# Why one can kill Rasputin twice in Mandarin

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**Abstract.** Mandarin Chinese allows so-called zero-change (failed-attempt) construals of causative monomorphemic verbs when the subject refers to an agent. However, while for non-gradable causative simple verbs, this reading is generally available only when the verb is modified by a cardinality adverbial (e.g., *liǎng cì* 'twice'), with gradable causative simple verbs, the zero-change reading is readily available even in the absence of a cardinality adverbial, though the presence of such an adverbial does indeed facilitate it. We account for this puzzle by arguing that the source of non-culmination differs for gradable vs. non-gradable causative simple verbs: it lies in the partitive semantics of perfective *le* for non-gradable causative verbs, and/or the degree argument tracking the degree of event realization for gradable causative verbs.
**Keywords:** zero-change construals, causative verbs, perfective, cardinality adverbial, gradability, agentivity, inner vs. outer aspect, event culmination, Mandarin Chinese.

## 1. Introduction

Mandarin Chinese is one of the languages exhibiting so-called failed-attempt or zero-change construals of verbs with a causative semantics (Chief 2008, Koenig and Chief 2008 among others). Such readings, illustrated with the Mandarin causative simple verbs in (1)-(3) below (simple because they are morphologically underived), have been documented across a wide variety of typologically diverse languages, for instance Salish languages (Bar-el et al. 2005), Karachay-Balkar (Tatevosov 2008), Malagasy (Paul et al. 2020 and references therein) or Korean (Beavers and Lee 2020).[2]

(1) Mòmo guān le nà-shàn mén, dàn gēnběn méi guān-shàng.
Momo close PFV that-CL door but at.all NEG close-up
'Momo closed that door, but it didn't get closed at all.'

(2) Mòmo shāo le tā-de shū, dàn méi shāo zháo.
Momo burn PFV 3SG-DE book but NEG.PFV burn ignite
'Momo burned her book, but it didn't get burnt at all.'

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[2]In Martin et al. (2020), we provide arguments in favour of the assumption endorsed here that causative simple verbs do exist in Mandarin, probing event structure through four diagnostics. We thus oppose a prevalent view according to which Mandarin simple verbs counterparts of English lexical causatives are not causative themselves. For a position similar to ours, see also Cheng (1989) and Koenig and Chief (2008).

 In: P. G. Grosz, L. Martí, H. Pearson, Y. Sudo, and S. Zobel (eds.) *Proceedings of Sinn und Bedeutung 25*, pp. 618–635. University College London and Queen Mary University of London.

(3) Zhāngsān shā le Lǐsì liǎng cì, Lǐsì dōu méi sǐ.
Zhangsan kill PFV Lisi two time, Lisi all not die
'Zhangsan killed Lisi twice, but Lisi didn't die.' (Tai 1984, 292)

Examples (1)-(3) illustrate that Mandarin perfective sentences built with verbs such as *guān* 'close' or *shā* 'kill' do not entail the occurrence of a change-of-state in their perfective form, since the expected change can be denied in a subsequent clause.
However, when the subject of the perfective sentence is an inanimate (causer), the occurrence of the change-of-state is entailed rather than implicated, as shown by the contrast between (1) and (4), following a pattern observed across many languages (see Demirdache and Martin's (2015) *agent control hypothesis*; cf. for instance Liu 2018 on Mandarin; Bar-el et al. 2005 on Salish languages; Beavers and Lee 2020 on Korean; Persohn 2021 on Xhosa and Nyakyusa).

(4) Yí-zhèn fēng guān-le nà-shàn mén, #dàn mén yìdiǎn dōu méi guān-shàng
one-CL wind close-PFV that-CL door but door a.little DOU NEG.PFV close-up
Intended:'A gust of wind closed that door, but it didn't get closed at all.'

An overlooked and to our knowledge unexplained fact concerns the contexts licensing the denial of the relevant change-of-state with an agentive subject and a causative verb with a *non-gradable* meaning such as *shā* 'kill', vs. one with a *gradable* meaning such as *shāo* 'burn'. *Non-gradable* causative simple verbs (some of which are listed in (6)) fail to felicitously combine with degree adverbs (*yíbùfen/yìdiǎn* 'partly', *wánquán/quán* 'completely', *shāowēi* 'slightly' or *yíxià* 'a little'), as will be shown in (16) and (19), unlike *gradable* causative verbs which felicitously combine with such adverbs, as shown in (15) and (17) in section 3.

