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

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Abstract

This paper provides an HPSG analysis for the morphosyntax and the semantics of deadjectival change of state (CoS) verbs in Mandarin Chinese. We first show that adjectives are a distinct word class from verbs in Mandarin Chinese and argue for the derivation of CoS verbs from property concept adjectives. We then model this derivation with a lexical rule. Finally, since CoS verbs can be combined with another verb to form a resultative verb compound (RVC) to express caused CoS, we also propose a lexical rule to account for RVCs.

1 Introduction

Languages may systematically derive change of state (CoS) and caused CoS from property concept state (PC, cf. Dixon 1982; Levin 1993, Koontz-Garboden 2005, Tham 2013, Beavers et al. 2017, among others), e.g., *loose* → *loosen* in English (examples from Koontz-Garboden 2005: 83):

(1) a. The knot loosened. (non-causative CoS)
b. Sandy loosened the knot. (causative CoS)
c. The knot is loose. (state)

In (1), both causative and non-causative CoS verbs *loosen* are derived from the state predicate *loose*, which is categorized as an adjective in English. Tham (2013) proposes a paradigm for this derivation from PC states to non-causative CoS and to caused CoS:

(2) Paradigm of Derivation from State to CoS (Tham 2013: 652, simplified[1])

	State Adj/Verb/Noun	CoS Verb	Caused CoS Verb
Property concept state-based	.....	.....	.....

Note that the basic state words differ in distinct categories among languages, e.g., adjective in English as in (1c), or verb in Tongan (Koontz-Garboden 2005), or noun in Warlpiri (Wetzer 1992), etc. Additionally, since not all languages present a complete derivation from state to CoS and to caused CoS as English does, Tham displays the arrow with a dashed line.

Mandarin Chinese shows a similar derivation from PC state to CoS verb and, however, not directly to caused CoS verb in the same form, but to resultative verb compound (RVC) by combining with a new verb. We take *hóng* 'red', a common PC describing a kind of color, as an example for PC state in Mandarin Chinese. Unlike in English, it is unacceptable to use a basic state lexeme directly as a transitive verb

[1]Tham (2013: 652) also presents a (caused) CoS based deverbal derivation, i.e. a derivation from caused CoS verb to non-causative CoS verb and to state. This is not the focus of our study and is not represented in the paradigm.

in Mandarin Chinese (cf. (1b) and (3c)). In most cases, caused CoS can only be realized by RVC instead (Tham 2013: 653–654), as in (3d).[2]

(3) a. Mén hěn hóng. (State)
door very red
'The door is (very) red.'

b. Mén hóng-le. (CoS)
door red-PFV
'The door reddened.'

c. * Zhāngsān hóng-le mén. (Caused CoS)
Zhangsan red-PFV door
Intended: 'Zhangsan reddened the door.'

d. Zhāngsān shuā-hóng-le mén. (Caused CoS, RVC)
Zhangsan brush-red-PFV door
'Zhangsan brushed the door red.'

Due to the lack of morphological marking in derivation in Mandarin Chinese, the issue now is whether the state word in this language is an adjective only expressing a state, or a verb which can denote a state and a CoS. That is, *hóng* in (3a) is an adjective and the CoS verb *hóng* in (3b) is derived from it, or it is an intransitive verb, just being able to convey a state or a CoS in different structures. Indeed, whether Mandarin Chinese has the adjective word class remains controversial in previous studies. To this question, we follow Tham's (2013) assumption, that Mandarin Chinese does possess adjective as an independent category from verb and derives CoS verbs systematically from PC adjectives, instead of resorting to pragmatic coercion as being proposed for Tongan by Koontz-Garboden (2007). Based on our data, we argue that the basic state *hóng* in (3a) is an adjective 'red' and *hóng* in (3b) is a deadjectival CoS verb 'redden'. Further arguments will be given in Section 2.1.

It is worth mentioning that the perfective marker *le* needs to be attached to both causative and non-causative CoS verbs, cf. (3b) and (3d). However, the CoS is not ascribed to the perfective marker *le*. We argue that the derived verb *hóng* 'redden' has already a CoS interpretation, consistent with Tham (2013: 663) but at odds with Smith (1997: 265), who analyzes the derived verb as state and treats CoS as a "dynamic, shifted interpretation".

Our study aims to provide an analysis of this derivation in Mandarin Chinese, i.e., from PC state to non-causative CoS, and to caused CoS RVC. Taking the 'red → redden' counterparts as an example, i.e., *hóng → hóng(-le) → V-hóng(-le)*, 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, Sag 1997, Müller et al. 2021).

[2] Abbreviations used in glossing of examples in this paper: CL = classifier; COP = copula; DE = noun phrase marker *de*; LOC = locative; NEG = negation; PFV = perfective; PREP = preposition; Q = interrogative particle; VPRT = post-verbal particle.

The paper is structured as follows: in Section 2, we present the predicatival uses of PC adjectives, deadjectival CoS verbs and RVCs. Formal analyses for deadjectival non-causative CoS verbs as well as the perfective marker *le* are given in Section 3. We deal with the caused CoS expressed by RVCs in Section 4. In the last section, we draw the conclusions of this paper.

2 The phenomenon

As briefly introduced in the previous section, a PC word describing a state in Mandarin Chinese can be categorized as an adjective. A non-causative CoS verb can be derived from the PC adjective. This deadjectival CoS verb can then be used in RVCs to express caused CoS.

2.1 Adjective as a distinct word class in Mandarin Chinese

Firstly, a PC word such as *hóng* 'red' denotes a state when used as a predicate, which is categorized as adjective. Unlike English adjectives, its predicative use is restricted to the following situations (cf. Liu 2010: 1018–1019, Grano 2012: 516): with degree adverb (4), with negation (5), in a polar question (6) or with contrastive focus (7). Using a bare adjective as a predicate is not possible, as in (8).

(4) with degree adverb
Zhāngsān yǎnjīng hěn hóng.
Zhangsan eye very red
'Zhangsan's eyes are (very) red.'

(5) with negation
Zhāngsān yǎnjīng bù hóng.
Zhangsan eye NEG red
'Zhangsan's eyes are not red.'

