical features such as aspect. This is also the case for verbal reduplication in Mandarin Chinese.

In sum, we maintain that verbal reduplication in Mandarin Chinese is better off analyzed as a morphological phenomenon.

3. Previous analyses

Previous analyses on the reduplication in Mandarin Chinese and in other languages can be classified into three groups: the reduplication as a verbal classifier phrase (Section 3.1), as an aspect modifier (Section 3.2), and as a special reduplication construction (Section 3.3).[12] This section will review these analyses and will discuss their advantages and shortcomings.

3.1. The reduplication as a verbal classifier phrase

Fan (1964), Chao (1968: 205) and Xiong (2016) analyze the reduplication in Mandarin Chinese as a verbal classifier phrase[13]. A verbal classifier is "a measure for verbs of action expresses the number of times an action takes place" (Chao 1968: 615), such as the *cì* in (44).

(44) méi chě-guo yí cì huǎng (Chao 1968: 616)
not tell-EXP one CLF lie
'haven't told lie once'

In this analysis, the first element in the reduplication is the actual verb, the second element is a verbal classifier borrowed from a verb, and *yi* 'one' is

[11] We do not claim that the syntactic analyses of reduplication discussed in Section 3 consider verbal reduplication in Mandarin Chinese to be syntactic repetition.

[12] The term *construction* is used here in its general sense, not in the sense of Construction Grammar.

[13] Alternative terms for *verbal classifier*: *measure for verbs of action* in Chao (1968: 615) or *cognate object* in Chao (1968: 312) and Hong (1999: 263). The *verbal classifier phrase* is also termed *quantity adverbial* in Li & Thompson (1981: 352–353) or *frequency phrase* in Huang et al. (2009: 91).

an optional pseudo-numeral that only has an abstract 'a little bit' meaning. The analysis is syntactic.

The parallel between the reduplication and a verbal classifier phrase is obvious. Both the reduplication and the verbal classifier phrase serve to quantify the duration or the extent of a situation. A reduplication structure can often be paraphrased into a verbal classifier phrase such as *yí xià* 'once, a while', *yí huì* 'a while', as illustrated in (45).

(45) (a) *děng-děng* wǒ.
wait-wait I
'Wait for me a little bit.'

(b) děng wǒ yí xià.
wait I one CLF
'Wait for me a little while.'

However, there are several arguments suggesting that the reduplication cannot be analyzed the same way as a verbal classifier phrase. First, the verb and the verbal classifier can be separated (46), while the reduplication cannot (47) (Paris 2013: 269).[14]

(46) (a) nǐ děng yí xià Zhāngsān!
you wait one CLF Zhangsan
'Wait for Zhangsan for a while!'

(b) nǐ děng Zhāngsān yí xià!
you wait Zhangsan one CLF
'Wait for Zhangsan for a while!'

(47) (a) nǐ *děng-yi-děng* Zhāngsān!
you wait-one-wait Zhangsan
'Wait for Zhangsan a little bit!'

---

[14] One reviewer notes that the objects that can be placed in between the verbal classifier phrase is usually limited to pronouns and proper nouns. We found some examples from the corpus showing that not only pronouns and proper nouns can be placed before *yí xià* 'once':

(1) tā kàn-le tāde liǎn yí xià. (CCL)
she look-PFV his face one CLF
'She took a look at his face.'

(2) tā … jiù kàn-le bōli yí xià, bōli jiù làn-le. (CCL)
he just look-PFV glass one CLF glass just break-PFV
'He just took a look at the glass and the glass just broke.'

We think it has to do with the length of the object, i.e. shorter objects can be placed before *yí xià* 'once' while longer ones cannot.

Even if we accept that the object can be only be placed before *yí xià* 'once' in limited cases, the fact that the object can be placed before *yí xià* 'once' in some cases but in no cases in between reduplication suggests there is a fundamental difference between the structure of the two phenomena.

(b) * nǐ *děng* Zhāngsān *yi* *děng*!
you wait Zhangsan one wait

Second, unlike verbal classifiers (48), the *yi* 'one' in A-*yi*-A cannot be replaced by other numerals (49) (Yang & Wei 2017: 299–230).

(48) (a) tā pāi-le wǒ yí xià.
he pat-PFV I one CLF
'He patted me once.'

(b) tā pāi-le wǒ liǎng xià.
he pat-PFV I two CLF
'He patted me twice.'

(49) (a) tā *pāi-le-yi-pāi* wǒ.
he pat-PFV-one-pat I
'He patted me a little bit.'

(b) * tā *pāi-le-liǎng-pāi* wǒ.
he pat-PFV-two-pat I

Third, idioms (50a) lose their idiomatic meaning when used with verbal classifiers (50b), but maintain their idiomatic meaning with reduplications (50c) (Yang & Wei 2017: 230–231).[15]

(50) (a) bào fó-jiǎo
clasp Buddha-foot
Literal: 'clasp the Buddha's foot'
Idiomatic: 'make a last-minute effort'

(b) tā kǎoshì qián bào-le sǎn xià fó-jiǎo.
he exam before clasp-PFV three CLF Buddha-foot
'He clasped the Buddha's foot three times before the exam.'
(idiomatic reading unavailable)

(c) tā kǎoshì qián *bào-le-bào* fó-jiǎo.
he exam before clasp-PFV-clasp Buddha-foot
Literal: 'He clasped the Buddha's foot a little bit before the

[15] This applies except when *yí xià* 'once' is used. Because of this exception, one reviewer suggests that the loss of the idiomatic meaning in (50b) but not in (50c) may be attributed to the use of the numeral *sān* 'three' in (50b), because if *sān xià* 'three times' is replaced with *yí xià* 'once' in (50b), he/she can still get the idiomatic interpretation. We suggest that it is not *sān xià* 'three times' that is special, but it is *yí xià* 'once' that is special. We can replace *sān* 'three' with any number above two, and the distinction still exist. But *yí xià* 'once' has acquired a duration reading 'for a little while' that is not available to the other event quantifiers formed by *xià*, which only have the 'for X times' interpretation (Deng 2013: 77, Zhang 2000: 16). We think *liǎng xià* 'twice' is following this tendency, too. In this case, it is easy to interpret *yí xià* and *liǎng xià* not as referring to the actual number of action taking place, but as duration adverbials as a whole, thus differing them from "actual" verbal classifier phrases with other numerals.

exam.'
Idiomatic: 'He made a bit of a last-minute effort before the exam.'

Based on these observations, it seems inappropriate to view the reduplication as a kind of verbal classifier phrase.

3.2. The reduplicant as an aspect modifier

A number of studies consider the reduplication to be an element that modifies the aspectual properties of the base verb (Arcodia et al. 2014, Basciano & Melloni 2017, Yang & Wei 2017) due to the delimitative aspectual meaning of reduplication.

