An HPSG account for verbal reduplication in Mandarin Chinese

The current study presents an HPSG analysis for verbal reduplication in Mandarin Chinese. We provide a detailed description of the phenomenon. After discussing reduplication' s interaction with *Aktionsarten* and aspect markers, we argue that it is 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 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. **?**: 204–205; **?**: 232; **?**: 14; **?**: 70; **?**: 382–383; **?**: 420–421; **?**: 48; **?**: 288; **?**: 11–12; **?**: Sec. 4.3). This means that the event or state denoted by the verb happens in a short duration and/or a low frequency (**?**: 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*-cháng 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; **???**) to this phenomenon using Minimal Recursion Semantics (MRS; **?**) as the semantic representation formalism. This new account avoids the problems of previous approaches and explains more forms of verbal reduplication in Mandarin Chinese.

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

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 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) (**??**) and the BCC corpus (**?**) was also consulted. Further, examples from novels and plays written by native speakers were considered.

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: *shuo* 'say'

(a)	shuo-shuo say-say	AA
(b)	shuo-yi-shuo say-one-say	A-*yi*-A
(c)	shuo-le-shuo say-PFV-say	A-*le*-A
(d)	shuo-le-yi-shuo say-PFV-one-say	A-*le-yi*-A
(e)	shuo-shuo-kan say-say-look	AA-*kan*
(f)	shuo-kan-kan say-look-look	A-*kan-kan*

(3) for disyllabic verbs: *lai-wang* come-go 'come and go/communicate'

(a) lai-wang-lai-wang — ABAB
come-go-come-go

(b) lai-wang-le-lai-wang — AB-*le*-AB
come-go-PFV-come-go

(c) lai-lai-wang-wang — AABB
come-come-go-go

(4) for V-O compounds: *shuo-huang* tell-lie 'lie'

(a) shuo-shuo-huang — AAB
tell-tell-lie

(b) shuo-yi-shuo-huang — A-*yi*-AB
tell-one-tell-lie

(c) shuo-le-shuo-huang — A-*le*-AB
tell-PFV-tell-lie

?, **?** and **?** compared the AA, ABAB and AABB forms of reduplication and found 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, **?**: 17–18, **?**: 144 and **?**: 90 identified 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. **?**: Sec. 3.1 also found that AA and ABAB have relatively high productivity, whereas the productivity of AABB is low. She further showed that AABB is generally correlated with the lack of a postverbal object, but the direct object remains present when a transitive verb undergoes AA or ABAB patterns of reduplication. **?**: 277 proposed that AA, ABAB originated from the verb-measure word combination from Middle Chinese, while AABB developed from the reiterative rhetoric from Old Chinese. 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-*kan*, A-*kan*-*kan*, 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)–(10). The reduplication cannot be aspect marked, though, except with the perfective aspect marker *le* (for further discussions see

Section 2.3.3). The reduplication is incompatible with an expression that quantifies the duration or the extent of the event expressed in the sentence (11) (**?**: 83–84; **?**: 114–115). This is probably because the reduplication already contains a quantity meaning (**?**: 84; **?**: 114–115), namely a short duration or a small extent.

(5) Intransitive verb:

(a) ta xiao-le.
he laugh-PFV
'He laughed.'

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

(6) Transitive verb:

(a) ni wen ta.
you ask him
'Ask him.'

(b) ni *wen-(yi)-wen* ta.
you ask-(one)-ask he
'Try to ask him.'

(7) Under negation:

(a) weishenme wo bu kan ta qita fangmian de jinbu he quanfangwei de chengzhang
why I not look he other aspect DE progress and comprehensive DE development
'Why don't I look at his progress in other aspects and comprehensive development?'

(b) weishenme wo bu *kan-kan* ta qita fangmian de jinbu he quanfangwei de chengzhang (CCL)
why I not look-look he other aspect DE progress and comprehensive DE development
'Why don't I look a little bit at his progress in other aspects and comprehensive development?'

(8) In *ba*-construction:

(a) gou-mai zhiqian zhen gai ba qingkuang mo qingchu.
purchase-buy before really should BA situation touch clearly
'(I) should really check the situation clearly before I make the purchase.'

(b) gou-mai zhiqian zhen gai ba qingkuang
purchase-buy before really should BA situation
mo-mo qingchu. (CCL)
touch-touch clearly
'(I) should really quickly check the situation clearly before I make the purchase.'

(9) With modal verb:

(a) you liang ben shu ni-men keyi kan …
there.be two CLF book you-PL can read
'There are two books that you can read …'

(b) you liang ben shu ni-men keyi *kan-kan* … (CCL)
there.be two CLF book you-PL can read-read
'There are two books that you can read a little bit …'

(10) In Serial Verb Construction (SVC):

(a) ta dao jinian-tang dong-ce de yi chu
she go.to memorial-hall east-side DE one place
chongxi-bu qing shifu bangmang kan
film.developing-department ask master help look
nali chu-le wenti.
where come.out-PFV problem
'She went to a film developing department at the east side of the memorial hall to ask the master to help have a look at where went wrong.'

(b) ta dao jinian-tang dong-ce de yi chu
she go.to memorial-hall east-side DE one place
chongxi-bu qing shifu bangmang *kan-kan*
film.developing-department ask master help look-look
nali chu-le wenti. (CCL)
where come.out-PFV problem
'She went to a film developing department at the east side of the memorial hall to ask the master to help have a quick look at where went wrong.'

(11) With an expression of quantity:

(a) ta yi tian pao shi li. (**?**: 83)
he one day run ten mile
'He runs ten miles a day.'

(b) * ta yi tian *pao-pao* shi li.
he one day run-run ten mile

2.3. Semantics

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 *Aktionsarten* (Section 2.3.2) and aspect markers (Section 2.3.3).