(6) in polar question
Zhāngsān yǎnjīng hóng mā.
Zhangsan eye red Q
'Are Zhangsan's eyes red?'

(7) with contrastive focus
píngguǒ hóng, qīngcǎo lǜ.
Apple red grass green
'The apple is red, the grass is green.'

(8) * Zhāngsān yǎnjīng hóng.
Zhangsan eye red
Intended: 'Zhangsan's eyes are red.'

One might argue that this predicate should be a stative verb and there is no adjective as an independent category in Mandarin Chinese. From this view, PC words

in Mandarin Chinese are morphologically categorized as stative verbs by Thompson (2004). She gives three reasons for treating PC words in Mandarin Chinese as verbs (Thompson 2004: 1113): a) No copular verb to distinguish this from other verbs; b) Same ability to occur with adverbial elements of degrees,[3] cf. (4) and (9); c) No distinction in attributive modification, cf. (10) and (11).[4]

(9) stative verb with degree adverb
tā hěn ài wǒ.
3.SG very love 1.SG
'S/he loves me very much.'

(10) PC as attributive modifier
gāo de rén
tall DE person
'tall person' or 'person who is tall'

(11) stative verb as attributive modifier
kū de rén
cry DE person
'person who is crying'

The use of copula *shì* is highly limited in Mandarin Chinese. It is required only when the predicate is an NP, cf. (12) and (13) and their English translations. That is, no copula is needed for predicates except for NPs. Thus, a) is not a sufficient indication that adjectives are the same as verbs in Mandarin Chinese.

(12) NP as predicate
tā shì yī-míng xuéshēng.
3.SG COP one-CL student
'S/he is (a/one) student.'

(13) PP as predicate
tā zài gōngyuán.
3.SG PREP.LOC.in garden
'S/he is in the/a garden.'

Furthermore, despite their identical abilities as proposed in b), Thompson (2004) fails to recognize that these elements showing degrees or contrast are necessary for adjectives but optional for verbs, cf. (8) and (14). Besides, the intensifier *hěn* may not have the meaning of intensified degree when used with PC words. Thus, the intensive reading is optional in (4), while *hěn* in (9) necessarily expresses a high(-er)

[3]She also mentions some inchoative suffixes like *-qǐlái* and modals. They are, however, the uses of deadjectival CoS verbs.

[4]Examples (9) – (11) are from Thompson (2004: 1113). We gloss the noun phrase marker *de* (Sun 2015: 374) as DE. Note that *de* was glossed by Thompson as REL, marker of relative clause. She assumed that the prenominal attributive uses of "adjective" and verb with *de* are relative clauses.

degree of loving compared to (14). In previous literature, *hěn* is analyzed as, for instance, positive interpretation morpheme (cf. Liu 2010, Grano 2012), as "subjective standard" (Hu. Fang 2018), etc.

(14) stative verb without degree adverb
tā ài wǒ.
3.SG love 1.SG
'S/he loves me.'

Lastly, the attributive use of adjectives with *de* differs from stative verbs. As Tham (2013: 658–661) points out, an adjective may occur prenominally without *de* and build a compound with no meaning changing, but stative verbs may not, cf. (15) and (16).[5] That is, not all prenomial modifications with *de* should be necessarily interpreted as relative clauses (Tham 2013: 659, cf. also Paul 2010: 117–136).

(15) adjective with/without *de*
gāo (de) jiàgé.
high DE price
'a high price'

(16) verb with/without *de*

a. (qīngshàonián) xǐhuán *(de) diànyǐng.
youth like DE movie
'a movie liked (by young people)'

b. xǐhuán (diànyǐng) *(de) qīngshàonián.
like movie DE youth
'young people who like (movies)'

In sum, Mandarin Chinese adjectives and stative verbs are distinguishable from each other. We argue that a PC word denoting a state is categorized as adjective in Mandarin Chinese and forms an independent category from stative verbs.

2.2 Behaviors of deadjectival non-causative CoS verbs

Having established the distinction between PC adjectives and stative verbs in Mandarin Chinese in the previous section, this section suggests that the non-causative CoS verbs can be derived systematically from the PC adjectives by showing the latter have systematic verbal CoS counterparts, which behave the same way as basic CoS verbs.

(17) and (18) show the CoS use of the word *hóng* 'redden', which has the same form as its adjectival counterpart. Note that *Zhāngsān* in (18) 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 (17) and (18). Thus, (18) is intransitive and non-causative. Compared to (3c), the licensing

[5]These examples are from Tham (2013: 661). Note that *de* was glossed by Tham as ASSOC, marker for associative phrase.

of an extra NP *Zhāngsān* to be the topic in (18) is due to the fact that this NP is an experiencer, or rather, the true subject *yǎnjīng* 'eye' is his body part.

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

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

Deadjectival CoS verbs behave the same as basic CoS verbs but differently from PC adjectives in the following ways. First, adjectives can be modified by classic intensifiers such as *hěn* 'very' and *fēicháng* 'extremely' (19), but deadjectival (20) and basic CoS verbs (21) can only be intensified by using the *de hěn lìhai* 'to a serious extent' phrase (Tham 2013: 664–665).[6] Note that (20a) can only have a stative interpretation, while (20b) only a CoS one.

(19) shù-yè fēicháng hóng. (Tham 2013: 664)
tree-leaf very red
'The leaves are extremely red.'

(20) a. Sānmáo de tóufa hěn bái.
Sanmao DE hair very white
'Sanmao's hair is very white.'
'Sanmao's hair turned drastically white.'

b. Sānmáo de tóufa bái de hěn lìhai. (Tham 2013: 665)
Sanmao DE hair white VPRT very serious
'Sanmao's hair turned drastically white.'
'Sanmao's hair is very white.'

(21) a. * Sānmáo hěn zuì. (Tham 2013: 664)
Sanmao very drunk
Intended: 'Sanmao is very drunk'

b. Sānmáo zuì de hěn lìhai. (Tham 2013: 664)
Sanmao drunk VPRT very serious
'Sanmao is drunk to a serious extent.'