(5) Gradable causative simple verbs: *shāo* 'burn', *dòng* 'freeze', *kāi* 'open', *guān* (*mén*) 'close (the door)', *sī* 'tear', *mái* 'bury', *fā* 'leaven', *rǎn*(*tóufa*) 'dye (one's hair)', *zhé yíge shùzhī* 'break a branch', *jiě* (*lǐngdài*) 'unknot (a cravat)', *qiē* 'cut'
(6) Non-gradable causative simple verbs: *shā* 'kill', *chú* (*èbà*)'get rid of (the tyrant)', *zhāi* (*píngguǒ*) 'pick (an apple)', *guān* (*shūdiàn*) 'close (the bookstore)', *suì* (*diézi*) 'break (a plate)', *xī* 'blow out', *jiù* 'save'.

The relevant observation is that most Mandarin speakers accept the zero-change reading for *non-gradable* causative simple verbs *only* when the verb is modified by what Parsons (1990) calls a cardinality adverbial, for instance, *hǎojǐcì* 'several times' or *yícì* 'once' (or alternatively by a durative adverbial, set aside here for space reasons), and this even if the agentive subject restriction is satisfied. Tellingly, many previous examples given in the literature to illustrate the zero-change reading for *shā* 'kill' do indeed contain a cardinality adverbial, such as for instance the example quoted from Tai (1984:292) in (3) above, or Chief's (2008) example (8) and Tai's (2003) example (12). In contrast, gradable causative simple verbs readily accept the zero-change reading without a cardinality (or durative) adverbial, as (1)-(2) and (8) confirm, although the presence of such an adverbial with these verbs does facilitate the reading. This generalisation which we refer to as the *cardinality adverbial effect* and which was originally observed by Hongyuan Sun is illustrated in (7a)–(7b). The paradigm in (9) is particularly striking: we see that the zero-change construal cannot be salvaged by adding the adverbial *yòu* 'again', while it can by adding the cardinality adverbial *sāncì* 'three times'.

(7) *The cardinality adverbial effect* (Hongyuan Sun)

a. #Gōngjué shā le Lāsīpǔjīng, Lāsīpǔjīng méi sǐ.
prince kill PFV Rasputin Rasputin NEG.PFV die
Intended: 'The prince killed Rasputin, but Rasputin didn't die.'

b. Gōngjué shā le Lāsīpǔjīng hǎojǐcì, Lāsīpǔjīng dōu méi sǐ.
prince kill PFV Rasputin several.times Rasputin DOU NEG.PFV die
Literally: 'The prince killed Rasputin several times, but Rasputin didn't die.'

(8) Lǐsì shāo le yì-gēn mùtou (hǎojǐcì), dàn gēnběn méi shāo-zháo.
Lisi burn PFV one-CL wood several.times but at.all NEG.PFV burn-ignite
'Lisi burned a piece of wood (several times) but it didn't get burned at all.'

(9) a. Nóngfū shā le nèi-tóu niú sāncì, niú dōu méi sǐ.
Farmer kill PFV that-CL ox three.times ox DOU NEG.PFV die
Literally: 'The farmer killed that ox three times, but the ox didn't die.'

b. #Nóngfū yòu shā le nèi-tóu niú, (niú dōu méi sǐ.)
Farmer again kill PFV that-CL ox ox DOU NEG.PFV die
Intended: 'The farmer killed that ox again, but the ox didn't die.'

This paper seeks to explain the puzzling set of contrasts illustrated in (7)–(9) – and, in particular, why one can kill Rasputin *several times* or *once*, but not *again*, in Mandarin. It is organized as follows. Section 2 presents Liu's (2018) experimental evidence confirming the cardinality adverbial effect, as well as the agent control hypothesis. Section 3 provides a semantics for Mandarin gradable vs. non-gradable causative simple verbs. Section 4 argues for two (complementary) sources for the non-culmination construal in Mandarin, namely the degree argument of the verb (section 4.1) and the aspectual perfective morphology *le* (section 4.2), and in so doing accounts for the cardinality adverbial effect. Section 5 extends Martin's (2020) account of the agentivity restriction on the zero-change construal of causative verbs to Mandarin simple verbs. Section 6 offers a brief comparison between Mandarin and Hindi.