Arcodia et al. (2014) and Basciano & Melloni (2017) analyze the reduplication within the framework of First Phase Syntax (Ramchand 2008). Ramchand (2008) proposes that an event is comprised of the following phrases: the causative subevent (*init*P), the process subevent (*proc*P) and the result subevent (*res*P), which are ordered hierarchically, as illustrated in Figure 1.[16] Dynamic and volitional verbs have the features [init proc] and are therefore located under *init* and *proc* (Arcodia et al. 2014: 24; Basciano & Melloni 2017: 147). Achievement verbs possess the feature [res] and reside under *res* (Arcodia et al. 2014: 24; Basciano & Melloni 2017: 147). Stative verbs do not contain a *proc*P (Basciano & Melloni 2017: 152).

Arcodia et al. (2014) and Basciano & Melloni (2017) assume that the first element in the reduplication is the actual verb, which resides under *init* and *proc*, and that the second element is the copy of the verb, which resides in the complement position of *proc* and serves as an event delimiter. Since the second element occupies the same syntactic position as *res*P, it should have complementary distribution with *res*P and should thus be incompatible with achievement verbs because of their [res] feature. Furthermore, if *proc*P does not exist in the event, as in the case of states, there should be no place for the reduplication either.

This analysis correctly predicts that the reduplication of achievement verbs and stative verbs is not as easily acceptable as that of dynamic and volitional verbs (marked by [init, proc] features).

However, as shown in Section 2.3.2, the reduplication of states and achievements is unusual but not impossible. This suggests that the reduced acceptability of reduplicated achievement and stative verbs is *semantic* rather than *structural*. Their use is possible in specific contexts and should not be ruled out *syntactically*. Consequently, this proposal does not seem to offer an appropriate account for reduplication.

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[16] The present study does not argue for a NP or a DP analysis and simply takes over the illustration provided in the cited papers.

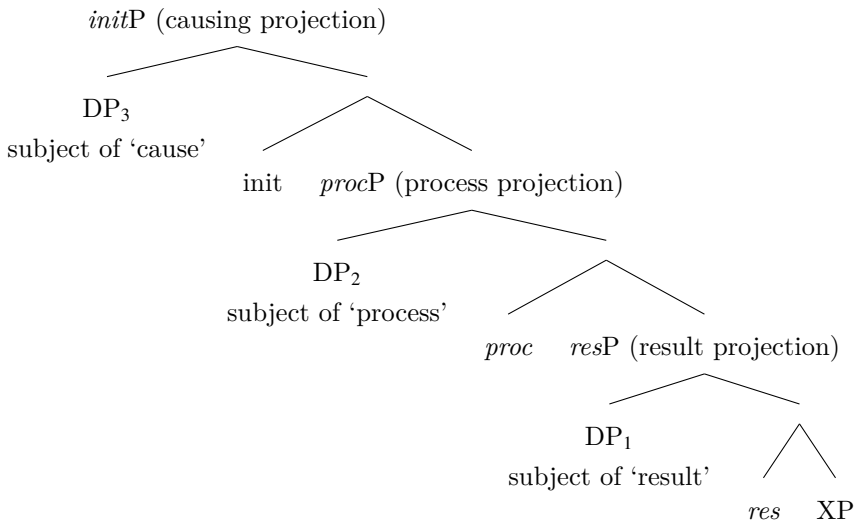

Figure 1: Event structure according to Ramchand (2008: 193)

Yang & Wei (2017: 229) endorse the analysis of reduplication as an aspect marker following the structure of Mandarin Chinese aspects proposed by Tsai (2008). Yang & Wei (2017) did not spell out the exact analysis. We infer the analysis for reduplication based on Tsai (2008), and show in Appendix A that Tsai's (2008) system has a syntax-semantics mismatch problem.

3.3. Reduplication construction

Fan et al. (2015) provide a unified HPSG analysis for the reduplication of both verbs and adjectives in Mandarin Chinese. They consider reduplication to be a morphological process and model it via lexical rules. They provide the lexical rule (51) for reduplication in general, and further propose *redup-a-lr* and *redup-v-lr* as subtypes of *redup-type*, as illustrated in (52) and (53) respectively.[17] For them, the reduplication functions as an intensifier predicate, as represented in the PREDICATE (PRED) in

[17] Note that the format in which the lexical rule is given is not the input–output format usually used for lexical rules in HPSG. Instead it is depicted as a unary branching phrase structure rule: the input is the daughter on the right-hand side of the rule. The output is the mother on the left-hand side. The view of lexical rules as unary branching rules is adopted in most current work on lexical rules (Briscoe & Copestake 1999, Meurers 2001) despite the notation that is commonly assumed.

HOOK is a technical feature for sharing information. LTOP and LBL will be explained in Section 4 below.

the CONSTRUCTIONAL-CONTENT (C-CONT). The *intensifier_x_rel* has two subtypes: *redup_up_x_rel* for the amplifiying meaning of adjectival reduplication and *redup_down_x_rel* for the delimitative meaning of verbal reduplication. The orthography is handled separately. The AABB form for adjectives and the ABAB form for verbs, as well as the AAB form for V-O compounds, are handled as irregular derivation forms.

(51)
$$\left[\begin{array}{ll} \textit{redup-type} & \\ \text{CAT}|\text{HEAD} & \boxed{1} \\ \text{VAL} & \boxed{2} \\ \text{CONT} & \boxed{3}\ \text{HOOK}\begin{bmatrix}\text{LTOP} & \boxed{4}\\ \text{IND} & \boxed{5}\end{bmatrix} \\ \text{C-CONT} & \left\langle\begin{bmatrix}\textit{event-rel} & \\ \text{PRED} & \textit{intensifier\_x\_rel}\\ \text{LBL} & \boxed{4}\\ \text{ARG1} & \boxed{5}\end{bmatrix}\right\rangle \end{array}\right] \rightarrow \begin{bmatrix}\text{CAT}|\text{HEAD} & \boxed{1}\\ \text{VAL} & \boxed{2}\\ \text{CONT} & \boxed{3}\end{bmatrix}$$

(52)
$$\left[\begin{array}{ll} \textit{redup-a-lr} \subset \textit{redup-type} & \\ \text{CAT}|\text{HEAD} & \textit{adjective} \\ \text{VAL} & \left[\text{SPR}\ \langle\rangle\right] \\ \text{C-CONT} & \left\langle\left[\text{PRED}\ \textit{redup\_up\_x\_rel}\right]\right\rangle \end{array}\right]$$
ORTHOGRAPHY: A → AA; (irregular AB → AABB)

(53)
$$\left[\begin{array}{ll} \textit{redup-v-lr} \subset \textit{redup-type} & \\ \text{CAT}|\text{HEAD} & \textit{verb} \\ \text{CONT}|\text{HOOK} & \left[\text{ASPECT}\ \textit{non-aspect}\right] \\ \text{C-CONT} & \left\langle\left[\text{PRED}\ \textit{redup\_down\_x\_rel}\right]\right\rangle \end{array}\right]$$
ORTHOGRAPHY: A → AA; A → A-*yi*-A; (irregular AB → ABAB)

This approach provides a unified account for adjectival and verbal reduplication. Their commonalities are captured by inheritance hierarchies of the intensifier predicates and the lexical rules. In the case of verbal reduplication, A-*yi*-A is analyzed as an alternative orthographical form of AA. This correctly captured the intuition that AA and A-*yi*-A express the same meaning and only differ from each other phonologically/orthographically (see Section 2.3.1).