2.3.1. Core meaning

The reduplication has a *delimitativeness* meaning (e.g. **?**: 204–205; **?**: 232; **?**: 14; **?**: 70; **?**: 382–383; **?**: 420–421; **?**: 48; **?**: 288; **?**: 11–12; **?**: 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 (**?**: 14; **?**: 149–150). Besides delimitativeness, **?**: 204, **?**: 276, **?** (**?**: 356; **?**: 199–120), **?**: 14 and **?**: 290–291 suggested that the reduplication signifies *tentativeness*, which can be used "to refer modestly to one's own activities, or for mild imperatives" (**?**: 356), or "trying to" do something (**?**: 234). *Frequentativeness* or *habitualness*, that the event denoted by the verb happens frequently or habitually, is mentioned by **?**: 276, **?**: 15 and **?**: 1 as the meaning of reduplication, as well. **?**: 276 further proposed a meaning of *slightness* or *casualness* for reduplication, which implies that the event is unimportant or conveys a casual attitude of the speaker. **?**: Sec. 3.1.3 suggested 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 agreed that the reduplication expresses a short duration and/or a low frequency, which fits the definition of delimitativeness. **?**: 152–154 and **?** argued that the core meaning of reduplication is delimitativeness, while all other meanings are merely pragmatic extensions in specific contexts. **?**: 152–154 pointed 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. **?** compared the sentence pairs with reduplicated verbs and their unreduplicated counterparts, and showed 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 concluded that these additional meanings are results of meaning extensions of delimitativeness in specific contexts. We follow **?** and **?** 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 (**?**: 70–79; **?**: 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 (12a), which could mean that the protagonist kept staring at the the footprint, (12b) 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.

(12) (a) Wu Xumang kan-le zuo-an shi liuxia de
Wu Xumang look-PFV commit-crime when leave DE
jiaoyin …
footprint (**?**: 158)
'Wu Xumang looked at the footprint left when the crime was committed.'

(b) Wu Xumang *kan-le-kan* zuo-an shi liuxia de
Wu Xumang look-PFV-look commit-crime when leave DE
jiaoyin …
footprint (**?**: 158)
'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" (**?**: 151).

As for A-*yi*-A, **?**: 273 compared examples found in novels and plays and concluded 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. **?**: Sec. 5 considered that the major difference in meaning 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 stressed 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. **?** found 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 stated that these differences are pragmatic rather than semantic, as he argued that AA and A-*yi*-A can be used interchangeably in most cases, and the specific differences in meaning only arise from specific contexts as a whole. **?**: 15 suggested 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-*kan* and A-*kan-kan* are described to express a "try …and find out" meaning (**?**: 63). **?**: 290 also observed that the tentative meaning is particularly prominent when the reduplication is followed by *kan* '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 *kan* 'look', and the whole structure can be understood as "do A a little bit and see".

2.3.2. Interaction with Aktionsarten

Previous research often claimed that the reduplication can only be used for verb classes of certain *Aktionsarten*, while it is infelicitous for other ones. **?**: 234–235 and **?**: 277–278 suggested that reduplication is only possible for volitional activity verbs. **?**: 70–71 und **?**: 290 both considered that reduplication can only be used in dynamic situations. The former further claimed that achievement verbs cannot be reduplicated. **?**: 155, **?**: 20 and **?**: 145 proposed 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.

?: 53 and **?**: 10–11 acknowledged that the reduplication of non-volitional verbs is more restricted than that of volitional ones. But **?**: 381–382 listed a number of non-volitional predicates that can be reduplicated. We found the examples shown in (13) in CCL where non-volitional verbs *weiqu* 'feel wronged', *ren-xing* 'be willful' and *diao* 'drop' are reduplicated.

(13) (a) keshi xian mujin, dajia ye zhihao
but now current everybody also can.only
weiqu-weiqu le. (CCL)
feel.wronged-feel.wronged PTC
'But now, everybody can only feel wronged a little bit.'

(b) ta-men neng zuo de buguo shi
she-PL can do DE just be
ren-ren-xing shua dian'er xiao piqi
be.willful-be.willful-temperament play a.little small temper
diao-diao yanlei shenme de. (CCL)
drop-drop tear what DE
'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. Compared to the questionable reduplication of the stative verb *bing* 'be sick' in (14a) and that of the achievement verb *ying* 'win' in (14b), the reduplication of the

activity verb *kan* 'watch' in (14c) and that of the semelfactive verb *kesou* 'cough' in (14d) is readily acceptable.

(14) (a) ? ta *bing-bing* jiu hao le. (?: 155)
he be.sick-be.sick then well PTC
Intended: 'He was sick for a little while and then got well.'

(b) ? ta *ying-le-ying* na chang bisai. (?: 155)
he win-PFV-win that CLF competition
Intended: 'He won that competition a little bit.'

(c) ta *kan-le-kan* na chang bisai.
he watch-PFV-watch that CLF competition
'He watched that competition for a little while.'

(d) ta *kesou-kesou* jiu hao le.
he cough-cough then well PTC
'He coughed a little bit and then got well.'

However, examples such as those in (15a–c) were found in novels and plays written by native speakers and example sentences like (15d) and (15e) constructed by native speaker linguists. Here, achievement verbs like *wang* 'forget' and *sheng* 'give birth to' and stative verbs like *shutan* 'be comfortable', *lian'ai* 'be in love' and *bing* 'be sick' are reduplicated.

(15) (a) deng ren-men ba zhe jian shi *wang-wang* zai shuo ba.[2]
wait people-PL BA this CLF incident forget-forget then talk PTC
'Let's wait until people forget this incident a little bit and then talk about it.'

(b) huitou mo ge zao *shutan-shutan* ba.[3]
later wipe CLF bath be.comfortable-be.comfortable PTC
'Let's take a bath later and be comfortable for a little while.'

(c) *lian-lian-ai* shi keyi de, ban xishi dinghao chi
like-like-love COP ok DE host wedding best late

[2] Liu, Zhen. 1963. *Chang chang de liushui [Long long water]*, 72. Beijing: The Writers Publishing House.
[3] Tian, Han. 1959. *Tianhan xuanji [Selected works of Tianhan]*, 122. Beijing: People's Literature Publishing House.
[4] Zhou, Libo. 1958. *Shang xiang ju bian [Big changes of mountains and the countryside]*, 204. Beijing: The Writers Publishing House.

yidian.[4]
a.bit
'It's ok to be in love a little bit, but it's better to get married a bit later.'

(d) wo zhen xiang *bing-yi-bing*, xie ta ge shi tian ban
I really want be.sick-one-be.sick rest it CLF ten day half
yue. (**?**: 54)
month
'I really want to be sick for a little while and rest for ten days or half a month.'

(e) jiao ta *sheng-sheng* xiaohai, jiu zhidao zuo
let she give.birth.to-give.birth.to child then know COP
muqin de gan-ku le. (**?**: 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.'

This shows 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.

2.3.3. Interaction with aspect markers

As mentioned in Section 2.1, the reduplication can only be marked by the perfective aspect marker *le* but not other aspect markers.[5] We believe this incompatibility to be for semantic reasons.

?: Ch. 4 considered *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. **?**: 128–131 stated that *le* has the semantic feature of dynamicity, since it "can focus on both heterogeneous internal structures and changing points" (**?**: 129). It can be combined with a situation with a dynamic internal structure, such as crying in (16a). It can also co-occur with a situation with a change at a certain time point, such as getting to know in (16b).