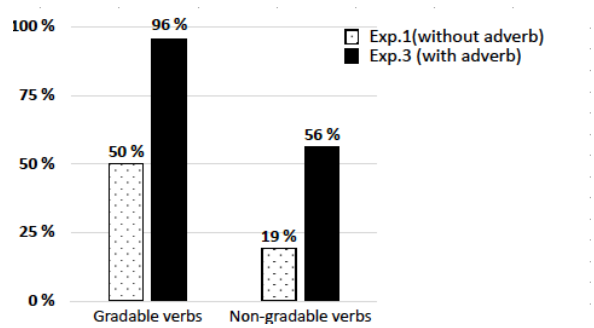
## 2. The cardinality adverbial effect and the agent control hypothesis: Liu's (2018) experimental corroboration

Liu (2018) ran section several truth-value judgment tasks to test the availability of zero-change construals in Mandarin, with 50 native speakers from southern and northern China, all with a high education level. The experiments manipulated two variables within-participants: ZERO-CHANGE vs. FULL-CHANGE, and (animate) AGENT vs. (inanimate) CAUSER subject. Five gradable and three non-gradable causative simple verbs (listed in (10)) were tested, though GRADABILITY itself was not a variable.

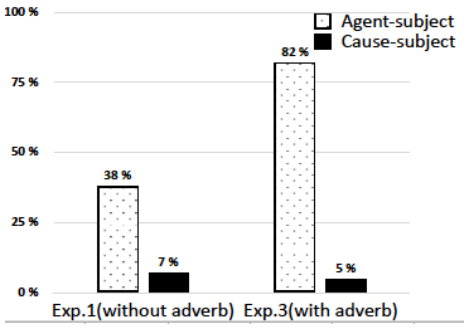
(10) a. Gradable causative simple verbs: *mái* 'bury', *zhé* 'cut', *jiě* 'untie', *guān* 'close', *kāi* 'open'

b. Non-gradable causative simple verbs: *shā* 'kill', *suì* 'break (a plate)', *xī* 'extinguish'.

In Experiment 1 (N=30), under the ZERO-CHANGE/AGENT condition, subjects saw videos showing an agent attempting, only once, to carry out an action (for instance close a window) without success (the window does not budge an inch), while under the FULL-CHANGE/AGENT condition, the agent's action was successful (the window gets successfully closed). Subjects had




(a) with vs. without adverbials (with an agent subject)




(b) with an agent vs. causer subject

Figure 1: Results of Liu's (2018) Experiments 1 and 3 : Percentage of YES answers for zero-change situations with (non-) gradable verbs (N=30) and with agent vs. causer subjects (N=20)

to judge the truth of perfective causative simple verbs sentences without a cardinality adverbial, volunteered as descriptions for the culminating/non-culminating causation event.[3]
In contrast, in Experiment 3 (N=20), subjects saw videos showing an agent attempting, this time repeatedly, to carry out an action, without any success under the ZERO-CHANGE condition, but successfully under the FULL-CHANGE condition. Subjects had to judge the truth of perfective causative simple verb sentences, this time with the cardinality adverb *hǎojǐcì* 'several times', volunteered as descriptions for culminating/non-culminating causation events. Relevant test items for Experiment 1 and 3 are illustrated in (11) and (12), respectively. 'No' answers were followed up with the question in (13).

(11) Hǎidào guān-le nà shàn mén ma?
Pirate close-PFV that CL door INT?
'Did the pirate close that door?'

(12) Hǎidào guān-le hǎojǐcì nà shàn mén ma?
Pirate close-PFV several.times that PFV door INT?
'Did the pirate close that door several times?'

(13) Zhēn de ma? Fā shēng shénme shì le?
'Really? What happened then?'

Liu's findings summarized under Figures 1a and 1b provide experimental corroboration for the *cardinality adverbial effect*, as well as the *agent control hypothesis*. As shown in Figure 1a, when a causative simple verb with an agent subject is not modified by a cardinality adverbial, perfective causative simple verb sentences are – to some variable extent – judged true in the ZERO-CHANGE condition with *gradable* causative simple verbs, but much less so with *non-gradable* causative simple verbs (the former being accepted on average 50% of the time, but the latter only 19% of the time). Crucially, a cardinality adverbial raises the acceptance rate on the ZERO-CHANGE condition *across verb types* (from 50% to 96% with gradable causative simple verbs and from 19% to 56% with non-gradable causative simple verbs). A $\chi$-square test confirmed that on the zero-change condition, modification by a cardinality adverb plays a significant role (Liu 2018: 231). Furthermore, we see that when a causative simple verb is

[3]The experimental material can be consulted at the following page: `https://osf.io/4aecs/`

combined with a causer (inanimate) subject, perfective sentences are judged false across verb types on the zero-change condition, as shown in Figure 1b.

## 3. Semantics for gradable vs. non-gradable causative simple verbs

In previous work (Martin et al. 2020), we proposed a new semantics for Mandarin gradable causative simple verbs building on Piñón's (2008) analysis of (English) incremental theme verbs. We summarize the main points of our analysis below.

