How things become red in Mandarin Chinese? A case study of deadjectival CoS predicates

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1 Introduction

Many languages systematically derive Change of State (CoS) predicates from property concept (PC, cf. Dixon 1982) adjectives (Levin 1993, Koontz-Garboden 2005, Beavers et al. 2017, among others), e.g., *red* \rightarrow *redden* in English. We follow Tham (2013) in assuming that Mandarin Chinese derives CoS verbs systematically from PC adjectives, instead of resorting to pragmatic coercion as being proposed for Tongan by Koontz-Garboden (2007). The readers are referred to Tham (2013) for detailed arguments for the existence of the word class adjective in Mandarin Chinese as well as for its systematic derivation from PC adjectives to CoS verbs.¹

This study aims to figure out how such deadjectival CoS verbs are derived in Mandarin Chinese and how they are used in sentences, using the *red* \rightarrow *redden* counterparts as an example. We provide a formal account for the morphosyntax and semantics of deadjectival CoS predicates in Mandarin Chinese in the framework of Head-driven Phrase Structure Grammar (HPSG, Pollard & Sag 1994).

2 Data

Hóng 'red' in Mandarin Chinese is a PC adjective. This can be seen from its limited use as a predicate compared to verbal ones. It is restricted to the following situations (cf. Liu 2010, Grano 2012): with degree adverb (1), with negation (2), in a polar question (3) or with contrastive focus (4). Using a bare adjective as predicate is not possible, as in (5).

- (1) with degree adverb
 Zhāngsān yănjīng hěn hóng
 Zhangsan eye very red
 'Zhangsan's eyes are (very) red.'
- (2) with negation
 Zhāngsān yănjīng bù hóng
 Zhangsan eye NEG red
 'Zhangsan's eyes are not red.'
- (3) in polar question
 Zhāngsān yănjīng hóng mā
 Zhangsan eye red Q
 'Are Zhangsan's eyes red?'

- (4) with contrastive focus
 Píngguŏ hóng, qīngcăo lǜ
 Apple red grass green
 'The apple is red, the grass is green.'
- (5) * Zhāngsān yănjīng hóng Zhangsan eye red
 'Zhangsan's eyes are red.' (intended)

An intransitive CoS verb *hóng* 'redden' can be derived from the corresponding PC adjective, as shown in (6) and (7). Note that *Zhāngsān* in (7) is not the subject of the sentence or the causative agent of the event, but rather the topic and the experiencer, i.e., *yǎnjīng* 'eye' is the subject of the verb *hóng-le* 'redden-PFV' in both (6) and (7).

- (6) Zhāngsān yǎnjīng hóng-le Zhangsan eye redden-PFV
 'Zhangsan's eyes reddened.'
- (7) Zhāngsān hóng-le yǎnjīng Zhangsan redden-PFV eye
 'Zhangsan's eyes reddened.'

¹Arguments in Tham (2013) will be illustrated in the full paper.

The event structure of (6) can be changed when modified with different temporal modifiers, cf. (8) and (9). With the time point adverbial $s\bar{a}n$ -ti $\bar{a}n$ hou 'in three days', (8) describes a CoS of the eyes' color, while (9), with time period adverbial $s\bar{a}n$ -ti $\bar{a}n$ 'for three days', indicates a state of the eyes' being red (after becoming red) either at a certain time in the past or continuing to the present.

- (8) inchoative sān-tiān hòu, Zhāngsān yǎnjīng hóng-le three-day later Zhangsan eye redden-PFV 'Three days later, Zhangsan's eyes reddened.'
- (9) stative
 Zhāngsān yănjīng hóng-le sān-tiān
 Zhangsan eye redden-PFV three-day
 'Zhangsan's eyes were red for three days.' or 'Zhangsan's eyes have been red for three days.'

Additionally, two kinds of *le* differing in their positions in the sentence lead to different interpretations of the events. The verb-final -*le* indicates a perfective situation, cf. -*le* in (10). Distinct from the verb-final -*le*, the sentence-final *le* is accounted for as a CoS marker (V. Pan 2019). However, not all our data are in line with this analysis. For instance, the two types of *le* can co-occur in one sentence (11): the verb-final -*le* describes the perfectivity of the event; the sentence-final *le* does not indicate a CoS, but rather functions as a sentence final particle for the speaker to express the unexpectedness towards the event, as Soh (2009) and Fang (2018) suggest.

- (10) Tā mà-le tāde háizi
 (Soh 2009:628)
 he scold-PFV his child
 'He has scolded his child (and this is the whole event).'
- (11) Zhāngsān yănjīng hóng-le sān-tiān le
 Zhangsan eye redden-PFV three-day LE
 'Zhangsan's eyes have been/were red for three days.'