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

(16) (a) Weici, Deng Lijun shangxin de ku-le san tian.
for.this Deng Lijun sadly DE cry-PFV three day
(**?**: 129)
'For this reason, Deng Lijun cried sadly for three days.'

(b) Ta zhidao-le zhe shi de nei-qing. (**?**: 130)
he know-PFV this matter DE inside-information
'He got to know the inside information on this matter.'

Le is compatible with the reduplication, because its dynamicity can relate to not only the termination or instantiation of an event (a point of change), but also the process of the situation, just like that of the reduplication.

In comparison, the experiential aspect marker *guo* cannot co-occur with a reduplicated verb, because its dynamicity attributes to an "experiential change" (**?**: 148), namely that a situation has been experienced historically and that "the final state of the situation no longer obtains" at the reference time (**?**: 144). Compare (17a) and (17b), *guo* in (17a) suggests a change out of the state of being a soldier, whereas *le* in (17b) conveys a change into the state of being a soldier (**?**: 149).

(17) (a) ta dang-guo bing. (**?**: 149)
he serve.as-EXP soldier
'He once served as a soldier.'

(b) ta dang-le bing. (**?**: 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 *zai*, as both only focus on a part of the situation and do not view the situation as a whole (**?**: 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.

2.4. Word vs. phrase

The literature on reduplication makes different assumptions on whether it is a morphological or syntactic phenomenon. **?**: Ch. 4, **?**: Ch. 3 and **?**: 4–5 listed reduplication under morphological processes. By contrast, **?**: 23, **?**, **?**: 146, **?**: 229–231, **?**: 330 and **?** claimed it to be syntactic. This section reviews the arguments in **?**, applies the tests proposed by **?** and **?** to distinguish words from phrases in Mandarin Chinese and compares the behaviors of the reduplication with those of Parallel Verb Compounds

(compounds which consist of two verbs that "either are synonymous or signal the same type of predicative notions" (**?**: 68), e.g. *gou-mai* 'purchase-buy, buy') and SVCs. The results argue for a morphological status of reduplication.

? compared the AA and the ABAB forms of reduplication with the AABB form and claimed that AA and ABAB are syntactic processes while AABB is morphological. She pointed 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 (18) and ABAB (19) but not into AABB (20).

(18) (a) Yao Ming *kan-kan* ta de fanyi Ke Lin...
Yao Ming look-look he DE translator Ke Lin
'Yao Ming looked at his translator Ke Lin a little bit...'

(b) Yao Ming *kan-le-kan* ta de fanyi Ke Lin... (CCL)
Yao Ming look-PFV-look he DE translator Ke Lin
'Yao Ming looked at his translator Ke Lin a little bit...'

(19) (a) ta *heji-heji*, dui Jiangqing shuo...
he consider-consider to Jiangqing say
'He considered a little bit, and told Jiangqing...'

(b) ta *heji-le-heji*, dui Jiangqing shuo... (CCL)
he consider-PFV-consider to Jiangqing say
'He considered a little bit, and told Jiangqing...'

(20) (a) *yao-yao-huang-huang* jiu ba chulai le. (**?**: 85)
shake-shake-sway-sway then pull out PTC
'Shake it a little bit and then it will be pulled out.'

(b) * *yao-yao-le-huang-huang* jiu ba chulai le. (**?**: 85)
shake-shake-PFV-sway-sway then pull out PTC

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 (21) or adjective (22).

(21) (a) * dian-che *yao-huang-yao-huang* kai zou... (**?**: 86)
electric-car shake-sway-shake-sway drive away...

(b) dian-che *yao-yao-huang-huang* kai zou... (**?**: 86)
electric-car shake-shake-sway-sway drive away...
'The tram drove away jiggly...'

(22) (a) * ...zuo zai *yao-huang-yao-huang* de che shang (**?**: 86)
sit on shake-sway-shake-sway DE car on

(b) ...zuo zai *yao-yao-huang-huang* de che shang (**?**: 86)
sit on shake-shake-sway-sway DE car on
'...sit on the jiggling car'

AA and ABAB do not change the valency of the input verb, but AABB makes a transitive verb intransitive (23).

(23) (a) qiao-da gan-jing shi huanjie gan-qi de hao banfa. (**?**: 88)
knock-beat liver-channel COP relieve liver-*qi* DE good method
'Beating the liver channel is a good method to relieve the stagnation of liver *qi*.'

(b) *qiao-da-qiao-da* gan-jing shi huanjie gan-qi de hao banfa. (**?**: 88)
knock-beat-knock-beat liver-channel COP relieve liver-*qi* DE good method
'Beating the liver channel a little bit is a good method to relieve the stagnation of liver *qi*.'

(c) * *qiao-qiao-da-da* gan-jing shi huanjie gan-qi de hao banfa. (**?**: 88)
knock-knock-beat-beat liver-channel COP relieve liver-*qi* DE good method

(d) *qiao-qiao-da-da* shi huanjie gan-qi de hao banfa.
knock-knock-beat-beat COP relieve liver-*qi* DE good method
'Knocking around is a good method to relieve the stagnation of liver *qi*.'

The two groups also have different input and output constraints. **?** claimed 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 (24). Moreover, as can be seen in the translation in (24), 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.

(24) (a) duo-shan → *duo-duo-shan-shan* (**?**: 88)
hide-dodge hide-hide-dodge-dodge
'hide and dodge' 'hide and dodge repeatedly'

(b) jin-chu → *jin-jin-chu-chu* (**?**: 88)
enter-exit enter-enter-exit-exit
'enter and exit' 'enter and exit repeatedly'

(c) shuo-xiao → *shuo-shuo-xiao-xiao* (**?**: 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 *-bar* derivation in German is a productive morphological process (**?**: 330). The *be-* prefixation in German does not change the category of the input: *arbeiten* 'work' → *bearbeiten* 'handle'. And inflections of tense in German do not change the valency of the input verb. Further, if *le* is considered to be a morphological element (e.g. **?**: 101–102; **?**: 246), the insertion of *le* does not have to be viewed as a syntactic process either. It seems that **?** only showed that AA and ABAB are different processes than AABB, but not necessarily that the former is syntactic while the latter morphological.

It is, therefore, necessary to resort to other tests that are intended to distinguish words from phrases. Furthermore, we applied the same tests to Parallel Verb Compounds, which are inarguably words (because at least one element in the compound cannot appear in a sentence independently), and SVCs, which are by definition phrases. We then compared the test results of these three kinds of expressions to see whether the reduplication behaves in a more similar way to Parallel Verb Compounds or to SVCs.