Following Piñón (2008), incremental theme verbs encode a degree of *event realization* $d_e$. The *degree of event realization* $d_e$ is to be distinguished from the *degree of change* $d_c$ encoded by degree achievements (Kennedy and Levin 2008) which measures a change in the extent to which an individual has a certain gradable property. The idea that gradable verbs may encode a degree of event realization $d_e$ rather than a degree of change $d_c$ is crucial here because it allows us to capture the idea that a causation event involving an agent (e.g., Lisi burning a piece of wood, Momo opening the door) can be realized to a positive degree without the theme actually enduring a change (e.g., without the wood starting to burn or the window starting to open). This is the case, for instance, if Lisi has started burning the wood by preparing the fire to do so and putting the wood into the fire, or if Momo has put his key within the lock of the door. In such a situation where the subject's referent started acting, the event is realized to a positive degree, i.e., $d_e > 0$. But this does not imply that the change is also initiated, i.e., that $d_c > 0$: maybe the wood is so damp that it is able to withstand high temperature without starting to burn, and maybe something impedes the door from opening. That is, Lisi may *start burning* the wood without the wood *starting to burn*, and Momo may *start opening* the door without the door *starting to open*. On the other hand, if the wood starts burning or if the door starts opening (i.e., if $d_c > 0$), then necessarily, the event is realized to a positive degree (i.e., $d_e > 0$). That a positive degree of change asymetrically entails a positive degree of event realization with causative verbs (used agentively) simply reflects the fact that agentive causation events involve some change-of-state of the theme *in addition to* some other subevent starting earlier, namely, some action performed by the subject (section 5 elaborates on this point).

The idea spelled-out in Martin et al. (2020) is that gradable causative simple verbs such as *shāo* 'burn' encode gradable properties which are measure functions $\mu$ yielding degrees $d_e$ as values, tracking the degree of realization of events, as in (14a). The argument $d_e$ gets bound either by the *positive binding operator* or by the *degree maximizing operator* (as shown in (14c) or (14d) respectively, and more generally, Piñón 2008 on incremental theme verbs).

(14) a. $\mathbf{burn}_\mu(e,y)$ 'the degree to which a burning event $e$ of $y$ is realized'
b. *shāo* 'burn' $\rightsquigarrow \lambda y \lambda d_e \lambda e.\mathbf{burn}_\mu(e,y) = d_e$
c. $\mathbf{burn}^+_\mu(e,d_e,y) := \mathbf{burn}_\mu(e,y) = d_e \wedge d_e > 0$
d. $\mathbf{burn}(e,y) := \mathbf{burn}_\mu(e,y) = d_e \wedge d_e = 1$
e. $\forall e \forall y(\mathbf{burn}(e,y)) \rightarrow \exists s(\mathbf{cause}(e,s) \wedge \mathbf{burnt}(s,y))$

When the value of $d_e$ in (14b) is set to 1 – i.e. the (burning of $y$) event is realized to degree 1 – the meaning postulate in (14e) ensures that $e$ causes some state of $y$ being burnt. Adverbs of completion such as *wánquán/quán* require the value of $d_e$ to be 1. Thus for instance, the continuation in (15) is not felicitous (example (16) is not acceptable to begin with, for *shā* 'kill' is not gradable).

(15) Nèi-běn shū Mòmo quán shāo le, #dànshì shū gēnběn méi
that-CL book Momo completely burn PFV but book at.all NEG.PFV
shāo-zháo.
burn-ignite
Intended: 'Momo completely burned the book, but the book didn't burn at all.'

(16) #Nèi-zhī yāzi Mòmo quán shā le.
that-CL duck Momo completely kill PFV
Intended: 'Momo completely killed that duck.'

By contrast, degree modifiers such as *shāowēi* 'slightly' or *yíxià* 'a little' (which can also be used together in the same sentence) specify that the event is realized to some positive degree above (but close) to zero. Since an agentive causation event type can be realized minimally without some change to be realized too, the zero-change construal of gradable causative simple verbs remains felicitous even in the presence of these degree adverbials, as (17) shows:

(17) Nèi-běn shū Mòmo zhǐ shāowēi shāo le yíxià, dàn gēnběn méi
that-CL book Momo only slightly burn PFV a.little but at.all NEG.PFV
shāo-zháo.
burn-ignite
Literally: 'Momo only slightly burned the book, but it didn't burn at all.'

We take this to provide support for the proposal spelled out here that Mandarin gradable causative simple verbs encode a *degree of event realization* $d_e$, rather than a *degree of change* $d_c$, since the subsequent clause denies the occurrence of any change whatsoever. In contrast, non-gradable causative simple verbs such as *shā* 'kill' do not encode a gradable property, as shown in (18). This is why they cannot be modified by a degree adverbial, as shown in (16) and (19). Thus for us non-gradable causative verbs have the same meaning in Mandarin and English.