Nevertheless, this analysis has some shortcomings. To begin with, since the combination with aspect markers is completely forbidden, it is impossible for this approach to account for A-*le*-A. Moreover, as verbal reduplication is considered to express a delimitative aspectual meaning, it seems unconvincing to assume that there is no aspect information

in its semantics. We consider a semantic explanation as described in Section 2.3.3 to be more reasonable for ruling out aspect markers other than *le*. Furthermore, this account can only deal with monosyllabic reduplication and handles ABAB and AAB as irregular forms, for the reason that ABAB and AAB reduplication of AB verbs "are not very productive in Chinese" (Fan et al. 2015: 102). This is not true. H. Xing (2000: 33), Basciano & Melloni (2017: 161), Melloni & Basciano (2018: 329) and Xie (2020: Sec. 3.1) all consider both AA and ABAB to be productive, and H. Xing (2000: 36) concludes that AAB is productive as well. Thus, these forms should not be handled as irregular forms, but should be derivable by lexical rules.

The shortcomings of previous analyses lead us to propose a new analysis on verbal reduplication with HPSG, that formalizes the phonology of the reduplication, resolves the problem of *yi* and preserves the generalization on aspect marking, as we will elaborate in Section 4.

4. A new HPSG analysis

In this section, we suggest a new lexical-rule-based analysis of aspect marking and reduplication using Minimal Recursion Semantics (MRS; Copestake et al. 2005). MRS is one instance of underspecified semantics as is currently used in theoretical and computational work in HPSG (Koenig & Richter 2024: Section 6, Bender et al. 2002: Section 3, Müller 2015: Section 4.4, Müller 2025: Chapter 5). The advantage of such types of semantics is that scope relations can be left underspecified. This way it is avoided that large numbers of analyses are assigned to single sentences. Instead sentences are paired with underspecified semantic representations from which various readings can be derived. MRS uses lists of elementary predications that are connected via pointers. Scope constraints are represented by statements of domination. This allows for elegant ways to underspecify scope. The details cannot be discussed here. The interested reader is referred to Copestake et al. (2005), Koenig & Richter (2024: Section 6) or for the use of MRS in a grammar of German to Müller (2025: Chapter 5). In what follows, we will present the elementary predications with the features assumed in MRS, but leave out handle constraints to keep things simple.

Like Fan et al. (2015), we assume lexical rules for reduplication. Our lexical rules are organized in an inheritance network. *verbal-reduplication-lr* is the most general type for reduplication lexical rules in this network and the implicational constraint in (54) shows the constraints on all structures of type *verbal-reduplication-lr*. Such structures take a verb as LEXICAL-DAUGHTER (LEX-DTR). The output reduplicates the PHONOLOGY (PHON) of the input verb with the possibility to have further phonological material in between. $\square$ indicates an underspecified list which could be empty or

not.[18] A delimitative relation is appended to the RELATIONS (RELS) value of the input verb, and it takes the event index of the input verb (3) as argument (ARG0, ..., ARG3 are feature names for arguments. The values are indices or events similar to variables in normal predicate logic.). The list of relations contains so-called elementary predications. There is no complicated embedding of relations. Instead each elementary predication comes with a label (LBL). The label can be used as an argument of another relation or in scope constraints, which are not provided here to keep things simple. The feature LTOP points to the local top. This is the elementary predication that is considered the top-most one in the RELS list. Other elementary predications may share the label or have arguments with labels of other elementary predications. We will discuss an example below when we discuss the perfective lexical rule. The label of the output (2) is identified with the label of the delimitative relation, hence *delimitative-rel* is treated as a modifier. Further relations can be added at the beginning of the RELS list to allow for the additional perfective meaning in A-*le*-A and A-*le-yi*-A. The combination with the perfective will be elaborated on in the following paragraphs.

(54) *verbal-reduplication-lr* ⇒

$$\left[\begin{array}{ll}
\text{PHON} & \boxed{1} \oplus \square \oplus \boxed{1} \\
\text{SYNSEM} & \left[\text{LOC}|\text{CONT} \left[\begin{array}{ll}\text{LTOP} & \boxed{2} \\ \text{IND} & \boxed{3}\end{array}\right]\right] \\
\text{RELS} & \square \oplus \boxed{4} \oplus \left\langle \left[\begin{array}{ll}\textit{delimitative-rel} & \\ \text{LBL} & \boxed{2} \\ \text{ARG0} & \boxed{3}\end{array}\right] \right\rangle \\
\text{LEX-DTR} & \left[\begin{array}{ll}
\text{PHON} & \boxed{1} \\
\text{SYNSEM}|\text{LOC} & \left[\begin{array}{ll}\text{CAT} & \left[\text{HEAD} \ \textit{verb}\right] \\ \text{CONT} & \left[\begin{array}{ll}\text{LTOP} & \boxed{2} \\ \text{IND} & \boxed{3}\end{array}\right]\end{array}\right] \\
\text{RELS} & \boxed{4}
\end{array}\right]
\end{array}\right]$$

To account for the variations in the phonology of the reduplication as well as the combination with the phonology and semantics of the perfective aspect marker *le*, the type hierarchy of lexical rules in Figure 2 is put forward. Apart from the type *perfective-reduplication-lr*, which adds the inherited perfective relation, there is a subtype *non-perfective-reduplication-lr*, which does not add further relations. Hence, what is □ in the RELS list

[18] The □ is equivalent to a tag with a number with the difference that □ is never shared. We follow Müller (2002: 161, 2003a: 294) and elsewhere in using this notation, since we think this is more precise than simply using three dots.