? and **?** proposed the following four tests to distinguish words from phrases in Mandarin Chinese: semantic compositionality, phrasal extension, phrasal substitution and conjunction reduction.[6]

The semantic criterion is that the meaning of a phrase is usually built up in a compositional way while that of a is word usually not (**?**: 140; **?**: 275). The meaning of the reduplication is not compositional, as it does not mean that the event denoted by the verb happens twice or multiple times, but rather that the event happens for a short duration and/or for low frequency. This non-compositionality suggests that a reduplication is more word-like.

The syntactic criteria are all based on the Lexical Integrity Hypothesis according to **?**: 60, as shown in (25):

(25) The Lexical Integrity Hypothesis
No phrase-level rule may affect a proper subpart of a word.

The first syntactic test is phrasal extension, namely the addition of optional elements (**?**: 150; **?**: 280). Optional elements that can possibly appear in a phrase should be able to be added into it, and subparts of a phrase should be able to be modified separately. If the unit is a word,

[6] It is important to note that none of these criteria are sufficient or necessary to determine the word or phrase status of an expression. Nevertheless, they together might suggest which of the two statuses is more likely.

however, then neither of these should be possible. As illustrated in (2)–(4) in Section 2.1, the reduplication can only be separated by *le* and *yi*. As mentioned above, whether aspect markers are considered to be morphological or syntactic elements depends on the theoretical framework (and possibly the target language).[7] And the status of *yi* is unclear, since it does not carry any additional meaning or grammatical function in the structure. Turning to separate modification, the element in the reduplication cannot be modified individually. Compared to (26a), where the adverbial *qingsheng de* 'quietly' modifies the whole reduplication, (26b) is ungrammatical, as the adverbial cannot modify the second element in the reduplication alone. It is worth mentioning that in (26a), it is not possible to analyze *qingsheng de* 'quietly' to modify only the first element in the reduplication, because the adverbial does not necessarily occur adjacent to the verb, as in (26c), and it still modifies the whole predicate. (26a) and (26c) have the same meaning.

(26) (a) ta dui ziji qingsheng de *xiao-le-xiao*.
he to REFL quietly DE laugh-LE-laugh
'He quietly laughed a little bit to himself.'

(b) * ta dui ziji *xiao-le* qingsheng de *xiao*.
he to REFL laugh-PFV quietly DE laugh

(c) ta qingsheng de dui ziji *xiao-le-xiao*.
he quietly DE to REFL laugh-PFV-laugh
'He quietly laughed a little bit to himself.'

Nothing can intervene between a Parallel Verb Compound and its subparts cannot be modified separately either (27).

(27) (a) ta gou-mai-le yi jian dayi.
he purchase-buy-PFV one CLF coat
'He bought a coat.'

(b) * ta gou-le-mai yi jian dayi.
he purchase-PFV-buy one CLF coat

(c) * ta gou-le-yi-mai yi jian dayi.
he purchase-PFV-one-buy one CLF coat

(d) ta kaixin de gou-mai-le yi jian dayi.
he happily DE purchase-buy-PFV one CLF coat
'He bought a coat happily.'

(e) * ta gou kaixin de mai-le yi jian dayi.
he purchase happily DE buy-PFV one CLF coat

[7] For example, **?**: Sec. 3.3.1 and **?**: 246 considered the postverbal aspect markers in Mandarin Chinese (*le*, *zhe* and *guo*) to be morphological elements. E.g. **?**, **?**, **?**: 23, **?**: 146 considered all aspect information to be syntactically encoded.

But an SVC readily allows other elements to appear between the two verbs (in (28a), the direct object of the first verb) and each verb can be modified separately (28b), as well.

(28) (a) ta zhong cai mai.
he plant vegetables sell
'He plants vegetables and sells them.

(b) ta xinku de zhong cai qinfen de mai.
he hardworkingly DE plant vegetables diligently DE sell
'He plants vegetables hard-workingly and sells them diligently.'

All in all, by the test of phrasal extension, reduplications behave more like words than like phrases.

The second syntactic test is phrasal substitution, namely the substitution of smaller exemplars of a specific category with a full blown XP (**?**: 152; **?**: 280). If a part of an expression is actually an XP that only contains one element, a full realization of this XP should be possible as well. Otherwise, this expression is considered to be a word. In a reduplication structure, it is ungrammatical to substitute each element with a full VP (29).

(29) (a) ta *chang-le-chang* tang.
he taste-PFV-taste soup
'He tasted the soup a little bit.'

(b) * ta *chang tang le chang tang.*
he taste soup PFV taste soup

It is the same case with Parallel Verb Compounds (30).

(30) * ta gou yi jian dayi mai le yi tiao kuzi.
he purchase one CLF coat buy PFV one CLF pants

However, it is grammatical to replace a reduced part of a SVC with a full VP (31).

(31) ta zhong cai mai (cai).
he plant vegetables sell vegetables
'He plants vegetables and sells vegetables.'

Again, reduplications look more word-like than phrase-like.

The third syntactic criterion is conjunction reduction. It should only be possible for coordinated phrases (32) and not for coordinated words (33) (**?**: 137; **?**: 283).

(32) (a) [jiu de shu] gen [xin de shu] (**?**: 137)
old DE book and new DE book
'old books and new books'

(b) [jiu de gen xin de] shu (?: 137)
old DE and new DE book
'old and new books'

(33) (a) [huo-che] gen [qi-che] (?: 137)
fire-car and gas-car
'train and automobile'

(b) * [huo gen qi] che (?: 137)
fire and gas car

For the reduplication, conjunction reduction does not seem to be possible. In (34a), the reduplication *jiao-jiao* 'chew a little bit' is coordinated with a simple verb *mo* 'apply' together with the adverbial *yidian* 'a little bit'. Without the adverbial *yidian* 'a little bit', *mo* 'apply' by itself cannot express the additional 'a little bit' meaning even when it is coordinated with a reduplicated verb. Similarly, in (34b), the reduplication *kan-le-kan* 'look a little bit' is coordinated with the predicate *zou-le chulai* 'walked out'. The verb in the latter case is not reduplicated and it cannot express the delimitative meaning either.

(34) (a) wujian gong-xiu mo dian bohe-gao huo *jiao-jiao*
midday work-break apply a.little mint-cream or chew-chew
kouxiangtang. (CCL)
chewing.gum
'During the working break in the midday, apply a little bit of mint cream or chew some chewing gum a little bit.'