Further, a deadjectival CoS verb builds a resultative verb compound (RVC) with another verb to indicate caused CoS, cf. (12a) and (12b). In (12a), *hóng* 'redden' can be deleted because *shuā* 'brush' can be used transitively and can by itself take *mén* 'door' as the object. The deletion is not possible in (12b), since $k\bar{u}$ 'cry' is an intransitive verb and cannot take *yănjīng* 'eye' as a further argument. This indicates that the object is the argument of *hóng* 'redden' rather than of the preceding verb (cf. ECM resultatives discussed in Müller 2002 and Williams 2008, among others).

- (12) caused CoS
 - a. Zhāngsān shuā-(hóng)-le mén Zhangsan brush-redden-PFV door 'Zhangsan brushed the door red.'
 - b. Zhāngsān kū-*(hóng)-le yănjīng Zhangsan cry-redden-PFV eye
 'Zhangsan's eyes reddened from crying.'

3 Analysis for monomorphemic deadjectival CoS verbs

As mentioned at the beginning, we follow Tham (2013) and assume that the Chinese CoS verbs are derived from PC adjectives. The examples in the previous section indicate that deadjectival CoS verbs can either be used by themselves as monomorphemes, or can be combined with other morphemes to form RVCs. This section is dedicated to the formalization of the derivation from adjectives to monomorphemic CoS verbs.

Taking into account all the structures monomorphemic deadjectival CoS verbs appear in, as we exemplify with verbal *hóng* 'redden' in Section 2, our analysis needs to cover the following cases: an inchoative *hóng* 'redden' use without any modifications (6), a stative use with a time period adverbial (9), an inchoative use with a time point adverbial (8), and lastly, again the stative use but with two different types of *le* (11). Syntactically, the category change does not result in a difference in the argument structure: the argument of the adjective remains the argument of the derived intransitive verb.

As for the semantic part: if we decompose the semantics of the four sentences mentioned above, two types of *hóng* 'redden' seem to be needed here, one inchoative, which can be used in conjunction with a time point expression, and one stative, which co-occurs with time period expressions.

However, if we revisit the content of these sentences, we find that inchoative *hóng* 'redden' actually contains a state of being red, as shown in (13a), which accounts for why *hóng* 'redden' allows a time period adverbial, see the differences between (8) and (9). Correspondingly, the eyes in (9) with stative *hóng* 'redden' must turn red before they can stay red for three days in this state. In other words, although the verbal stative *hóng* 'redden' emphasizes the state, it must contain the content of becoming red as shown in (13b). Combining the two types of *hóng* 'redden' above, we need only one, the originally inchoative *hóng* 'redden'. The stative meaning is only activated when *hóng* 'redden' combines with a time period adverbial and in this case, the time period adverbial will only be linked to the *red* relation.

- (13) a. *hóng-le* (inchoative) $\lambda x \lambda e_1 \lambda e_2 [BECOME(e_1, RED(e_2, x)) \land e_1 <_t e_2]$
 - b. *hóng-le* three days (stative) $\lambda x \lambda e_1 \lambda e_2[BECOME(e_1, RED(e_2, x)) \land e_1 <_t e_2 \land \text{ for-three-days}(e_2)]$
 - c. three days later *hóng-le* (inchoative) $\lambda x \lambda e_1 \lambda e_2 \lambda e_3$ [BECOME(e₁, RED(e₂, x)) $\wedge e_1 <_t e_2 \wedge e_3 <_{t=3d} e_1$]²
 - d. *hóng-le* three days *le* (stative) $\lambda x \lambda e_1 \lambda e_2[BECOME(e_1, RED(e_2, x)) \land e_1 <_t e_2 \land$ for-three-days(e₂)]

Comparing (13b) and (13d), sentence-final *le* does not affect the content of the sentence. The "unexpectedness" in (11) is a pragmatic effect and will not be accounted for in the current analysis.

The feature descriptions of the adjectival *hóng* 'red' and the verbal *hóng* 'redden' are proposed in (14) and (15) respectively. To capture the productivity of the pattern, we suggest the deadjectical CoS lexical rule in (16). The argument of the PC adjective (\Box) becomes the subject of the intransitive verb; in the semantic part of the CoS verb, an additional relation of *become* is added to the original adjective content. An underspecified *precedence* relation is introduced to account for the temporal difference between the two events.



 $^{^{2}}e_{3}$ is set to precede the BECOME event e_{1} , and it is, in our data (s. (8)), spaced three days apart from e_{1} , i.e. t=3d.