Similarly, adjectives and CoS verbs interact differently with negation (Tham 2013: 665–667, cf. also Guo 2018). Compare (22) and (23), when *lǎo* 'old/become old' is negated by *bù*, it can only have a stative interpretation. In contrast, when it is negated by *méi*, only the CoS meaning is possible. Accordingly, basic CoS verbs cannot be negated by *bù* but only by *méi* (24).

[6] Tham (2013) glosses the *de* in *de hěn lìhai* 'to a serious extent' as VPRT, i.e. a post-verbal particle. The particle occurs immediately to the right of the verb, and may be followed by adverbial modifiers or resultative complements (Tham 2013: 664). Note that it is written with a different character as the noun phrase marker *de* glossed as DE.

(22) tā kàn-shàngqu yì diǎn dōu bù lǎo (Lin 2003: 437)
he look-appear one little all NEG old
'He is not old at all in appearance.'

(23) tā kàn-shàngqu yì diǎn dōu méi lǎo (Lin 2003: 437)
he look-appear one little all NEG old
'He hasn't become old at all in appearance.'

(24) a. * Sānmáo bú zuì (Tham 2013: 666)
Sanmao NEG drunk

b. Sānmáo méi zuì (Tham 2013: 666)
Sanmao NEG drunk
'Sanmao didn't get drunk.'

To sum up, PC adjectives have systematic CoS counterparts, which behave differently from adjectives but in the same way as basic CoS verbs. The systematicity indicates that there is an underlying grammatical process (Tham 2013: 668, 671–672), and the CoS meaning does not arise from pragmatic coercion as Koontz-Garboden (2007) proposes for Tongan. The Principle of Monotonic Composition (Rappaport Hovav & Levin 1998, Koontz-Garboden 2005: 98–99), as formulated in (25), constrains that the word meaning is built up by adding pieces of meaning rather than subtracting. With our example, the meaning of verbal *hóng* 'redden' is built up by adding the BECOME operator to the meaning of adjectival *hóng* 'be red'. See detailed discussions on the semantics of deadjectival CoS verbs in Section 3. Based on this, we assume that CoS verbs are derived from their PC adjective counterparts.

(25) The Principle of Monotonic Composition:
Word meaning is constructed monotonically on the basis of event structure constants and operators. (Koontz-Garboden 2005: 98)

The event structure of (17) can be changed when combined with different temporal modifiers, cf. (26) and (27). With the time point adverbial *sān-tiān hòu* 'in three days', (26) describes a CoS of the eyes' color, while (27), with time period adverbial *sān-tiān* '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.

(26) inchoative
sān-tiān hòu, Zhāngsān yǎnjīng hóng-le.
three-day later Zhangsan eye redden-PFV
'Three days later, Zhangsan's eyes reddened.'

(27) stative
Zhāngsān yǎnjīng 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.'

Finally, a word on the two types of *le* in Mandarin Chinese is needed here. In our examples above (17, 18, 26, 27), the verb-final *le* is obligatory. This *le* marks the perfective aspect, as shown in (28). While we mark the *le* in (17) as a verb-final perfective marker, V. Pan (2019: 16–17) argues instead that this is a sentence-final *le*, and that the CoS meaning comes from this sentence-final particle. However, not all our data are in line with this analysis. For instance, (18) still expresses a CoS meaning without the presence of the sentence-final *le*. Further, the two types of *le* can co-occur in one sentence (29):[7] the verb-final *le* describes the perfectivity of the event; the sentence-final *le* does not change the stative reading as in (27). Therefore, we maintain our view that the CoS meanig comes from the deadjectival verb itself, and we agree with Soh (2009) and Fang (2018) that the sentence-final *le* does not indicate a CoS, but is rather used for the speaker to express the unexpectedness towards the event.

(28) Tā mà-le tāde háizi. (Soh 2009: 628)
he scold-PFV his child
'He has scolded his child (and this is the whole event).'

(29) Zhāngsān yǎnjīng hóng-le sān-tiān le.
Zhangsan eye redden-PFV three-day LE
'Zhangsan's eyes have been/were red for three days.'

2.3 Behaviors of caused CoS RVCs

A deadjectival CoS verb builds an RVC with another verb to indicate caused CoS, cf. (30a) and (30b). In (30a), *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 (30b), since *kū* 'cry' is an intransitive verb and cannot take *yǎnjīng* '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 Wechsler & Noh 2001: 394–395, Müller 2002: 247–250 and Williams 2008: Sec. 6.1, among others).

(30) caused CoS

a. Zhāngsān shuā-(hóng)-le mén.
Zhangsan brush-redden-PFV door
'Zhangsan brushed the door red.'

b. Zhāngsān kū-*(hóng)-le yǎnjīng.
Zhangsan cry-redden-PFV eye
'Zhangsan's eyes reddened from crying.'

[7] We gloss the sentence-final *le* as LE to distinguish it from the perfective verb-final *le*.

3 Analysis for non-causative CoS verbs

As mentioned in Section 1, we follow Tham (2013) and assume that the Chinese CoS verbs are derived from PC adjectives. The examples in the previous sections 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 in Section 2, our analysis needs to account for all of the following simplified cases of derivation from the adjectival *hóng* 'red' (31) to the verbal *hóng* 'redden': an inchoative use without any modifications (32a), a stative use with a time period adverbial (32b), an inchoative use with a time point adverbial (32c), and lastly, again the stative use but with two different types of *le* (32d).

(31) yǎnjīng hěn hóng.
eye very red
'Eyes are (very) red.'

(32) a. yǎnjīng hóng-le.
eye redden-PFV
'Eyes reddened.'

b. yǎnjīng hóng-le sān-tiān.
eye redden-PFV three-day
'Eyes were red for three days.'

c. sān-tiān hòu, yǎnjīng hóng-le.
three-day later eye redden-PFV
'Three days later, eyes reddened.'

d. yǎnjīng hóng-le sān-tiān le.
eye redden-PFV three-day LE
'Eyes were red for three days.'

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, i.e., the subject *yǎnjīng* 'eye' in (32).

As for the semantic part: judging from 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 a time period expression.