(18) *shā* 'kill' $\rightsquigarrow \lambda y \lambda e. \exists s(\textbf{cause}(e,s) \wedge \textbf{dead}(s) \wedge \textbf{theme}(e,y))$

(19) #Nèi-tóu niú Lùlu shāowēi shā le yíxià.
that-CL ox Lulu slightly kill PFV a.little
Intended: 'Lulu killed that ox a little.'

In the next section, we argue that there are two sources for the zero-change construal of causative simple verbs in Mandarin, namely the degree argument projected by the verb and the verbal *le*, which is a non-completive perfective marker. The effects of the degree argument and the perfective can add up: if both actively contribute to make the zero-change construal available, then this construal is easier to obtain than when only one of these two sources is at play. It is because only one of the two sources for the zero-change construal is active with non-gradable causative simple verbs that the level of acceptance of this construal is lower with non-gradable than with gradable causative simple verbs (recall Liu's 2018 experiments, revealing 19% vs. 56% of acceptance in the absence of a cardinality adverbial, and 50% vs. 96% in the presence of such an adverbial).

## 4. Two sources for the zero-change construal of causative simple verbs

### 4.1. The degree argument

With the semantics in (14) for gradable causative simple verbs, we are now in position to explain why such verbs license the zero-change construal, and why this construal is easier to obtain in the presence of a cardinality adverbial. We begin with the first point.

When gradable causative simple verbs are combined with the functional head introducing the agent via Event Identification (Kratzer 1996), we obtain an agentive transitive predicate, as stated in (20):

(20) $[Voice_{ag}]$ [shāo shū] $\rightsquigarrow$
$[\lambda x \lambda e.\mathbf{agent}(e,x)][\lambda d_e \lambda e.\mathbf{burn}_{\mu}(e,y) = d_e \wedge y = (\mathbf{the\text{-}book})]$ = (via Event Identification)
$\lambda x \lambda d_e \lambda e.\mathbf{agent}(e,x) \wedge \mathbf{burn}_{\mu}(e,y) = d_e \wedge y = (\mathbf{the\text{-}book})$
'a predicate of events $e$ such that $x$ is the agent of $e$, and $e$ is a burning event of the book realized to degree $d_e$'.

The reason why gradable causative simple verbs used agentively license the zero-change construal (recall Liu's 2018 experimental findings, Figure 1b) is straightforward. The degree $d_e$ of event realization encoded by a predicate such as (20) can have a positive, albeit not maximal value. Furthermore, as mentioned in section 3, an agentive burning event may start, although the theme itself may not have started burning yet (i.e., when the degree of change $d_c = 0$). That is, when the subject is an agent, an incomplete burning event $e$ may consist in an unsuccessful attempt of burning the theme.

What Liu's findings further revealed, however, is that the acceptance for the zero-change construal with unmodified gradable causative simple verbs is not very high (50% acceptance vs. 96% when the verb is modified). We can explain this relatively low level of acceptance as follows. Following Piñón (2008), we take the degree maximizing operator to be preferred, over the positive degree binding operator, as a binder for $d_e$. This is the case because binding by the former yields a stronger meaning than by the latter: if $d_e = 1$, then $d_e > 0$, but not vice-versa (Kennedy and Levin 2008 make a similar point about the preference for telic readings that some predicates with variable telicity show). This proposal accounts for why, in the first place, sentences such as *Lǐsì shāo le yì-gēn mùtou* 'Lisi burned a piece of wood' by default implicate the occurrence of some result state (here, that a piece of wood was burned). We hypothesize that participants that judge as false, under the zero-change situation, sentences which do *not* contain a cardinality adverbial, have difficulties to discard the preferred (stronger) meaning of such sentences.

Let us now turn to the question of why cardinality adverbials facilitate the zero-change reading of causative gradable verbs (recall from Liu's 2018 experimental findings that the acceptance rate for gradable causatives on the zero-change condition raises from 50% to near ceiling levels once a cardinality adverbial is added to the test sentence). The explanation for this effect is as follows. Cardinality adverbials are adverbials of quantification and, as such, cannot felicitously quantify over a set of events if it is known that this set has a cardinality of less than two (de Swart 1991). This is why *once-only predicates* – that is, predicates denoting singleton sets (e.g., *be a dog*) – cannot be felicitously modified by the adverbial of quantification *twice*, as shown by *#Charlie was a dog twice*.