(b) Song Ailing *kan-le-kan* yupen you zou-le chulai.
Song Ailing look-PFV-look bath.tub again walk-PFV out
(CCL)
'Song Ailing looked at the bath tub a little bit and walked out again.'

Conjunction reduction is not possible for Parallel Verb Compounds as well. We can see in (35) that for the Parallel Verb Compounds *gou-mai* 'purchase-buy, buy' and *gou-zhi* 'purchase-place, purchase', it is neither possible to delete the first verb nor the second.

(35) (a) * ta gou-mai-le yi jian dayi hai gou-le yi
he purchase-buy-PFV one CLF coat and purchase-PFV one
tiao kuzi.
CLF pants
Intended: 'He bought a coat and purchased a pair of pants.'

(b) * ta gou-mai-le yi jian dayi hai -zhi-le yi
he purchase-buy-PFV one CLF coat and place-PFV one
tiao kuzi.
CLF pants

Intended: 'He bought a coat and purchased a pair of pants.'

By contrast, it is grammatical to delete a repeated part in a coordinated SVC. In (36a), while it is possible for the object of selling to be only cows, it is equally acceptable to interpret it as the person sells both vegetables and cows. With the second interpretation, (36a) can be understood as a reduced version of (36b).

(36) (a) ta zhong cai hai yang niu mai.
he plant vegetables and farm cow sell
'He plants vegetables and farms cows and sells them.'

(b) ta zhong cai mai hai yang niu mai.
he plant vegetables sell and farm cow sell
'He plants vegetables and sells them and farms cows and sells them.'

Once again, this criterion suggests that reduplications do not have this expected property of phrases.

Following the analyses above, it is clear that the reduplication failed all of the tests for phrasal status. In comparison, Parallel Verb Compounds failed all the tests as well, whereas SVCs passed all of them. This makes the behavior of the reduplication seem more similar to that of a Parallel Verb Compound than that of an SVC. Therefore, it seems more appropriate to assume reduplication to be a morphological process rather than a syntactic one.

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 marker (Section 3.2), and as a special reduplication construction (Section 3.3).[8] This section will review these analyses and will discuss their advantages and shortcomings.

3.1. The reduplication as a verbal classifier phrase

?, **?**: 205 and **?** analyzed the reduplication in Mandarin Chinese as a verbal classifier phrase[9]. A verbal classifier is "a measure for verbs of action expresses the number of times an action takes place" (**?**: 615), such as the *ci* in (37).

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

[9] Alternative terms for *verbal classifier*: *measure for verbs of action* in **?**: 615 or *cognate object* in **?**: 312 and **?**: 263. The *verbal classifier phrase* is also termed *quantity adverbial* in **?**: 352–353 or *frequency phrase* in **?**: 91.

(37) mei che guo yi ci huang (**?**: 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 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 *yi xia* 'once, a while', *yi hui* 'a while', as illustrated in (38).

(38) (a) *deng-deng* wo.
wait-wait I
'Wait for me a little bit.'

(b) deng wo yi xia.
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 (39), while the reduplication cannot (40) (**?**: 269).

(39) (a) ni deng yi xia Zhangsan!
you wait one CLF Zhangsan
'Wait for Zhangsan for a while!'

(b) ni deng Zhangsan yi xia!
you wait Zhangsan one CLF
'Wait for Zhangsan for a while!'

(40) (a) ni *deng-yi-deng* Zhangsan!
you wait-one-wait Zhangsan
'Wait for Zhangsan a little bit!'

(b) * ni *deng* Zhangsan *yi* *deng*!
you wait Zhangsan one wait

Second, unlike verbal classifiers (41), the *yi* 'one' in A-*yi*-A cannot be replaced by other numerals (42) (**?**: 299–230).

(41) (a) ta pai-le wo yi xia.
he pat-PFV I one CLF
'He patted me once.'

(b) ta pai-le wo liang xia.
he pat-PFV I two CLF
'He patted me twice.'

(42) (a) ta *pai-le-yi-pai* wo.
he pat-PFV-one-pat I
'He patted me a little bit.'

(b) * ta *pai-le-liang-pai* wo.
he pat-PFV-two-pat I

Third, idioms (43a) lose their idiomatic meaning when used with verbal classifiers (43b), but maintain their idiomatic meaning with reduplications (43c) (**?**: 230–231).

(43) (a) bao fo-jiao
clasp Buddha-foot
Literal: 'clasp the Buddha's foot'
Idiomatic: 'make a last-minute effort'

(b) ta kaoshi qian bao-le san xia fo-jiao.
he exam before clasp-PFV three CLF Buddha-foot
'He clasped the Buddha's foot three times before the exam.'
(idiomatic reading unavailable)

(c) ta kaoshi qian *bao-le-bao* fo-jiao.
he exam before clasp-PFV-clasp Buddha-foot
Literal: 'He clasped the Buddha's foot a little bit before the 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 marker

A number of studies consider the reduplication to be a delimitative aspect marker (**???**) due to its delimitative aspectual meaning. **??** also analyzed the reduplication in Tagalog as an imperfective aspect marker.

? and **?** analyzed the reduplication within the framework of First Phase Syntax (**?**). **?** proposed 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.[10] Dynamic and volitional verbs have the features [init proc]

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

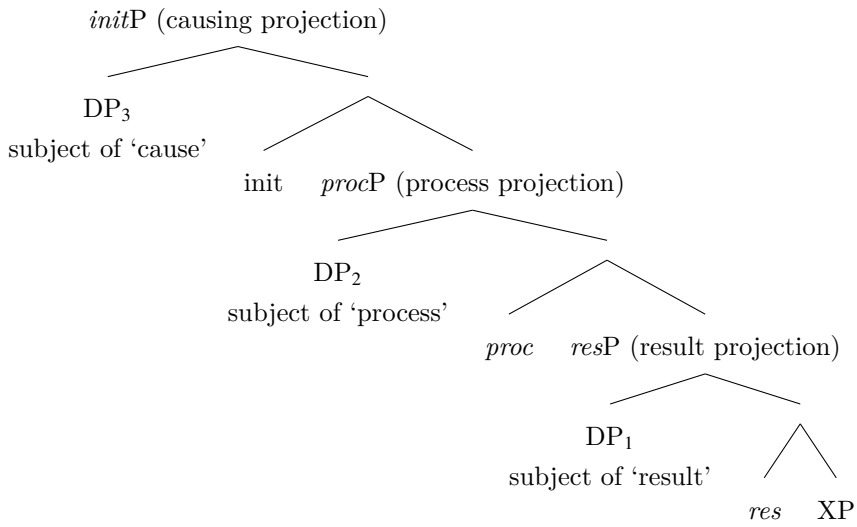

Figure 1: Event structure according to **?**: 193

and are therefore located under *init* and *proc* (**?**: 24; **?**: 147). Achievement verbs possess the feature [res] and reside under *res* (**?**: 24; **?**: 147). Stative verbs do not contain a *proc*P (**?**: 152).