However, if we decompose the content of these sentences, we find that they have a common semantic core: [BECOME(e, RED(s, x)) $\wedge$ e $<_t$ s],[8] which means, inchoative *hóng* 'redden' actually contains a state of being red, as shown in (33a). It accounts for why *hóng* 'redden' allows a time period adverbial, see the differences between

[8] We treat e (event) and s (state) as subcategories of eventualities, in the sense of Bach (1986: 6).

(33a) and (33b). Correspondingly, the eyes in (32b) with an "originally" 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 (33b). (33a) and (33c) are almost the same, except that (33c) has an extra e_2 in it, which is set to precede the BECOME event e_1, and it is, in our data (32c), spaced three days apart from e_1, i.e. t=3d. The semantics of (33b) and (33d) are exactly the same, although (33d) has an extra sentence-final *le*.

Judging from the semantic representation in (33), we need only the 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.

(33) a. *hóng-le* (inchoative)
$\lambda x \lambda e \lambda s$[BECOME(e, RED(s, x)) $\wedge$ e $<_t$ s]

b. *hóng-le* three days (stative)
$\lambda x \lambda e \lambda s$[BECOME(e, RED(s, x)) $\wedge$ e $<_t$ s $\wedge$ for-three-days(s)]

c. three days later *hóng-le* (inchoative)
$\lambda x \lambda e_1 \lambda s \lambda e_2$[BECOME($e_1$, RED(s, x)) $\wedge$ $e_1 <_t$ s $\wedge$ $e_2 <_{t=3d}$ e_1]

d. *hóng-le* three days *le* (stative)
$\lambda x \lambda e \lambda s$[BECOME(e, RED(s, x)) $\wedge$ e $<_t$ s $\wedge$ for-three-days(s)]

Comparing (33b) and (33d), the sentence-final *le* does not affect the content of the sentence. The "unexpectedness" in (29) 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 (34) and (35) respectively.

(34) adjectival *hóng* 'red'

$$\begin{bmatrix} \text{CAT} & \begin{bmatrix} \text{HEAD} & \textit{adj} \\ \text{PRD} & + \\ \text{SUBJ} & \boxed{1}\left\langle \text{NP}_{\boxed{2}} \right\rangle \\ \text{COMPS} & \langle\rangle \\ \text{ARG-ST} & \boxed{1} \end{bmatrix} \\ \text{CONT} & \begin{bmatrix} \text{IND} & \boxed{3} \end{bmatrix} \\ \text{RELS} & \left\langle \begin{bmatrix} \textit{red} & \\ \text{LBL} & \textit{handle} \\ \text{ARG0} & \boxed{3} \\ \text{ARG1} & \boxed{2} \end{bmatrix} \right\rangle \end{bmatrix}$$

(35) verbal *hóng* 'redden'

$$\begin{bmatrix}
\textsc{cat} & \begin{bmatrix} \textsc{head} & \textit{verb} \\ \textsc{subj} & \boxed{1}\left\langle \textsc{np}\,\boxed{2} \right\rangle \\ \textsc{comps} & \langle\rangle \\ \textsc{arg-st} & \boxed{1} \end{bmatrix} \\
\textsc{cont} & \left[\textsc{ind} \quad \boxed{3}\right] \\
\textsc{rels} & \left\langle \begin{bmatrix} \textit{become} & \\ \textsc{lbl} & \textit{handle} \\ \textsc{arg}0 & \boxed{3} \\ \textsc{arg}1 & \boxed{4} \end{bmatrix}, \begin{bmatrix} \textit{red} & \\ \textsc{lbl} & \boxed{4} \\ \textsc{arg}0 & \boxed{5} \\ \textsc{arg}1 & \boxed{2} \end{bmatrix}, \begin{bmatrix} \textit{precedence} & \\ \textsc{lbl} & \textit{handle} \\ \textsc{arg}1 & \boxed{3} \\ \textsc{arg}2 & \boxed{5} \end{bmatrix} \right\rangle
\end{bmatrix}$$

To capture the productivity of the pattern, we suggest the deadjectical CoS lexical rule in (36). The argument of the PC adjective ($\boxed{2}$) 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.

(36) Deadjectival CoS lexical rule

$$\begin{bmatrix}
\textsc{cat} & \left[\textsc{head} \quad \textit{adj}\right] \\
\textsc{cont} & \left[\textsc{ind} \quad \boxed{1}\right] \\
\textsc{rels} & \boxed{2}\left\langle \begin{bmatrix} \textsc{lbl} & \boxed{3} \\ \textsc{arg}0 & \boxed{1} \end{bmatrix} \right\rangle
\end{bmatrix} \mapsto$$

$$\begin{bmatrix}
\textsc{cat} & \left[\textsc{head} \quad \textit{verb}\right] \\
\textsc{cont} & \left[\textsc{ind} \quad \boxed{4}\right] \\
\textsc{rels} & \left\langle \begin{bmatrix} \textit{become} & \\ \textsc{lbl} & \textit{handle} \\ \textsc{arg}0 & \boxed{4} \\ \textsc{arg}1 & \boxed{3} \end{bmatrix} \right\rangle \oplus \boxed{2} \oplus \left\langle \begin{bmatrix} \textit{precedence} & \\ \textsc{lbl} & \textit{handle} \\ \textsc{arg}1 & \boxed{4} \\ \textsc{arg}2 & \boxed{1} \end{bmatrix} \right\rangle
\end{bmatrix}$$

This pattern is also applicable to other deadjectival CoS predicates. As the two pairs of examples, adjectival and verbal *gāo* 'high' and *piányi* 'cheap', from Tham (2013: 657) and the *People's Daily* subcorpus in the Beijing Language and Culture University (BLCU) Corpus Center (Xun et al. 2016) show in (37) and (38).

(37) a. bìngrén xuèyā hěn gāo. (Tham 2013: 657)
patient blood.pressure very high
'The patient's blood pressure is (very) high.'

b. bìngrén xuèyā gāo-le. (Tham 2013: 657)
patient blood.pressure high-PFV
'The patient's blood pressure has raisen.'

(38) a. bīnguǎn hěn piányi. (*People's Daily*, Dec. 27. 2002)
hotel very cheap
'Hotels are (very) cheap.'

b. kànbīng piányi-le. (*People's Daily*, Nov. 10. 2013)
see.a.docotor cheap-PFV
'It became cheaper to see a doctor.'