Causative predicates expressing an irreversible result state such as English *burn the book* are also once-only predicates, for the same (whole) book can be burned only once. This accounts

for the oddity of VPs such as *#burn the book twice* in English. In Mandarin, things are different. The VP *shāo shū* 'burn the book' is a once-only predicate like English *burn the book* if $d_e = 1$ (for then the set of events denoted by *shāo shū* is the singleton set). But if $1 > d_e > 0$, *shāo shū* 'burn the book' denotes a set of events whose cardinality may be more than one. Cardinality adverbials thus enhance the zero-change use with gradable causative simple verbs because they help discard the otherwise preferred use of the maximizing operator. These adverbials thereby favour the use of the (otherwise dispreferred) positive binding operator.

Interestingly, in some contexts, English *burn* superficially resembles Mandarin *shāo* 'burn' when it combines with a quantized DP allowing so-called non-maximal uses (e.g., *the dress* below), where not all the subparts of the entity denoted by the head noun satisfy the predicate applied to it (Križ 2016). The superficial point of resemblance with Mandarin is that as the first clause of (21) shows, when combined with such a DP in the theme position, *burn* is in fact felicitous with a cardinality adverbial. Here, the VP *burn the dress* does indeed denote a set of events whose cardinality is higher than 1. This is so because *the dress* can be loosely interpreted as referring to different subparts of the whole dress, each of which can be burned through different ironing events.

(21) Damn it! How many times have I burned my dress while ironing it!#Fortunately, it is still completely intact!

This resemblance with Mandarin *shāo* is only superficial, however, for English *burn* combined with a definite entails a *change* of the theme, and this even when the definite must be taken in its non-maximal use under the pressure of a cardinality adverbial. For instance, the continuation in (21) denying the occurrence of any change is infelicitous. By contrast, in Mandarin, *shāo* does *not* entail a change when modified by a cardinality adverbial, as was shown in (8).

A straightforward way to account for this difference between English *burn* and Mandarin *shāo* is to assume that while with *shāo*, the degree argument can be bound either by the degree maximizing operator or the positive binding operator, with *burn*, it must be bound by the maximizing operator. That is, English *burn y* can only denote a set of complete burning *y* events, which necessarily yield some result state of *y* being burnt. As a result, even when *the dress* is used vaguely as referring to some subpart of the dress, the VP *burn the dress* still denotes *successful* events of burning (some part of) the dress.

### 4.2. Perfective *-le*

We turn now to non-gradable causative simple verbs which do not encode a gradable property, as shown in (18)-(19). The source of the zero-change construal thus cannot be a degree argument for these verbs. In this section, we argue that with these predicates, the source of non-culmination lies in the aspectual marker *le*.

A revealing and to our knowledge not yet observed difference between gradable vs. non-gradable causative simple verbs is illustrated below with the contrasts in (22)-(25), which importantly all involve a cardinality adverbial combining with a causative verb *without* aspectual marking. What these contrasts show is that whereas gradable causative simple verbs can felicitously combine with cardinality adverbials when used bare, without aspect, this is not always so with non-gradable causatives.

(22) Wǒ mìnglìng nǐ shāo nà-běn shū liǎng-cì.
1SG order 2SG burn that-CL book two-time
'I order you to burn that book twice.'

(23) #Wǒ mìnglìng nǐ shā Lāsīpǔjīng sān-cì.
1SG order 2SG kill Rasputin three-time
Intended: 'I order you to kill Rasputin three times.'

(24) Shāo nà-běn shū liǎng-cì shì ge hǎo zhúyì.
burn that-CL book two-time be CL good idea
'To burn that book twice is a good idea.'

(25) #Shā Lāsīpǔjīng sān-cì shì ge hǎo zhúyì.
kill Rasputin three-time be CL good idea
Intended: 'To kill Rasputin three times is a good idea.'

Thus for instance, (22) can be uttered as an order to try at least twice to burn a book which is very difficult to burn. But Yusupov (the man thought to have carried out the plot of Rasputin's assassination) couldn't felicitously use (23) to order his co-conspirators to try to murder Rasputin several times because he has proven difficult to kill, for just like in English, this sentence weirdly suggests that Rasputin could in principle be *successfully* killed several times. The above contrasts provide further support for our claim that the (bare) VP *shāo nà-běn shū* 'burn that book' is not (necessarily) a once-only predicate (it becomes one only if $d$=1), while the (bare) VP *shā Rasputin* is a once-only predicate.