This pattern is also applicable to other deadjectival CoS predicates, as in (17):

- (17) a. Yùshù de căoméi shú le (People's Daily 13 April 2011¹)
 Yushu DE strawberry ripe PFV
 'Yushu's strawberries have ripened.'
 - b. Xuéxiào de jiàgé piányi le 80-duō-yuán (People's Daily 8 Dez 2001²) school DE price cheap PFV 80-over-yuan
 'The price at school has become over 80 yuan cheaper.'

The combination of the verbal *hóng* 'redden' with the verb-final -*le* 'PFV' can be realized using the perfective lexical rule proposed in Müller & Lipenkova (2013: 246) as shown in (18).

(18) Perfective lexical rule



We assume that lexical items in Mandarin Chinese are underspecified in terms of their status as stem or word. The rule in (18) maps a stem onto a word. Hence it cannot be applied to its output. This prevents (18) to be used recursively.

4 Analysis for caused CoS RVCs

Caused CoS are expressed mainly by resultative verb compounds (RVCs) (Tham 2013: 653), as shown in (12). We propose the lexical rule in (21) based on the lexical rule for German resultative predicates in Müller (2002: Ch. 5, 2018: 70), similar to the lexical rule proposed by Wechsler & Noh (2001) for predicative resultatives in English and Korean. It takes the intransitive form of a verb as input,⁵ as indicated by an empty COMPS list. This output is a verb that takes another intransitive verb as well as its subject (\exists) as complements. The subject of the output verb is taken over directly from the input verb and therefore needs not to be represented in the lexical rule. The meaning of the output is that the event expressed by the input verb (\blacksquare) causes the event expressed by the verbal argument (\triangleleft). Notice that different from the proposal in Müller (2002: Ch. 5, 2018: 70), the meaning of the output does not contain a *become* relation. This is because based on our proposal in (16), the deadjectival CoS verb, namely the verbal argument in the output of (21), already contains the *become* relation. Thus it does not need to be represented again in (21).

(19) a. tā yào xiān chī fàn hòu hē jiǔ. the want first eat rice after drink alcohol 'He wants to eat rice first and drink alcohol after.' (Lü 1987: 2)

(20) Zhāngsān kànjiàn-le tāde māmā, Lĭsì yě kànjiàn-le. Zhangsan see-PFV his mom Lisi also see-PFV 'Zhangsan saw his mom, Lisi also saw.'

³Example from the BCC corpus (Xun et al. 2016)

⁴Example from the BCC corpus (Xun et al. 2016)

⁵As in German (Müller 2002: Sec. 5.1.7), most Mandarin Chinese verbs can be used without an object (Lü 1987: 2; Yang 1999: 35), as shown in (19).

<sup>b. tā yào xiān chī hòu hē.
he want first eat after drink
'He wants to eat first and drink after.'</sup>

Note that this is different from the null object construction (e.g. Huang 1991; H. Pan 2019), where there is a contextually salient antecedent of the unrealized object, as illustrated in (20).



We follow previous literature (e.g. Gu 1992; Li & Thompson 1981; Y. Li 1990; Tham 2015) in assuming that the second predicate is a verb (rather than an adjective). The second predicate in an RVC expresses a CoS meaning (C. Li 2007; Williams 2008), i.e. in (12a), Zhangsan's brushing causes the door to become red, rather than to stay in the state of being red. The CoS meaning is expressed by an deadjectival verb, while adjectives only express stative meaning (Tham 2013). Furthermore, there are RVCs whose second predicate is a basic verb, such as *pǎo* 'run' in (22).

(22) Zhāngsān xià-pǎo-le Lǐsì.
 Zhangsan scare-run-PFV Lisi.
 'Zhangsan scared Lisi, which caused Lisi to run away.'

If we assume that some second predicates are adjectives while others are verbs, we would have to assume two different rules for RVCs. Thus, it is simpler to assume all second elements of RVCs to be verbs.

5 Conclusions

To summarize, we propose an HPSG account for deadjectival CoS verbs in Mandarin Chinese such as *hóng* 'red/redden'. Monomorphemic deadjectival CoS verbs can be analyzed as a lexical rule that changes an adjective to a verb and adds inchoativity to its meaning. RVCs expressing caused CoS can be handled by a lexical rule based on the proposal in Müller (2002: Ch. 5, 2018: 70). It maps an intransitive verb onto a verb which takes another intransitive verb and its subject as complements while the subject remains. The meaning of the two verbs are in a causal relationship. Even though we have only used *hóng* 'red/redden' as an example here, the analysis can be applied to deadjectival CoS verbs in general.

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