The combination of the verbal *hóng* 'redden' with the verb-final *le* 'PFV' can be realized using the perfective lexical rule proposed by Müller & Lipenkova (2013: 246), as shown in (39).

(39) Perfective lexical rule

$$\left[\begin{array}{ll} \textsc{phon} & \boxed{1} \\ \textsc{synsem}\,|\,\textsc{loc} & \left[\begin{array}{ll} \textsc{cat}\,|\,\textsc{head} & \textit{verb} \\ \textsc{cont}\,|\,\textsc{ind} & \boxed{3} \end{array}\right] \\ \textsc{rels} & \boxed{2} \end{array}\right] \mapsto \left[\begin{array}{ll} \textsc{phon} & \boxed{1} \oplus \langle \text{le} \rangle \\ \textsc{rels} & \left\langle \left[\begin{array}{ll} \textit{perfective-rel} \\ \textsc{arg} \quad \boxed{3} \end{array}\right] \right\rangle \oplus \boxed{2} \end{array}\right]$$

As it is implemented in the CoreGram project (Müller 2015), the recursive application of this lexical rule is prevented in the way that the input must be of type *simple_word*. The output has a daughter and is thus automatically of type *complex_word*. In this way, (39) cannot be applied to its output.

4 Analysis for caused CoS RVCs

Caused CoS are expressed mainly by resultative verb compounds (RVCs) (Tham 2013: 653), as shown in (30) in Section 2.3. Müller (2002: Ch. 5, 2018: 70) provides the lexical rule in (41) for German resultative predicates such as (40), similar to the lexical rule proposed by Wechsler & Noh (2001) for predicative resultatives in English and Korean.

(40) Er fischt den Teich leer.
he fishes the pond empty

(41) is a lexical rule that licenses for each intransitive verb another lexical item that takes a secondary predicate as complement and forms a predicate complex. It maps an intransitive verb to a verb that takes an X(P) predicate and the subject of this X(P) as arguments. The RELS list of the output contains the RELS of the input (3), a *cause* and a *become* relation. The *cause* relation relates the event of the input verb (2) to the *become* event (7). The argument of the *become* relation is the contribution of the X(P) (5).

(41) Lexical rule for resultatives (Müller 2018: 70)

$$\begin{bmatrix} \textsc{arg-st} & \left\langle \boxed{1}\ \mathrm{NP}\left[\textit{str}\right] \right\rangle \\ \textsc{cont} & \left[\textsc{ind}\ \boxed{2}\right] \\ \textsc{rels} & \boxed{3} \end{bmatrix} \mapsto \begin{bmatrix} \textsc{arg-st} & \left\langle \boxed{1}, \boxed{4}\ \mathrm{NP}\left[\textit{str}\right], \mathrm{X(P)}\left[\textsc{prd+}, \textsc{subj}\left\langle \boxed{4} \right\rangle\right]\!:\!\boxed{5} \right\rangle \\ \textsc{cont} & \left[\textsc{ind}\ \boxed{6}\ \textit{event}\right] \\ \textsc{rels} & \boxed{3} \oplus \left\langle \begin{bmatrix} \textit{cause} & \\ \textsc{arg}0 & \boxed{6} \\ \textsc{arg}1 & \boxed{2} \\ \textsc{arg}2 & \boxed{7} \end{bmatrix}, \begin{bmatrix} \textit{become} & \\ \textsc{arg}0 & \boxed{7} \\ \textsc{arg}1 & \boxed{5} \end{bmatrix} \right\rangle \end{bmatrix}$$

Similar to (41), we propose the lexical rule in (42) for RVCs in Mandarin Chinese. It takes the intransitive form of a verb as input, as indicated by an empty COMPS list. The output is a verb that takes another intransitive verb as well as its subject (3) 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 (1) causes the event expressed by the verbal argument (4). Notice that different from (41), the meaning of the output does not contain a *become* relation. This is because based on our proposal in (36), the deadjectival CoS verb, namely the verbal argument in the output of (42), already contains the *become* relation. Thus it does not need to be represented again in (42).

(42) Lexical rule for RVCs:

$$\begin{bmatrix} \textsc{cat} & \begin{bmatrix} \textsc{head} & \textit{verb} \\ \textsc{comps} & \langle\rangle \end{bmatrix} \\ \textsc{cont} & \left[\textsc{ind}\ \boxed{1}\right] \\ \textsc{rels} & \boxed{2} \end{bmatrix} \mapsto$$

$$\begin{bmatrix} \textsc{cat} & \begin{bmatrix} \textsc{comps} & \boxed{3} \oplus \left\langle \begin{bmatrix} \textsc{loc} & \begin{bmatrix} \textsc{cat} & \begin{bmatrix} \textsc{head} & \textit{verb} \\ \textsc{subj} & \boxed{3}\left\langle \mathrm{NP} \right\rangle \\ \textsc{comps} & \langle\rangle \end{bmatrix} \\ \textsc{cont} & \left[\textsc{ind}\ \boxed{4}\right] \end{bmatrix} \end{bmatrix} \right\rangle \end{bmatrix} \\ \textsc{cont} & \left[\textsc{ind}\ \boxed{5}\ \textit{event}\right] \\ \textsc{rels} & \boxed{2} \oplus \left\langle \begin{bmatrix} \textit{cause} & \\ \textsc{arg}0 & \boxed{5} \\ \textsc{arg}1 & \boxed{1} \\ \textsc{arg}2 & \boxed{4} \end{bmatrix} \right\rangle \end{bmatrix}$$

Rather than assuming different rules for intransitive and transitive verbs, we propose that (42) with an intransitive verb as the input can cover all cases of RVCs,

because as 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 (43).[9]

(43) Lü (1987: 2)

a. tā yào xiān chī fàn hòu hē jiǔ.
he want first eat rice after drink alcohol
'He wants to eat rice first and drink alcohol after.'

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

We assume that the second predicate is a verb, rather than an adjective. The second predicate in an RVC expresses a CoS meaning (Shibagaki 2010: Sec. 5), i.e. in (30a), repeated here as (44), Zhangsan's brushing causes the door to become red, rather than to stay in the state of being red. In Mandarin Chinese, the CoS meaning is expressed by verbs, while adjectives only express stative meaning (Tham 2013: 655, 661–667).