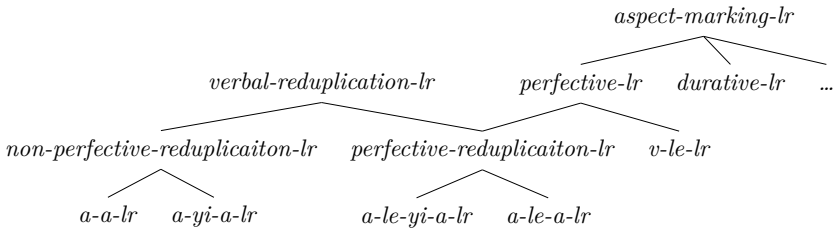

Figure 2: Type hierarchy for lexical rules of verbal reduplication and *le*

in (54) is the empty list in (55):

(55) *non-perfective-verbal-reduplication-lr* ⇒
$$\begin{bmatrix} \textsc{rels} & \boxed{1} \oplus \left\langle [] \right\rangle \\ \textsc{lex-dtr} & \left[\textsc{rels} \ \boxed{1} \right] \end{bmatrix}$$

The RELS list of the output of the lexical rule is the RELS list of the daughter ($\boxed{1}$) plus a list with one element. Since this element is specified in the supertype, it is not specified in (55) again.

non-perfective-verbal-reduplication-lr has *aa-lr* and *a-yi-a-lr* as direct subtypes. (57) and (58) show *aa-lr* and *a-yi-a-lr*, respectively. As subtypes of *verbal-reduplication-lr* illustrated in (54), both inherit the constraints on the LEX-DTR and on the semantics of the output, and because of (55), no extra material is appended to the RELS value of the input verb and the list containing the *delimitative-rel*. In addition to the inherited constraints, *aa-lr* and *a-yi-a-lr* specify the phonology of the output differently. *aa-lr* determines that the $\square$ between the two phonological copies in (54) is the empty list, whereas *a-yi-a-lr* specifies this list of phonological material as ⟨ *yi* ⟩:

(56) Constraints on lexical rules of type *aa-lr* and *a-yi-a-lr*:

(a) *aa-lr* ⇒
$$\begin{bmatrix} \textsc{phon} & \boxed{1} \oplus \boxed{1} \\ \textsc{lex-dtr} & \left[\textsc{phon} \ \boxed{1} \right] \end{bmatrix}$$

(b) *a-yi-a-lr* ⇒
$$\begin{bmatrix} \textsc{phon} & \boxed{1} \oplus \langle\ yi\ \rangle \oplus \boxed{1} \\ \textsc{lex-dtr} & \left[\textsc{phon} \ \boxed{1} \right] \end{bmatrix}$$

The lexical rules with all inherited constraints are given in (57) and (58):

(57) The AA lexical rule with all constraints inherited from the supertypes:

$$\left[\begin{array}{ll} \textit{aa-lr} & \\ \textsc{phon} & \boxed{1} \oplus \boxed{1} \\ \textsc{synsem} & \left[\textsc{loc}|\textsc{cont} \left[\begin{array}{ll} \textsc{ltop} & \boxed{2} \\ \textsc{ind} & \boxed{3} \end{array}\right]\right] \\ \textsc{rels} & \boxed{4} \oplus \left\langle \left[\begin{array}{ll} \textit{delimitative-rel} & \\ \textsc{lbl} & \boxed{2} \\ \textsc{arg0} & \boxed{3} \end{array}\right] \right\rangle \\ \textsc{lex-dtr} & \left[\begin{array}{ll} \textsc{phon} & \boxed{1} \\ \textsc{synsem}|\textsc{loc} & \left[\begin{array}{ll} \textsc{cat} & \left[\textsc{head} \ \textit{verb}\right] \\ \textsc{cont} & \left[\begin{array}{ll} \textsc{ltop} & \boxed{2} \\ \textsc{ind} & \boxed{3} \end{array}\right] \end{array}\right] \\ \textsc{rels} & \boxed{4} \end{array}\right] \end{array}\right]$$

(58) The A-*yi*-A lexical rule with all constraints inherited from the supertypes:

$$\left[\begin{array}{ll} \textit{a-yi-a-lr} & \\ \textsc{phon} & \boxed{1} \oplus \langle\ \textit{yi}\ \rangle \oplus \boxed{1} \\ \textsc{synsem} & \left[\textsc{loc}|\textsc{cont} \left[\begin{array}{ll} \textsc{ltop} & \boxed{2} \\ \textsc{ind} & \boxed{3} \end{array}\right]\right] \\ \textsc{rels} & \boxed{4} \oplus \left\langle \left[\begin{array}{ll} \textit{delimitative-rel} & \\ \textsc{lbl} & \boxed{2} \\ \textsc{arg0} & \boxed{3} \end{array}\right] \right\rangle \\ \textsc{lex-dtr} & \left[\begin{array}{ll} \textsc{phon} & \boxed{1} \\ \textsc{synsem}|\textsc{loc} & \left[\begin{array}{ll} \textsc{cat} & \left[\textsc{head} \ \textit{verb}\right] \\ \textsc{cont} & \left[\begin{array}{ll} \textsc{ltop} & \boxed{2} \\ \textsc{ind} & \boxed{3} \end{array}\right] \end{array}\right] \\ \textsc{rels} & \boxed{4} \end{array}\right] \end{array}\right]$$

v-le-lr is a direct subtype of the *perfective-lr*. *perfective-reduplication-lr* inherits from both *verbal-reduplication-lr* and *perfective-lr* and has two subtypes, *a-le-yi-a-lr* and *a-le-a-lr* itself. *verbal-reduplication-lr* is already presented in (54). We now turn to the constraints on *perfective-lr* and its subtypes.

Müller & Lipenkova (2013: 246) propose the perfective lexical rule given in (59), adapted to the formalization adopted in the current paper. It takes a verb as LEX-DTR and appends ⟨ *le* ⟩ to its phonology. Further, it accounts for the change in semantics by appending the RELS value of the input verb to a *perfective-rel*.

(59) Perfective lexical rule adapted from Müller & Lipenkova (2013:

246):

$$\begin{bmatrix} \textit{perfective-lr} & \\ \textsc{phon} & \boxed{1} \oplus \langle\ \textit{le}\ \rangle \\ \textsc{synsem}|\textsc{loc}|\textsc{cont} & \begin{bmatrix} \textsc{ltop} & \boxed{2} \\ \textsc{ind} & \boxed{3} \end{bmatrix} \\ \textsc{rels} & \left\langle \begin{bmatrix} \textit{perfective-rel} & \\ \textsc{lbl} & \boxed{2} \\ \textsc{arg0} & \boxed{3} \\ \textsc{arg1} & \boxed{4} \end{bmatrix} \right\rangle \oplus \boxed{5} \\ \textsc{lex-dtr} & \begin{bmatrix} \textsc{phon} & \boxed{1} \\ \textsc{synsem}|\textsc{loc} & \begin{bmatrix} \textsc{cat} & \begin{bmatrix} \textsc{head} & \textit{verb} \end{bmatrix} \\ \textsc{cont} & \begin{bmatrix} \textsc{ltop} & \boxed{4} \\ \textsc{ind} & \boxed{3} \end{bmatrix} \end{bmatrix} \\ \textsc{rels} & \boxed{5} \end{bmatrix} \end{bmatrix}$$

The event variables ($\boxed{3}$) of the input and the output verb are shared. The LTOP of the output of the lexical rule ($\boxed{2}$) is the label of the perfective relation, and this relation scopes over the embedded verb. The handle of the embedded verb ($\boxed{4}$) is the argument of the *perfective-rel*.