So why are *kill*-predicates modifiable by cardinality adverbials once perfectivized, but not when used bare? In other words, why are they once-only predicates when used bare, but not when perfectivized? The idea we explore below is that perfectivization with *le* yields a predicate compatible with cardinality adverbials because once a non-gradable predicate first combines with the partitive non-completive aspectual marker *le*, it no longer is a once-only predicate (and the aspectual marker *le* can scope below a cardinality adverb in Mandarin). We first start with some background on the semantics of *le.*

Verbal *le* in Mandarin is most commonly referred to as a perfective marker (Lin 2006, Sun 2014 among others).[4] According to the standard neo-Reichenbachian definition of the perfective, perfective aspect encodes a relation between the temporal trace of the eventuality $\tau(e)$ and the topic time $t$, such that $\tau(e) \subseteq t_T$ (as seen in (26) below), and introduces existential closure over the event (Kratzer 1996). This definition captures the intuition that a perfective sentence depicts an eventuality in its entirety.

(26) $[\![\text{PFV}]\!] = \lambda P.\exists e[\tau(e) \subseteq t_T \wedge P(e)]$

While Lin (2004) and Chief (2008) assume that the verbal marker *le* has a meaning close to (26), Koenig and Muansuwan (2000) argue that this definition of perfectivity is not appropriate for many South Asian and East Asian languages, such as Thai, Chinese, Hindi, Korean or Tamil. They propose instead, on the basis of Thai data, to distinguish two types of perfective operators. What we will call strong perfective markers (as the French *passé simple*) entail event

[4]Many authors distinguish verbal *le*, argued to be a perfective operator, and sentential *le*, claimed to be an inchoative marker (Li and Thompson 1981, 238, Paul 2015) or a perfect marker. All our examples involve the verbal perfective marker *le*.

completion when combined with telic predicates (and thus have a semantics as in (26)). A second type of perfective markers, which we call weak and found in Hindi and Thai, require event maximality rather than event completion. That is, the reported event has to cease (i.e., to be the *maximal* part of some possible event *P* in the context), but does not necessarily culminate with respect to a (telic) predicate *P*. Altshuler (2014) develops Koenig and Muansuwan's insight within the framework of a broader typology of partitive operators, that includes Russian and Hindi aspectual markers. With Martin and Gyarmathy (2019), we follow Koenig & Muansuwan's suggestion to extend their analysis to Mandarin: the Mandarin perfective marker *le* is very similar to the Hindi perfective under Altshuler's (2014) analysis. Following Smith (1997) or Soh and Gao (2001), we thus take one of the sources for non-culmination with telic predicates in Mandarin to lie in the meaning of verbal *le*. Additionally, since we assume below that *le* can compose with the predicate before the cardinality adverbial, we separate out existential closure over events from its meaning (as Matthewson 2012 does for Gitksan):

(27) $[\![\text{PFV}_M]\!] = \lambda P \lambda e[\tau(e) \subseteq t_T \wedge \mathsf{MAX}(e,P)]$
('M' stands for maximality)

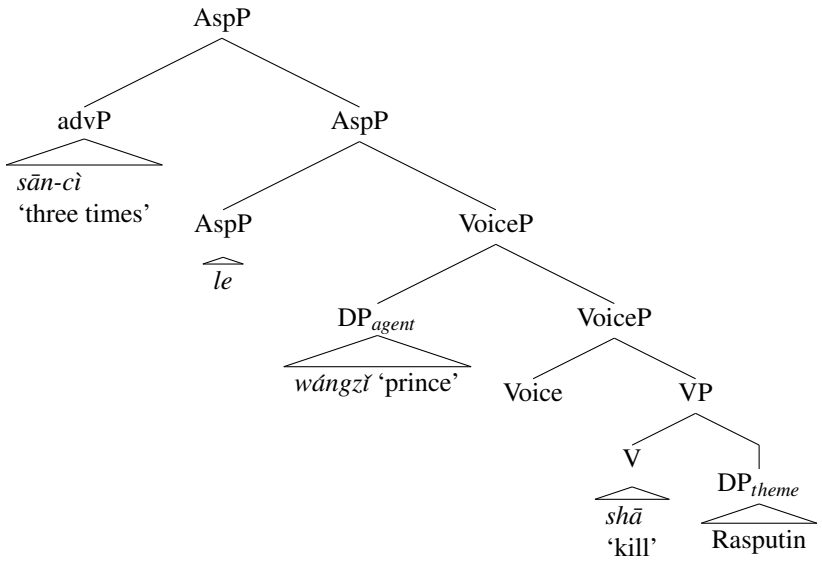
Let us now go back to the bare, aspectless, predicate **the-prince-kill-rasputin**. This predicate denotes a (singleton) set of complete events, as shown in (28a).