(44) Zhāngsān shuā-hóng-le mén
Zhangsan brush-redden-PFV door
'Zhangsan brushed the door red.'

Furthermore, there are RVCs whose second predicate is a basic verb, such as *pǎo* 'run' in (45).

(45) 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, because an adjectival secondary predicate requires a *become* relation in the output of the resultative lexical rule (41), while a verbal one does not (42). Thus, it is simpler to assume all second elements of RVCs to be verbs.

The two verbs in an RVC are not in a coordinated relation. First, switching the positions of the two verbs will result in a change in the meaning of the whole construction. Second, when negated by *bù*, as in (46), the negation only scopes over the second verb but not the first. If the denotation of the first verb is not true, the whole proposition is false regardless of the truth condition of the second verb. It goes to show that the second verb is truth-conditionally subordinate to the first verb (Song et al. 2015).

[9]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 (i).

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

(46) Zhāngsān xǐ-bù-gānjìng yīfu.
Zhangsan wash-NEG-clean clothes
'Zhangsan cannot wash the clothes clean.'

Third, behaviors in imperatives show that the first verb is the head, as the whole structure inherits the ability to form imperative (47a) from the first verb (47b), while the second verb cannot form imperative (47c–d). The same behavior can be observed for resultative verb constructions in Yorùbá and thus, Maché (2022: 71) also assumes the first verb to be the head.

(47) a. chuī-gān tóufa!
blow-dry hair
'Blow the hair dry!'

b. chuī tóufa!
blow hair
'Blow the hair!'

c. * gān tóufa!
dry hair
Intended: 'Dry the hair!'

d. * gān!
dry
Intended: 'Be dry!'/'Become dry!'

All in all, it is desirable to analyze the second verb in a subordinate position to the first verb, as opposed to a headless structure such as what Müller & Lipenkova (2009) propose for the Serial Verb Construction in Mandarin Chinese.

For the example in (44), there is first a lexical entry (48) for the intransitive form of *shuā* 'brush'.

(48) *shuā* 'brush' (intransitive form)

$$\begin{bmatrix} \textsc{cat} & \begin{bmatrix} \textsc{subj} & \langle \text{NP}\boxed{1} \rangle \\ \textsc{comps} & \langle\rangle \end{bmatrix} \\ \textsc{cont} & \begin{bmatrix} \textsc{ind} & \boxed{2} \end{bmatrix} \\ \textsc{rels} & \begin{bmatrix} \textit{brush} & \\ \textsc{arg}0 & \boxed{2} \\ \textsc{arg}1 & \boxed{1} \\ \textsc{arg}2 & \square \end{bmatrix} \end{bmatrix}$$

The value of ARG2 is □, as it is not linked to any element in the valence representation. As Müller (2002: 214) argues, the value of ARG2 is underspecified and is determined by the context. For (44), it is hard to imagine a situation where the brushing of something else caused the door to become red. However, Müller (2002: 211–215) shows with examples such as (49) that the accusative NP *Weinkeller* 'wine cellar' is not the object selected by the main verb *trinken* 'drink'.

(49) Die Gäste tranken den Weinkeller leer. (Müller 2002: 212)
the guests drank the wine.cellar empty

A similar example can be constructed in Mandarin Chinese, as in (50).[10]

(50) kèrén hē-kōng-le jiǔjiào.
guest drink-empty-PFV wine.cellar
'The guests drank the wine cellar empty.'

Applying the lexical rule (42) to (48), we get the lexical item (51) for *shuā* 'brush' as being used in an RVC such as *shuā-hóng* 'brush-red'.

(51) *shuā* 'brush' (as used in *shuā-hóng* 'brush-red')

$$\left[\begin{array}{l}
\textsc{cat} \left[\begin{array}{l}
\textsc{subj} \left\langle \textsc{np}_{\boxed{1}} \right\rangle \\
\textsc{comps} \; \boxed{2} \oplus \left\langle \left[\textsc{loc} \left[\begin{array}{ll} \textsc{cat} & \left[\begin{array}{ll} \textsc{head} & \textit{verb} \\ \textsc{subj} & \boxed{2}\left\langle \textsc{np} \right\rangle \\ \textsc{comps} & \langle\rangle \end{array}\right] \\ \textsc{cont} & \left[\textsc{ind} \quad \boxed{3}\right] \end{array}\right]\right] \right\rangle
\end{array}\right] \\
\textsc{cont} \left[\textsc{ind} \quad \boxed{4}\right] \\
\textsc{rels} \left\langle \left[\begin{array}{ll} \textit{brush} & \\ \textsc{arg}0 & \boxed{5} \\ \textsc{arg}1 & \boxed{1} \\ \textsc{arg}2 & \square \end{array}\right], \left[\begin{array}{ll} \textit{cause} & \\ \textsc{arg}0 & \boxed{4} \\ \textsc{arg}1 & \boxed{5} \\ \textsc{arg}2 & \boxed{3} \end{array}\right] \right\rangle
\end{array}\right]$$

Combining (51) with the lexical item of *hóng* 'redden' as suggested in (35) yields the RVC *shuā-hóng* 'brush-red' as in (52). It means the subject's (1) brushing (4) causes the complement (2) to become (3) red (6), which correctly represents the meaning of *shuā-hóng* 'brush-red'.

[10]This analysis of an underspecified argument inferred from the context is not unique to resultative constructions, but also applies to, for instance, AcI (*Accusativum cum Infinitivum* 'accusative with infinitive') constructions, such as in (i). AcI verbs are those which embed an infinitive verb, whose subject appear in accusative (Müller 2002: 58).

(i) a. We saw them cross the river (# but we didn't see them).
b. I felt George get on the other end of the water bed (but, of course, I didn't actually feel George). (Kirsner & Thompson 1976: 209)

(i.a) seems to show that usually, when we perceive the event or the situation, we perceive the involved participants, too. However, based on examples such as (i.b), Kirsner & Thompson (1976) argue convincingly that the subject of the complement VP is not the direct object of the matrix verb, i.e. *George* is not the direct object of *feel*, rather, the event of George getting on the water bed is perceived globally. Thus, they conclude that the inference in (i.a) is made based on our world knowledge, rather than the grammatical structure of the sentence. De Geest (1970: 50–51) and Müller (2002: 63–64) argue for the same with Dutch and German examples, respectively.