The lexical rule suggested in (59) only explains simple perfective aspect marking with *le*, where *le* immediately follows the verb. But it cannot account for the perfective aspect marking of a reduplicated verb, as *le* does not occur after the reduplication, nor can *le* be reduplicated together with the verb. It can only appear between the verb and the reduplicant. In order to accommodate *le* marking for both simple and reduplicated verbs, a general perfective lexical rule as in (60) and a subtype *v-le-lr* as in (61) are posited here. Besides adding a *perfective-rel* in the RELS list of the output as in (59), the *perfective-lr* in (60) allows an underspecified list to be appended at the end of the RELS list. The PHON value of the output makes it possible for further phonological material to occur both before and after ⟨ *le* ⟩.

(60) Type constraints on the type *perfective-lr* from which other subtypes inherit:

$$\left[\begin{array}{ll}
\textit{perfective-lr} & \\
\textsc{phon} & \boxed{\ } \oplus \langle\ \textit{le}\ \rangle \oplus \boxed{\ } \\
\textsc{synsem}|\textsc{loc}\ |\textsc{cont} & \begin{bmatrix} \textsc{ltop} & \boxed{2} \\ \textsc{ind} & \boxed{3} \end{bmatrix} \\
\textsc{rels} & \left\langle \begin{bmatrix} \textit{perfective-rel} \\ \textsc{lbl} \quad \boxed{2} \\ \textsc{arg}0 \ \boxed{3} \\ \textsc{arg}1 \ \boxed{4} \end{bmatrix} \right\rangle \oplus \boxed{5} \oplus \boxed{\ } \\
\textsc{lex-dtr} & \left[\begin{array}{ll} \textsc{synsem}|\textsc{loc} & \left[\begin{array}{ll} \textsc{cat} & \left[\textsc{head}\ \textit{verb}\right] \\ \textsc{cont} & \begin{bmatrix} \textsc{ltop} & \boxed{4} \\ \textsc{ind} & \boxed{3} \end{bmatrix} \end{array}\right] \\ \textsc{rels} & \boxed{5} \end{array}\right]
\end{array}\right]$$

v-le-lr with all inherited constraints as given in (61) inherits from *perfective-lr* and specifies that the first element in the output PHON list is identified with the PHON value of the input verb and that nothing else comes after ⟨ *le* ⟩. Furthermore, no other list can be appended at the end of the RELS list of the output anymore. This corresponds to the proposal of Müller & Lipenkova (2013: 246) shown in (59), which accounts for the simple perfective marking of verbs.

(61) Structure of type *v-le-lr* with constraints inherited from *perfective-lr*:

$$\left[\begin{array}{ll}
\textit{v-le-lr} & \\
\textsc{phon} & \boxed{1} \oplus \langle\ \textit{le}\ \rangle \\
\textsc{synsem}|\textsc{loc}\ |\textsc{cont}|\textsc{ltop} & \boxed{2} \\
\textsc{rels} & \left\langle \begin{bmatrix} \textit{perfective-rel} \\ \textsc{lbl} \quad \boxed{2} \\ \textsc{arg}0 \ \boxed{3} \\ \textsc{arg}1 \ \boxed{4} \end{bmatrix} \right\rangle \oplus \boxed{5} \\
\textsc{lex-dtr} & \left[\begin{array}{ll} \textsc{phon} & \boxed{1} \\ \textsc{synsem}|\textsc{loc}\ |\textsc{cat} & \begin{bmatrix} \textsc{head} & \textit{verb} \\ \textsc{cont} & \begin{bmatrix} \textsc{ltop} & \boxed{4} \\ \textsc{ind} & \boxed{3} \end{bmatrix} \end{bmatrix} \\ \textsc{rels} & \boxed{5} \end{array}\right]
\end{array}\right]$$

perfective-reduplication-lr inherits from both *verbal-reduplication-lr* and *perfective-lr*. The PHON value of the output reduplicates the phonology of the input verb and states that there is ⟨ *le* ⟩ in between, as well as potentially further phonological material. The RELS list of the output appends the *delimitative-rel* to the *perfective-rel* and the RELS value of

the input verb. The arguments of both *perfective-rel* and *delimitative-rel* share the event index of the input verb (3) to ensure that they apply to the same event denoted by the input verb. The label of the *delimitative-rel* and the input verb are identified (*delimitative-rel* is a modifier) and this shared label is embedded under the *perfective-rel*.

(62) Perfective and reduplication combined: type *perfective-reduplication-lr* with constraints inherited from *perfective-lr* and *verbal-reduplication-lr*:

$$\left[\begin{array}{ll}
\textit{perfective-reduplication-lr} & \\
\textsc{phon} & \boxed{1} \oplus \langle\ \textit{le}\ \rangle \oplus \square \oplus \boxed{1} \\
\textsc{synsem}|\textsc{loc}|\textsc{cont}|\textsc{ltop} & \boxed{2} \\
\textsc{rels} & \left\langle \left[\begin{array}{ll} \textit{perfective-rel} & \\ \textsc{lbl} & \boxed{2} \\ \textsc{arg0} & \boxed{3} \\ \textsc{arg1} & \boxed{4} \end{array}\right] \right\rangle \oplus \boxed{5} \oplus \left\langle \left[\begin{array}{ll} \textit{delimitative-rel} & \\ \textsc{lbl} & \boxed{4} \\ \textsc{arg0} & \boxed{3} \end{array}\right] \right\rangle \\
\textsc{lex-dtr} & \left[\begin{array}{ll} \textsc{phon} & \boxed{1} \\ \textsc{synsem}|\textsc{loc} & \left[\begin{array}{ll} \textsc{cat} & \left[\textsc{head}\ \textit{verb}\right] \\ \textsc{cont} & \left[\begin{array}{ll} \textsc{ltop} & \boxed{4} \\ \textsc{ind} & \boxed{3} \end{array}\right] \end{array}\right] \\ \textsc{rels} & \boxed{5} \end{array}\right]
\end{array}\right]$$

For example (63), we get the MRS representation in (64), where h1 and h2 correspond to the handles 2 and 4 and e1 to the event variable 3:

(63) tā *cháng-le-cháng* tāng.
he taste-PFV-taste soup
'He tasted the soup a little bit.'

(64) h1 ⟨ h1:perfective(e1,h2), h2:taste(e1,he,soup), h2:delimitative(e1) ⟩

So the delimitative relation is treated as an adjunct to the main relation of the verb, and the perfective relation scopes over both the main relation and the delimitative relation.