? and **?** assumed that the first element in the reduplication is the actual verb, which resides under *init* and *proc*, and that the second element is an aspect marker, which resides in the complement position of *proc*, as it delimits the process of the event. 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.

?: 229 endorsed the analysis of reduplication as an aspect marker following the structure of Mandarin Chinese aspects proposed by **?**. **?** provided the syntactic analysis for aspect markers in Mandarin Chinese

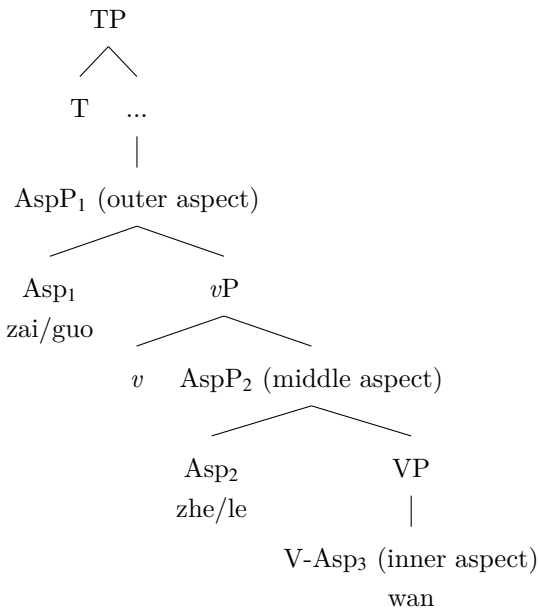

Figure 2: Structure of the aspectual system in Mandarin Chinese according to **?**: 683

as shown in Figure 2.[11] He observed that *zhe* 'PROG', *le* 'PFV' and *wan* 'COMPL' necessarily occur with additional information about the event denoted by the sentence (44), while *zai* 'DUR' and *guo* 'EXP' can occur without further information (45).

(44) Xiaoli chi-zhe/le/wan fan *(le).
Xiaoli eat-PROG/PFV/COMPL meal PTC
'Xiaoli is eating/ate/finished eating the meal.'

(45) Xiaoli (gangcai) zai ku/ku-guo.
Xiaoli just.now DUR cry/cry-EXP
'Xiaoli was crying/cried just now.'

He thus proposed three aspect positions under TP. *zai* and *guo* reside under Asp_1, while *zhe* and *le* under Asp_2, as illustrated in Figure 2.[12]

Turning to reduplication, it cannot occur without additional information as well (46). Based on this, the reduplicant should reside under Asp_2,

[11] Asp = Aspect

[12] **?** differentiated the middle and the inner aspect based on the fact that *wan* 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.

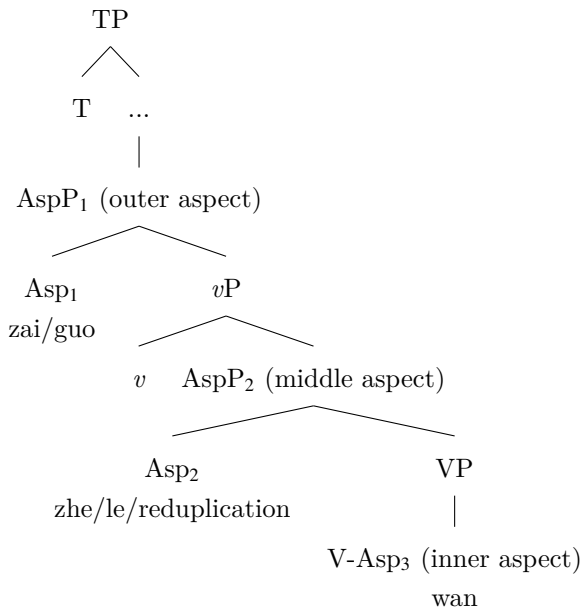

Figure 3: Position of reduplication according to the aspectual system in **?**

as illustrated in Figure 3.

(46) (a) * ta *xiao-xiao*
he laugh-laugh

(b) ta *xiao-le-xiao*
he laugh-PFV-laugh
'He laughed a little.'

(c) ta *xiao-xiao*, bu shuohua
he laugh-laugh not speak
'He laughed a little, and didn't speak.'

This analysis would result in a mismatch between syntax and semantics. Even though *le*, *guo* and reduplication all mark perfective aspects (Section 2.3.3, **??**), *guo* is situated under Asp_1 while *le* and the reduplication are under Asp_2, as can be seen from Figure 3.

In sum, both analyses of the reduplicant as an aspect marker do not seem to be convincing.

3.3. Reduplication construction

The following section discusses previous literature which proposed a special construction for the reduplication.

? provided an analysis within the theoretical framework of Parallel Architecture (**??**) for Contrastive Reduplication (CRs) in English like (47),[13] as shown in Figure 4.[14]

(47) I make the tuna salad, and you make the *SALAD-salad*.

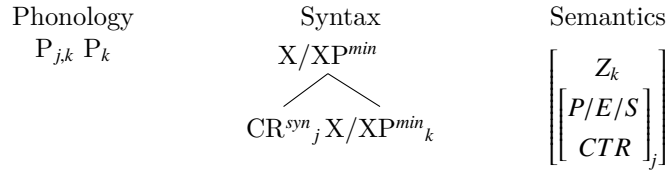

Figure 4: Analysis for CRs in English according to **?**: 344

Applying this to the reduplication in Mandarin Chinese, the structure should be something like Figure 5.[15,16] The base verb is coindexed with its phonology and its semantics 'look'. The phonology of the reduplicant is coindexed with the phonology of the verb. The reduplicant is coindexed with the delimiative semantics and modifies the semantics of the base verb. The base verb and the reduplicant combine to a V.[17] We draw the head on the left because all analyses mentioned above considered the first element in the reduplication to be the actual verb and the second element the reduplicant, but this analysis itself does not forbid the head to be on the right side.

As for the other forms of reduplication, A-*le*-A can be viewed as two compositional processes [[[A] -*le*] -A]. Furthermore, the *yi* in A-*yi*-A and A-*le*-*yi*-A can simply be viewed as a dangling phonological unit. In this case, ⟨ *yi* ⟩ is neither coindexed with a syntactic unit nor with a semantic one.