(52) *shuā-hóng* ‘brush-red’

$$\left[\begin{array}{l}\textsc{cat}\left[\begin{array}{ll}\textsc{subj} & \left\langle \mathrm{NP}_{\boxed{1}} \right\rangle \\ \textsc{comps} & \left\langle \mathrm{NP}_{\boxed{2}} \right\rangle\end{array}\right] \\ \textsc{cont}\left[\textsc{ind} \quad \boxed{5}\right] \\ \textsc{rels}\left\langle \left[\begin{array}{ll}\textit{brush} & \\ \textsc{arg}0 & \boxed{4} \\ \textsc{arg}1 & \boxed{1} \\ \textsc{arg}2 & \square\end{array}\right], \left[\begin{array}{ll}\textit{cause} & \\ \textsc{arg}0 & \boxed{5} \\ \textsc{arg}1 & \boxed{4} \\ \textsc{arg}2 & \boxed{3}\end{array}\right], \left[\begin{array}{ll}\textit{become} & \\ \textsc{arg}0 & \boxed{3} \\ \textsc{arg}1 & \boxed{6}\end{array}\right], \left[\begin{array}{ll}\textit{red} & \\ \textsc{arg}0 & \boxed{6} \\ \textsc{arg}1 & \boxed{2}\end{array}\right], \left[\begin{array}{ll}\textit{precedence} & \\ \textsc{arg}1 & \boxed{3} \\ \textsc{arg}2 & \boxed{6}\end{array}\right] \right\rangle\end{array}\right]$$

5 Conclusions

To summarize, Mandarin Chinese systematically derives change of state (CoS) verbs from property concept adjectives. These non-causative CoS verbs can then be combined with another verb to form resultative verb compounds (RVCs), which express caused CoS. We propose an HPSG account for deadjectival CoS verbs in Mandarin Chinese such as *hóng* ‘red/redden’. The derivation of non-causative 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 events denoted by the two verbs are in a causal relationship.

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References

Bach, Emmon. 1986. The algebra of events. *Linguistics and philosophy* 9(1). 5–16.

Beavers, John, Michael Everdell, Kyle Jerro, Henri Kauhanen, Andrew Koontz-Garboden, Elise LeBovidge & Stephen Nichols. 2017. Two types of states: A cross-linguistic study of change-of-state verb roots. In Patrick Farrell (ed.), *Proceedings of the linguistic society of america*, vol. 2, 1–15. Austin, TX: Linguistic Society of America. DOI: 10.3765/plsa.v2i0.4094.

de Geest, Wim. 1970. Infinitiefconstructies bij verba sentiendi. *Studia Neerlandica* 3. 33–59.

Dixon, Robert M.W. 1982. *Where have all the adjectives gone? And other essays in syntax and semantics* (Janua Linguarum: Series Maior 107). The Hague: Mouton. DOI: 10.1515/9783110822939.

Fang, Hongmei. 2018. Mirativity in Mandarin: The sentence-final particle *le* (了). *Open Linguistics* 4(1). 589–607. DOI: 10.1515/opli-2018-0029.

Fang, Huilin. 2018. Subjective standard-setting in gradable predicates: On the Mandarin *hen* structure. In *Proceedings of Sinn und Bedeutung*, vol. 21, 409–426.

Grano, Thomas. 2012. Mandarin *hen* and universal markedness in gradable adjectives. *Natural Language & Linguistic Theory* 30(2). 513–565. DOI: 10.1007/s11049-011-9161-1.

Guo, Rui. 2018. *Xiandai hanyu cilei yanjiu [A study of word classes in Modern Chinese]*. Beijing: Shangwu yinshuguan [The Commercial Press].

Huang, C.-T. James. 1991. Remarks on the status of the null object. In Robert Freidin (ed.), *Principles and parameters in comparative grammar*, 56–76. Cambridge, MA: MIT Press.

Kirsner, Robert S. & Sandra A. Thompson. 1976. The role of pragmatic inference in semantics: A study of sensory verb complements in English. *Glossa* 10(2). 200–240.

Koontz-Garboden, Andrew. 2005. On the typology of state/change of state alternations. In Geert Booij & Jaap van Marle (eds.), *Yearbook of morphology 2005*, 83–117. Dordrecht: Springer. DOI: 10.1007/1-4020-4066-0_4.

Koontz-Garboden, Andrew. 2007. Aspectual coercion and the typology of change of state predicates. *Journal of Linguistics* 43(1). 115–152. DOI: 10.1017/S0022226706004464.

Levin, Beth. 1993. *English verb classes and alternations: A preliminary investigation*. Chicago: University of Chicago press.

Lin, Jo-Wang. 2003. Aspectual selection and negation in Mandarin Chinese. *Linguistics* 41(3). 425–459. DOI: 10.1515/ling.2003.015.

Liu, Chen-Sheng Luther. 2010. The positive morpheme in Chinese and the adjectival structure. *Lingua* 120(4). 1010–1056. DOI: 10.1016/j.lingua.2009.06.001.

Lü, Shuxiang. 1987. Shuo "sheng" he "bai" [On "win" and "lose"]. *Zhongguo yuwen* 1. 1–5.

Maché, Jakob. 2022. Accounting for the variation in West Benue resultative constructions. In Stefan Müller & Elodie Winckel (eds.), *Proceedings of the International Conference on Head-Driven Phrase Structure Grammar*, 65–85. Frankfurt/Main: University Library. DOI: 10.21248/hpsg.2022.4.

Müller, Stefan. 2002. *Complex predicates: Verbal complexes, resultative constructions, and particle verbs in German* (Studies in Constraint-Based Lexicalism 13). Stanford, CA: CSLI Publications.

Müller, Stefan. 2015. The CoreGram project: Theoretical linguistics, theory development and verification. *Journal of Language Modelling* 3(1). 21–86. DOI: 10.15398/jlm.v3i1.91.