Two subtypes of *perfective-reduplication-lr* are posited: *a-le-yi-a-lr* and *a-le-a-lr*, as shown in (65). They take over the semantic change to the input from *perfective-reduplication-lr*, but specify the PHON value differently. Specifically, *a-le-yi-a-lr* specifies the middle phonological material as ⟨ *le, yi* ⟩, while *a-le-a* specifies it as ⟨ *le* ⟩ only.[19]

[19] A reviewer wants to know what prevents phonological material other than *yi* and *le* to appear in between the reduplicated elements. The possible historical and phonological reasons are discussed in Appendix B. In this analysis, the subtypes of

(65) (a) *a-le-yi-a-lr* ⇒

$$\begin{bmatrix} \text{PHON} & \boxed{1} \oplus \langle\ \textit{le, yi}\ \rangle \oplus \boxed{1} \\ \text{LEX-DTR} & \left[\text{PHON}\ \boxed{1}\right] \end{bmatrix}$$

(b) *a-le-a-lr* ⇒

$$\begin{bmatrix} \text{PHON} & \boxed{1} \oplus \langle\ \textit{le}\ \rangle \oplus \boxed{1} \\ \text{LEX-DTR} & \left[\text{PHON}\ \boxed{1}\right] \end{bmatrix}$$

The analysis of (63) is shown in tree format in Figure 3. The LEX-DTR is the daughter in the tree.

The figure shows how the lexical item for *cháng* 'to taste' is inserted as a daughter into the *a-le-a-lr* lexical rule. The arguments of *cháng* 'to taste' are represented within the SPR and the COMPS list (see Ginzburg & Sag 2000 for English) and the respective argument NPs are linked to the arguments of *taste*: the subject is ARG1, the agent, and the object is ARG2, the stimulus. See Davis et al. (2024) for more on linking. The part of speech of the lexical item (*verb*) and the valence information is carried over from the daughter to the mother unchanged. The semantic contribution of the daughter verb, the value of $\boxed{5}$, is inserted into the RELS list of the mother as it was specified in the constraints on the type *perfective-reduplication-lr* in (62). The PHON value of the mother is the concatentation of *cháng*, *le* and *cháng*, as specified in the constraint on *a-le-a-lr* in (65b). The resulting unit *cháng-le-cháng* then combines with its object forming a VP. This VP is combined with the subject resulting in a complete verbal projection, a sentence. *cháng-le-cháng* behaves in the same way as the simple *cháng*.

Since the above-described lexical rules do not constrain the number of syllables of the input verb, but simply reduplicate its phonology as a whole, they can also account for the ABAB and the AB-*le*-AB forms of reduplication, as long as the input verb is disyllabic. Notice that the lexical rules above also produce AB-*yi*-AB and AB-*le-yi*-AB for disyllabic input verbs. Although these forms are considered unacceptable by some authors (Li & Thompson 1981: 30; Hong 1999: 275–276; Basciano & Melloni 2017: 160; Yang & Wei 2017: 239), Fan (1964: 269) and Sui (2018: 143) consider AB-*yi*-AB and AB-*le-yi*-AB to be possible, even though they both recognize that these two forms are rare. Indeed, a few examples of AB-*yi*-AB and AB-*le-yi*-AB in Early Mandarin (66a–b) and Modern Mandarin (66c–f) were found.

(66) (a) nǐ yǔ wǒ *zhěnglǐ-yi-zhěnglǐ*.[20]
you let me arrange-one-arrange

verbal-reduplication-lr (58, 65) prevent phonological materials other than ⟨ *le* ⟩ and ⟨ *yi* ⟩ from appearing in between the reduplication by specifying what can appear in the □ list and what not.

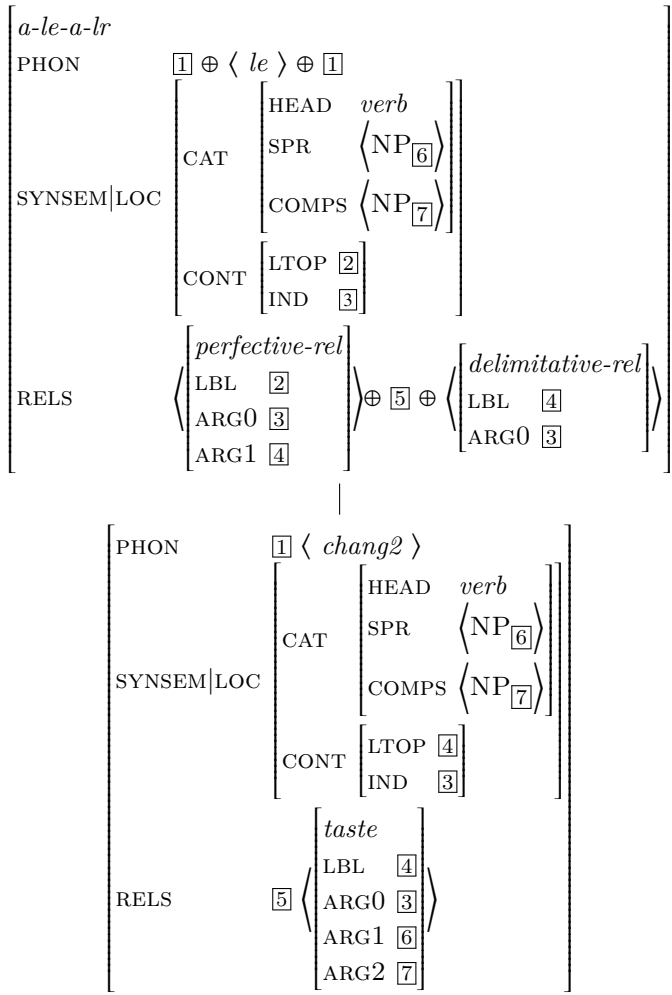

Figure 3: Analysis of *cháng-le-cháng* taste-PFV-taste 'taste the soup a little bit'

'Let me arrange it a little bit!'

(b) nǐ *dǎtīng-yi-dǎtīng.*[21]
you inquire-one-inquire
'Inquire about it a little bit!'

[20] *Yuánqǔ xuǎn*: *Lǔzhāiláng [Selected Yuanqu: Luzhailang]*, as cited in Zhang (2000: 15)

[21] *Yuán Míng juàn*: *Piáotōngshì [Yuan and Ming volume: Piaotongshi]*, 308, as cited

(c) gè gè diǎn-tóu *wēixiào-yi-wēixiào*.[22]
CLF CLF nod-head smile-one-smile
'Each one nodded his head and smiled a little bit.'

(d) tā *wēixiào-le-yi-wēixiào*, you *míngxiǎng-le-yi-míngxiǎng*.[23]
he smile-PFV-one-smile and meditate-PFV-one-meditate
'He smiled a little bit and meditated a little bit.'

(e) fēicháng yánsù de bǎ jìnshì yǎnjìng
very seriously DE BA nearsighted glasses
duānzhèng-le-yi-duānzhèng.[24]
straighten-PFV-one-straighten
'[He] very seriously straightened the nearsighted glasses quickly.'

(f) jǐduō sǎnluàn-zhe de chuán lǐ de dēngguāng, yě
many scattered-DUR DE boat in DE light also
hūyīnhūmiè de *biànhuàn-le-yi-biànhuàn* wèizhi. (CCL)
flicker DE change-PFV-one-chang position
'Many scattered lights in the boats also changed their positions a little bit, flickering.'