This analysis correctly captures the fact that the addition of *yi* does not change the syntactic and semantic behavior of the reduplication. It

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[13] Capitalization indicates contrastive intonation.

[14] P = phonological unit, P/E/S CTR = prototypical/extreme/salient contrast, XP^{min} = XP without its specifier

[15] DELIM = delimitative

[16] Although the reduplication in Mandarin Chinese does not have a contrastive meaning, we preserve the notation of CR^{syn} in **?** here to simply refer to the reduplicant.

[17] In English, it makes sense to assume CR^{syn} to be a syntactic unit, because the base can be XP^{min} (e.g. *OVER-THE-HILL-over-the-hill*). But for Mandarin Chinese, the base can only be V. As **?**: 353 wrote: "when applying to its smallest scope, X inside of a word, it has the feel of other things that attach there, i.e., morphological affixes". It seems that it suffices to assume the reduplication in Mandarin Chinese to be a morphological phenomenon (cf. Section 2.4). We continue to call the second column "syntax" to preserve the consistency of the notations.

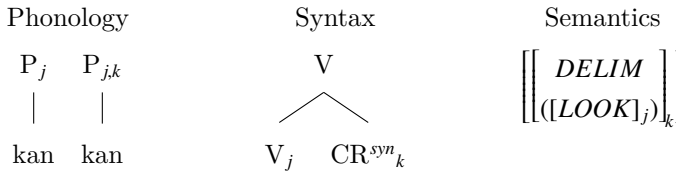

Figure 5: Analysis for AA following **?**

also provides a formal account for the phonology of the reduplication. Nevertheless, by assuming a construction specially for the reduplication, this approach fails to account for the similarities of the reduplication and other aspect markers in Mandarin Chinese, unlike the affixation analyses described in Section 3.2.

? provided a unified HPSG analysis for the reduplication of both verbs and adjectives in Mandarin Chinese. They considered reduplication to be a morphological process and modeled it via lexical rules. They provided the lexical rule (48) for reduplication in general, and further proposed *redup-a-lr* and *redup-v-lr* as subtypes of *redup-type*, as illustrated in (49) and (50) respectively.[18] For them, the reduplication functions as an intensifier predicate, as represented in the PREDICATE (PRED) in 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.

(48)
$$\begin{bmatrix} \textit{redup-type} \\ \text{CAT}|\text{HEAD} & \boxed{1} \\ \text{VAL} & \boxed{2} \\ \text{CONT} & \boxed{3}\ \text{HOOK}\begin{bmatrix} \text{LTOP} & \boxed{4} \\ \text{IND} & \boxed{5} \end{bmatrix} \\ \text{C-CONT} & \left\langle \begin{bmatrix} \textit{event-rel} \\ \text{PRED} & \textit{intensifier\_x\_rel} \\ \text{LBL} & \boxed{4} \\ \text{ARG1} & \boxed{5} \end{bmatrix} \right\rangle \end{bmatrix} \rightarrow \begin{bmatrix} \text{CAT}|\text{HEAD} & \boxed{1} \\ \text{VAL} & \boxed{2} \\ \text{CONT} & \boxed{3} \end{bmatrix}$$

[18] 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 (**??**) despite the notation that is commonly assumed.

(49)
$$\begin{bmatrix} \textit{redup-a-lr} \subset \textit{redup-type} \\ \textsc{cat}|\textsc{head} \ \textit{adjective} \\ \textsc{val} \quad \left[\textsc{spr} \ \langle\rangle\right] \\ \textsc{c-cont} \quad \left\langle\left[\textsc{pred} \ \textit{redup\_up\_x\_rel}\right]\right\rangle \end{bmatrix}$$
ORTHOGRAPHY: A → AA; (irregular AB → AABB)

(50)
$$\begin{bmatrix} \textit{redup-v-lr} \subset \textit{redup-type} \\ \textsc{cat}|\textsc{head} \quad \textit{verb} \\ \textsc{cont}|\textsc{hook} \ \left[\textsc{aspect} \ \textit{non-aspect}\right] \\ \textsc{c-cont} \quad \left\langle\left[\textsc{pred} \ \textit{redup\_down\_x\_rel}\right]\right\rangle \end{bmatrix}$$
ORTHOGRAPHY: A → AA; A → A-*yi*-A; (irregular AB → ABAB)

This approach provided 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" (**?**: 102). This is not true. **?**: 33, **?**: 161, **?**: 329 and **?**: Sec. 3.1 all considered both AA and ABAB to be productive, and **?**: 36 concluded 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; **?**).

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 **?**. 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 **?**, 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 (51) 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. □ indicates an underspecified list which could be empty or not. A delimitative relation is appended to the RELATIONS (RELS) value of the input verb, and it takes the event index of the input verb as argument. The label of the output (2) is identified with the label of the input and 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.

(51) *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 6 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

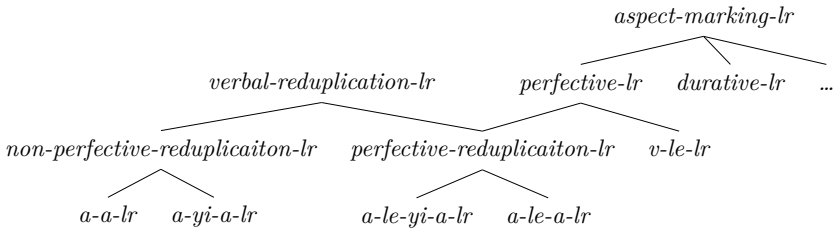

Figure 6: Type hierarchy for lexical rules of verbal reduplication and *le*

in (51) is the empty list in (52):

(52) *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 (52) again.

non-perfective-verbal-reduplication-lr has *aa-lr* and *a-yi-a-lr* as direct subtypes. (54) and (55) show *aa-lr* and *a-yi-a-lr*, respectively. As subtypes of *verbal-reduplication-lr* illustrated in (51), both inherit the constraints on the LEX-DTR and on the semantics of the output, and because of (52), 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 □ between the two phonological copies in (51) is the empty list, whereas *a-yi-a-lr* specifies this list of phonological material as ⟨ *yi* ⟩:

(53) 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 (54) and (55):

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

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

(55) 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 (51). We now turn to the constraints on *perfective-lr* and its subtypes.

?: 246 proposed the perfective lexical rule given in (56), 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*.