Müller, Stefan. 2018. *A lexicalist account of argument structure: Template-based phrasal LFG approaches and a lexical HPSG alternative* (Conceptual Foundations of Language Science 2). Berlin: Language Science Press. DOI: 10.5281/zenodo.1441351.

Müller, Stefan, Anne Abeillé, Robert D. Borsley & Jean-Pierre Koenig (eds.). 2021. *Head Driven Phrase Structure Grammar: The handbook* (Empirically Oriented Theoretical Morphology and Syntax 9). Berlin: Language Science Press. DOI: 10.5281/zenodo.5543318.

Müller, Stefan & Janna Lipenkova. 2009. Serial verb constructions in Chinese: A HPSG account. In Stefan Müller (ed.), *Proceedings of the 16th International Conference on Head-Driven Phrase Structure Grammar, Georg-August Universitat Göttingen, Germany*, 234–254. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2009.12.

Müller, Stefan & Janna Lipenkova. 2013. ChinGram: A TRALE implementation of an HPSG fragment of Mandarin Chinese. In *Proceedings of the 27th Pacific Asia Conference on Language, Information, and Computation (PACLIC 27)*, 240–249. Taipei, Taiwan: Department of English, National Chengchi University.

Pan, Haihua. 2019. Null object constructions, VP-ellipsis, and sentence interpretation. In Haihua Pan & Jianhua Hu (eds.), *Interfaces in grammar*, 283–299. Amsterdam: John Benjamins.

Pan, Victor. 2019. *Architecture of the periphery in Chinese: Cartography and Minimalism*. London: Routledge. DOI: 10.4324/9781315158228.

Paul, Waltraud. 2010. Adjectives in Mandarin Chinese: The rehabilitation of a much ostracized category. In Patricia Cabredo Hofherr & Ora Matushansky (eds.), *Adjectives: Formal analyses in syntax and semantics* (Linguistics Today 153), 115–152. Amsterdam: John Benjamins. DOI: 10.1075/la.153.04pau.

Pollard, Carl J. & Ivan A. Sag. 1994. *Head-Driven Phrase Structure Grammar*. Chicago: University of Chicago Press.

Rappaport Hovav, Malka & Beth Levin. 1998. Building verb meanings. In Miriam Butt & Wilhelm Geuder (eds.), *The projection of arguments: Lexical and compositional factors*, 97–133. Stanford, CA: CSLI Publications.

Sag, Ivan A. 1997. English relative clause constructions. *Journal of Linguistics* 33(2). 431–483. DOI: 10.1017/S002222679700652X.

Shibagaki, Ryosuke. 2010. Mandarin secondary predicates. *Taiwan Journal of Linguistics* 8(1). 57–93. DOI: 10.6519/TJL.2010.8(1).3.

Smith, Carlota. 1997. *The parameter of aspect*. Dordrecht: Springer. DOI: 10.1007/978-94-011-5606-6.

Soh, Hooi Ling. 2009. Speaker presupposition and Mandarin Chinese sentence-final-*le*: A unified analysis of the "change of state" and the "contrary to expectation" reading. *Natural Language & Linguistic Theory* 27(3). 623–657. DOI: 10.1007/s11049-009-9074-4.

Song, Sanghoun, Chen Bo, Francis Bond & Sio Joanna Ut-Seong. 2015. An HPSG-based Analysis of Resultative Compounds in Chinese. Paper presented at the 22nd International Conference on Head-Driven Phrase Structure Grammar.

https://bond-lab.github.io/events/2015-hpsg/pdf/vv-compounds.pdf (29 August, 2023).

Sun, Chaofen. 2015. The uses of DE as a noun phrase marker. In William S-Y. Wang & Chaofen Sun (eds.), *The Oxford Handbook of Chinese Linguistics*, 362–376. New York: Oxford University Press. DOI: 10.1093/oxfordhb/9780199856336.013.0027.

Tham, Shiao Wei. 2013. Change of state verbs and result state adjectives in Mandarin Chinese. *Journal of Linguistics* 49(3). 647–701. DOI: 10.1017/S0022226713000261.

Thompson, Sandra A. 2004. Property concepts. In Geert Booij, Christian Lehmann, Joachim Mugdan, Stavros Skopeteas & Wolfgang Kesselheim (eds.), *Morphology: An international handbook on inflection and word-formation*, vol. 2 (Handbooks of Linguistics and Communication Science [HSK] 17/2), 1111–1117. Berlin & New York: De Gruyter Mouton. DOI: 10.1515/9783110172782.2.14.1111.

Wechsler, Stephen & Bokyung Noh. 2001. On resultative predicates and clauses: Parallels between Korean and English. *Language Sciences* 23(4). 391–423. DOI: 10.1016/S0388-0001(00)00031-0.

Wetzer, Harrie. 1992. "Nouny" and "verby" adjectivals: A typology of predicative adjectival constructions. In Michel Kefer & Johan van der Auwera (eds.), *Meaning and grammar: Cross-linguistic perspectives* (Empirical Approaches to Language Typology [EALT] 10), 223–262. Berlin & New York: De Gruyter Mouton. DOI: 10.1515/9783110851656.223.

Williams, Alexander. 2008. Patients in Igbo and Mandarin. In Johannes Dölling, Tatjana Heyde-Zybatow & Martin Schäfer (eds.), *Event structures in linguistic form and interpretation* (Language, Context and Cognition 5), 3–30. Berlin: De Gruyter. DOI: 10.1515/9783110925449.3.

Xun, Endong, Gaoqi Rao, Xiaoyue Xiao & Jiaojiao Zang. 2016. Dashuju beijing xia BCC yuliaoku de yanzhi [The construction of the BCC corpus in the age of big data]. *Yuliaoku Yuyanxue [Corpus linguistics]* 3(1). 93–109.

Yang, Suying. 1999. Cong feibingedongci xianxiang jan yuyi yu jufajiegou zhijian de guanxi [The unaccusative phenomenon: A study on the relationship between syntax and semantics]. *Dangdai Yuyanxue [Contemporary Linguistics]* (1). 30–43.