This suggests that even though AB-*yi*-AB and AB-*le-yi*-AB might be degraded, they are not ungrammatical *per se*. The reason for this degradedness is probably phonological, since AB-*yi*-AB and AB-*le-yi*-AB contain too many syllables (Fan 1964: 274; Zhang 2000: 15; Yang & Wei 2017: 239; Sui 2018: 143), but we argue that it is not an issue of grammaticality. Thus, they can still be produced via the lexical rules posited above, but are ruled out or degraded due to a general phonological constraint.[25]

AAB, A-*yi*-AB, A-*le*-AB, AA-*kàn* and A-*kàn-kàn* can also be accounted for by the lexical rules proposed in this section. They can be analyzed as compounds consisting of a reduplicated monosyllabic verb and another element. Specifically, AAB, A-*yi*-AB and A-*le*-AB can be considered as the compound of a reduplicated monosyllabic verb (A) and a noun (B).[26] AA-*kàn* can be regarded as the compound of a reduplicated monosyllabic

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in Zhang (2000: 15)

[22] Róu, Shí. 1975. *Róu Shí xiǎoshuō xuǎnjí [Selected novels of Roushi]*, 31. Beijing: People's Literature Publishing House.

[23] Róu, Shí. 1975. *Róu Shí xiǎoshuō xuǎnjí [Selected novels of Roushi]*, 31. Beijing: People's Literature Publishing House.

[24] Lǐ, Jiérén. 1962. *Dà bō [Great wave]*, 3rd band, 171. Beijing: The Writers Publishing House.

[25] One reviewer suggests that given that AB-*yi*-AB and AB-*le-yi*-AB were possible in previous stages of the language (see Zhang 2000: 15, Basciano & Melloni 2017: 160–161), these rare occurrences can be seen as relics of this usage.

[26] Huang (1984: 64–65) and Her (1996: Sec. 2; 2010: Sec. 3.1) argue that some of these V-O combinations are compounds, some are phrases, and some have dual

verb (A) and the verb *kàn* 'look', whereas A-*kàn*-*kàn* is the compound of a monosyllabic verb (A) and the reduplication of *kàn* 'look'. A-*yi*-A-*kàn* is also possible, though rare, presumably also due to its length. An inquiry in CCL found 55 hits of A-*yi*-A-*kàn*. A sample is listed in (67).

(67) (a) tèyì gōngnéng de yánjiūzhě-men bùfáng rúcǐ
special power DE researcher-PL may.as.well such
shì-yi-shì-kàn … (CCL)
try-one-try-look
'Researchers of special power may as well have a try as such and see …'

(b) dànshì duì fā méi fā-guo hégé-zhèng,
but about issue not issue-EXP conformity-certificate
yǐjīng shuō bù qīng le, xūyào *chá-yi-chá-kàn*.
already say not clealy PTC need check-one-chek-look
(CCL)
'But one already cannot say it clearly anymore, whether a certificate of conformity is issued or not. One needs to have a check and see.'

(c) ràng wǒ lái *cāi-yi-cāi-kàn*. (CCL)
let I come guess-one-guess-look
'Let me have a guess.'

(d) dà-lǎobǎn-men yào *děng-yi-děng-kàn* (CCL)
big-boss-PL need wait-one-wait-look
'Big bosses need to wait a little bit and see.'

(e) fūrén nǐ dào *shǔ-yi-shǔ-kàn*, zhè zhū huā de
madam you just count-one-count-look this CLF flower DE
huāduǒ gòng yǒu jǐ zhǒng yánsè. (CCL)
blossom in.total have how.many CLF color
'Madam, just try to count and see how many colors the blossom of this flower has in total.'

Due to the prominent tentative, trying meaning of AA-*kàn* and A-*kàn*-*kàn*, they are not compatible with the perfective aspect marker *le* semantically, as one usually cannot try something that is already realized. Thus, structures such as A-*le*-A-*kàn* and A-*kàn*-*le*-*kàn* are considered pragmatically infelicitous.

The current analysis provides a unified account for all forms of delimitative verbal reduplication in Mandarin Chinese. Like in Fan et al.

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status (both compounds and phrases). Following this approach, AAB, A-*yi*-AB and A-*le*-AB can (also) be considered as the phrasal combination of a reduplicated verb and its object.

(2015), *yi* is handled as a phonological element which does not make any contribution to the semantics, and an inheritance hierarchy is used to capture the commonalities among different forms of reduplication. But the present proposal also reflects the connection between the reduplication and aspect marking via multiple inheritance. This account makes use of a semantic mechanism, which correctly rules out aspect marking with forms other than *le*. By providing a semantic explanation, this mechanism seems less *ad hoc* than the one used in Fan et al. (2015), which simply assumed that the reduplication cannot combine with aspect information. The present approach also has a broader coverage of the forms of verbal reduplication than the one in Fan et al. (2015). Furthermore, all the forms are derivable from the lexical rules proposed here, so that there is no need to resort to irregular lexicon entries, and the productivity of these forms is correctly captured. In sum, the analysis proposed in this paper possesses greater explanatory power and resolves the problems of previous studies.

5. Conclusions

The current study provides a new HPSG account for delimitative verbal reduplication in Mandarin Chinese. We present empirical evidence that reduplication is possible with all verb classes. We give a semantic explanation for the incompatibility of reduplication with aspect markers other than *le*. We argue that reduplication is better analyzed as a morphological rather than a syntactic process. We model reduplication as a lexical rule, and the different forms of reduplication are captured in an inheritance hierarchy using underspecified lists. The interaction between verbal reduplication and aspect marking is handled by multiple inheritance. This analysis is compatible with both mono- and disyllabic verbs, so that all productive forms of reduplication are derivable by lexical rules. The analysis is implemented as part of a computer-processable grammar of Mandarin Chinese.

A. Analysis based on the aspectual system by Tsai (2008)

Yang & Wei (2017: 229) claim that reduplication can be analyzed as an aspect marker following the structure of Mandarin Chinese aspects proposed by Tsai (2008). Tsai (2008) provides the syntactic analysis for aspect markers in Mandarin Chinese as shown in Figure 4.[27] He observes the so-called incompleteness effect, namely that a minimal sentence, which only contains a verb marked by *zhe* 'DUR', *le* 'PFV' or *wán* 'COMPL' and its arguments, seems incomplete without further sentential elements such as the sentence final particle *le* or a temporal adverbial like *gāngcái* 'just now'

[27] Asp = Aspect

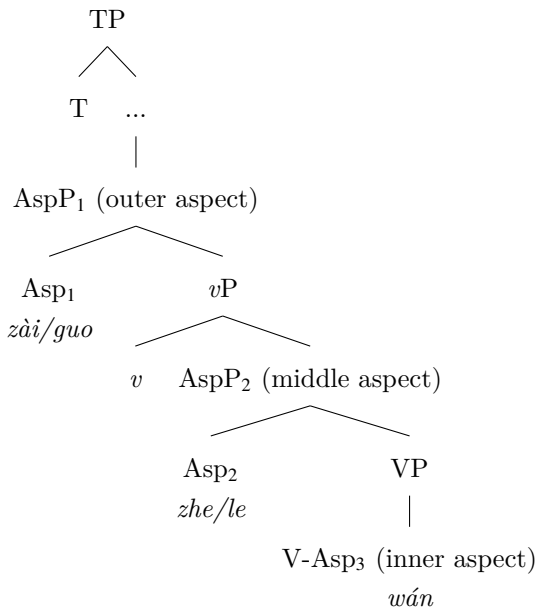

Figure 4: Structure of the aspectual system in Mandarin Chinese according to Tsai (2008: 683)

(68). In contrast, a minimal sentence with a verb marked by *zài* 'PROG' or *guo* 'EXP' and its arguments can stand alone (69).