(56) Perfective lexical rule adapted from **?**: 246:

$$\begin{bmatrix} \textit{perfective-lr} \\ \text{PHON} \quad \boxed{1} \oplus \langle\ \textit{le}\ \rangle \\ \text{SYNSEM|LOC|CONT} \quad \begin{bmatrix} \text{LTOP} & \boxed{2} \\ \text{IND} & \boxed{3} \end{bmatrix} \\ \text{RELS} \quad \left\langle \begin{bmatrix} \textit{perfective-rel} \\ \text{LBL} \quad \boxed{2} \\ \text{ARG0} \ \boxed{3} \\ \text{ARG1} \ \boxed{4} \end{bmatrix} \right\rangle \oplus \boxed{5} \\ \text{LEX-DTR} \quad \begin{bmatrix} \text{PHON} \ \boxed{1} \\ \text{SYNSEM|LOC} \begin{bmatrix} \text{CAT} & \begin{bmatrix} \text{HEAD} & \textit{verb} \end{bmatrix} \\ \text{CONT} & \begin{bmatrix} \text{LTOP} & \boxed{4} \\ \text{IND} & \boxed{3} \end{bmatrix} \end{bmatrix} \\ \text{RELS} \ \boxed{5} \end{bmatrix} \end{bmatrix}$$

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

The lexical rule suggested in (56) 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 (57) and a subtype *v-le-lr* as in (58) are posited here. Besides adding a *perfective-rel* in the RELS list of the output as in (56), the *perfective-lr* in (57) 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* ⟩.

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

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

v-le-lr with all inherited constraints as given in (58) 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 **?**: 246 shown in (56), which accounts for the simple perfective marking of verbs.

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

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

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 ($\boxed{3}$) 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*.

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

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

For example (29a), repeated here as (60), we get the MRS representation in (61), where h1 and h2 correspond to the handles 2 and 4 and e1 to the event variable 3:

(60) ta *chang-le-chang* tang.
he taste-PFV-taste soup
'He tasted the soup a little bit.'

(61) 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 (62). 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.

(62) (a) *a-le-yi-a-lr* ⇒

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

(b) *a-le-a-lr* ⇒

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

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 generally considered unacceptable (**?**: 30; **?**: 275–276; **?**: 160; **?**: 239), **?**: 269 and **?**: 143 considered AB-*yi*-AB and AB-*le-yi*-AB to be possible, even though they both recognized that these two forms are rare. Indeed, a few examples of AB-*yi*-AB and AB-*le-yi*-AB in Early Mandarin (63a–b) and Modern Mandarin (63c–f) were found.

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[18] *Yuanqu xuan: Luzhailang [Selected Yuanqu: Luzhailang]*, as cited in **?**: 15
[19] *Yuan Ming juan: Piaotongshi [Yuan and Ming volume: Piaotongshi]*, 308, as cited in **?**: 15
[20] Rou, Shi. 1975. *Roushi xiaoshuo xuanji [Selected novels of Roushi]*, 31. Beijing: People's Literature Publishing House.
[21] Rou, Shi. 1975. *Roushi xiaoshuo xuanji [Selected novels of Roushi]*, 31. Beijing: People's Literature Publishing House.
[22] Li, Jieren. 1962. *Da bo [Great wave]*, 3rd band, 171. Beijing: The Writers Publishing House.

(63) (a) ni yu wo *zhengli-yi-zhengli*.[19]
you let me arrange-one-arrange
'Let me arrange it a little bit!'

(b) ni *dating-yi-dating*.[20]
you inquire-one-inquire
'Inquire about it a little bit!'

(c) ge ge dian-tou *weixiao-yi-weixiao*.[21]
CLF CLF nod-head smile-one-smile
'Each one nodded his head and smiled a little bit.'

(d) ta *weixiao-le-yi-weixiao*, you *mingxiang-le-yi-mingxiang*.[22]
he smile-PFV-one-smile and meditate-PFV-one-meditate
'He smiled a little bit and meditated a little bit.'

(e) feichang yansu de ba jinshi yanjing
very seriously DE BA nearsighted glasses
duanzheng-le-yi-duanzheng.[23]
straighten-PFV-one-straighten
'[He] very seriously straightened the nearsighted glasses quickly.'

(f) jiduo sanluan-zhe de chuan li de dengguang, ye
many scattered-DUR DE boat in DE light also
huyinhumie de *bianhuan-le-yi-bianhuan* weizhi. (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 (**?**: 274; **?**: 15; **?**: 239; **?**: 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.

AAB, A-*yi*-AB, A-*le*-AB, AA-*kan* and A-*kan-kan* 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).[24] AA-*kan* can be regarded as the compound of a reduplicated monosyllabic

[24] **?**: 64–65 and **?** (**?**: Sec. 2; **?**: Sec. 3.1) argued that some of these V-O combinations are compounds, some are phrases, and some have dual 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.

verb (A) and the verb *kan* 'look', whereas A-*kan-kan* is the compound of a monosyllabic verb (A) and the reduplication of *kan* 'look'. A-*yi*-A-*kan* is also possible, though rare, presumably also due to its length. An inquiry in CCL found 55 hits of A-*yi*-A-*kan*. A sample is listed in (64).

(64) (a) teyi gongneng de yanjiuzhe-men bufang ruci
special power DE researcher-PL may.as.well such
shi-yi-shi-kan … (CCL)
try-one-try-look
'Researchers of special power may as well have a try as such as see …'

(b) danshi dui fa mei fa-guo hege-zheng,
but about issue not issue-EXP conformity-certificate
yijing shuo bu qing le, xuyao *cha-yi-cha-kan*.
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) rang wo lai *cai-yi-cai-kan*. (CCL)
let I come guess-one-guess-look
'Let me have a guess.'

(d) da-laoban-men yao *deng-yi-deng-kan* (CCL)
big-boss-PL need wait-one-wait-look
'Big bosses need to wait a little bit and see.'

(e) furen ni dao *shu-yi-shu-kan*, zhe zhu hua de
madam you just count-one-count-look this CLF flower DE
huaduo gong you ji zhong yanse. (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-*kan* and A-*kan-kan*, 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-*kan* and A-*kan-le-kan* are considered pragmatically infelicitous.

The current analysis provides a unified account for all forms of delimitative verbal reduplication in Mandarin Chinese. Like in **?**, *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 **?**, 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 **?**. 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 verbal reduplication in Mandarin Chinese. We present empirical evidence that reduplication is possible with all *Aktionsarten*. We give a semantic explanation for the incompatibility of reduplication with aspect markers other than *le*. We argue that reduplication is 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.