(68) Xiǎolǐ chī-zhe/le/wán fàn *(le).
Xiaoli eat-DUR/PFV/COMPL meal PTC
'Xiaoli is eating/ate/finished eating the meal.'

(69) Xiǎolǐ (gāngcái) zài kū/kū-guo.
Xiaoli just.now PROG cry/cry-EXP
'Xiaoli was crying/cried just now.'

He thus proposes three aspect positions under TP. *zài* 'PROG' and *guo* 'EXP' reside under Asp_1, while *zhe* 'DUR' and *le* 'PFV' under Asp_2, as illustrated in Figure 4.[28]

Turning to reduplication, a minimal sentence with reduplication also seems incomplete (70). Based on this, the reduplicant should reside under Asp_2, as illustrated in Figure 5.

[28] Tsai (2008) differentiated the middle and the inner aspect based on the fact that *wán* can only occur with certain types of predicate. This differentiation does not play a role for our purpose and will not be further discussed here.

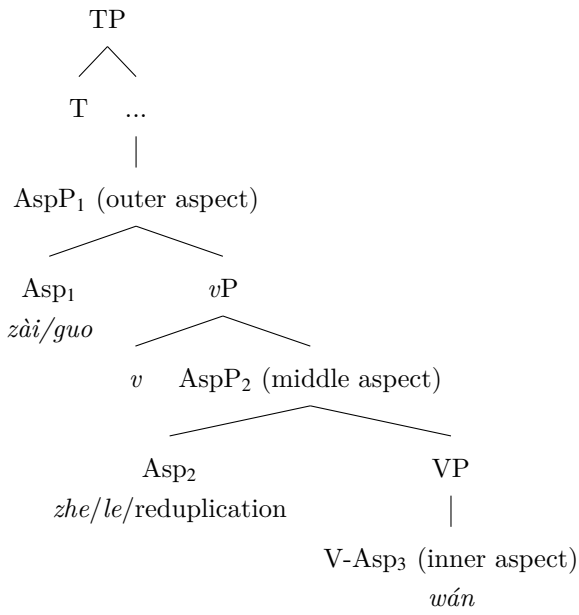

Figure 5: Position of reduplication according to the aspectual system in Tsai (2008)

(70) (a) * tā *xiào-xiao*
he laugh-laugh

(b) tā *xiào-le-xiào*
he laugh-PFV-laugh
'He laughed a little.'

(c) tā *xiào-xiao*, bù shuōhuà
he laugh-laugh not speak
'He laughed a little, and didn't speak.'

This analysis would result in a mismatch between syntax and semantics, in the sense that the aspect markers that belong to the same semantic group do not occur in the same syntactic position. Even though *le* 'PFV', *guo* 'EXP' and reduplication all mark perfective aspects (Section 2.3.3, Dai 1997, Xiao & McEnery 2004), *guo* 'EXP' is situated under Asp_1, while *le* 'PFV' and reduplication are under Asp_2. Similarly, *zài* 'PROG' and *zhe* 'DUR' are both imperfective aspects but also occur in different syntactic positions.

B. *yi* AND *le*

A reviewer suggests that the fact that only *yi* and *le* can appear in between reduplication seems somewhat arbitrary, and it is not evident why certain

elements are permissible while others are not. We think that there might be historical and phonological reasons.

le 'PFV' marks the perfective aspect. The reason for *le* 'PFV' being the only aspect marker compatible with reduplication is explained in Section 2.3.3.

As for *yi* 'one', its use stems from the historical development of delimitative verbal reduplication but is synchronically opac. Zhang (2000: 13–15) shows that delimitative verbal reduplication originates from the "V + numeral + verbal classifier" phrase, where the verbal classifier is borrowed from a verb of the same form, as shown in (71) from *Sòngdài juàn: Xūtáng Héshang yǔlù [The Song dynasty volume: Quotations from Abbot Xutang]* p. 387 as cited in Zhang (2000: 12).

(71) míng yòu hè, qí yì hè, míng lián hè liǎng hè,
Ming again yell Qi also yell Ming in.succession yell two yell
qí biàn lǐbài
Qi thus bow
'Ming yelled again. Qi yelled too. Ming yelled twice. Qi thus bowed.'

Here the numeral refers to the actual number of the action taking place and can be any number. This evolved into the structure of V-*yi*-V (or A-*yi*-A), which does not express the actual number of the action anymore, but simply conveys that the action happens in a short period of time or for only few times. Consider (72) from *Sòngdài juàn: Zhāng Xié zhuàngyuán [The Song dynasty volume: Top graduate Zhang Xie]* p. 519 as cited in Zhang (2000: 13).

(72) qiě *xiē-yi-xiē* le, qù zuò dì.
just rest-one-rest PTC go sit ground
'(Let me) just take a rest and go sit on the ground.'

In this case, *yī* 'one' cannot be replaced by other numerals. Since V-*yi*-V does not express the actual number of the action anymore, it became possible to delete the *yī* 'one', hence the use of the VV (or AA) form, too.

Synchronically, A-*yi*-A has the same meaning as AA and both do not refer to the actual number of the event denoted by the verb. This means that *yī* 'one' in A-*yi*-A does not contribute any specific meaning to the structure and is only there as a historical remnant. In this sense, *yī* 'one' appearing in between the reduplication is synchronically arbitrary.

Besides the obvious conceptual reason that *yī* 'one' is taken to mean 'little/few', there might be a phonological explanation for *yī* 'one' rather than other numerals is used in the A-*yi*-A structure. In Mandarin Chinese, one form of intensifying reduplication is A-*li*-AB e.g. *hú-li-hútú* 'confused-li-confused', where the *li* is fixed and also does not bear any meaning. Sui (2018: 137) assumes that this syllable is filled with *li* because the open

syllable *li* is a relatively unmarked phonological constituent (Yip 1992) and the second syllable in A-*li*-AB occupies an unstressed position. We can see the similarities between *li* in A-*li*-AB and *yi* in A-*yi*-A: they are both relatively unmarked and occupies an unstressed position. This can also make it easier for *yī* 'one' rather than other numerals to become part of a fixed structure. But a phonological account is out of the scope of this paper and has to be left for further research.

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