(28) a. [ Gōngjué $Voice_{ag}$ shā Rasputin ] $\rightsquigarrow$
$\lambda e.\exists s(\textbf{agent}(e,\textbf{the-prince}) \wedge \textbf{cause}(e,s) \wedge \textbf{dead}(s) \wedge \textbf{theme}(s,\textbf{rasputin}))$
b. [ $\text{PFV}_M$ Gōngjué $Voice_{ag}$ shā Rasputin ] $\rightsquigarrow$
$\lambda e.\tau(e) \subseteq t_T \wedge \mathsf{MAX}(e,\lambda e'.\exists s(\wedge\textbf{agent}(e',\textbf{the-prince}) \wedge \textbf{cause}(e',s) \wedge$
$\textbf{dead}(s) \wedge \textbf{theme}(s,\textbf{rasputin})))$

When the predicate (28a) is perfectivized, we obtain the (non-completive) perfectivized predicate (28b). Crucially, (28b) is not a once-only predicate anymore, since there may exist many parts of a possible **the-prince-kill-rasputin** event (and, in fact, many such incomplete kill-Rasputin events did indeed take place according to Rasputin's biography).
This accounts for why the predicate (28b) can be felicitously modified by a cardinality adverbial, and, furthermore, can in principle accept the zero-change reading, since the partitive operator *le* returns maximal kill-Rasputin events which, in the appropriate context, may amount to unsuccessful attempts to kill Rasputin.
We propose that cardinality adverbials are compatible with the perfectivized form of *shā Rasputin* because in striking contrast with English, Mandarin aspectual markers may not only scope (as in English) above cardinality adverbials, but also below them, just above VoiceP, as seen in (29). Consequently, what the cardinality adverbial counts in (29) are maximal events of the prince killing Rasputin.
Let us now go back to the contrast (7), repeated below for convenience:

(7) a. #Gōngjué shā le Lāsīpǔjīng, Lāsīpǔjīng méi sǐ.
prince kill PFV Rasputin Rasputin NEG.PFV die
Intended: 'The prince killed Rasputin, but Rasputin didn't die.'
b. Gōngjué shā le Lāsīpǔjīng hǎojǐcì, Lāsīpǔjīng dōu méi sǐ.
prince kill PFV Rasputin several.times Rasputin DOU NEG.PFV die
Literally: 'The prince killed Rasputin several times, but Rasputin didn't die.'

(29)




We first tackle the question of why, in the absence of a cardinality adverbial, the acceptability of the zero-change use for perfectivized non-gradable causative simple verbs is very low (19% of acceptance in Liu's 2018 Experiment 1). We take the low acceptability of sentences such as (7a) to show that although perfectives with a partitive semantics such as Mandarin *le* (or Hindi *yaa*) allow both completive and incompletive uses, completive uses are by default preferred (see Gyarmathy and Altshuler 2020 and references therein). This preference in turn arises because completive interpretations yield a stronger meaning (if there exists an event complete with regard to *P*, then there exists a part of such an event, but not vice-versa). Subjects rejecting sentences such as (7a) have difficulties discarding the preferred, stronger, completive meaning of *le* selected in the first clause, in order to opt on second thought for the weaker, incompletive use, as would be necessary to make such sentences consistent.

Now, why does the zero-change reading of perfectivized non-gradable causatives become more acceptable in the presence of a cardinality adverbial? Precisely because the latter overrides the otherwise preferred completive use of perfective *le*. That is, if *le* returns incomplete rather than complete *P*-events, the perfectivized predicate is not a once-only predicate anymore and becomes compatible with a cardinality adverbial. And importantly, the cardinality adverbial in (7b) promotes the incompletive use of *le before* the boundary of the first clause in (7b) has been processed. This is crucial, for we know from Bott and Hamm's (2014) processing studies that the culmination inference triggered by an 'optionally telic' sentence tends to lose its defeasible character once the boundary of the clause immediately containing the telic verb in question has been processed (even if the culmination inference can be overriden before this point). In this respect, the clause denying Rasputin's death in (7a) is not as efficient as the adverbial in (7b), because this denial 'comes too late', as it takes place *after* the clause boundary.

The analysis just sketched also accounts for the striking contrast illustrated in (9) above, as well as (30a)-(30b) below – that is, for why the zero-change construal can be salvaged by adding a cardinality adverbial, but not by adding the adverbial *yòu* 'again':

(30) a. Nóngfū shā le nèi-tóu niú sān-cì, niú dōu méi sǐ.
Farmer kill PFV that-CL ox three-times ox DOU NEG.PFV die
'The farmer killed that ox three times, but the ox didn't die.'

b. #Nóngfū yòu shā le nèi-tóu niú, (niú dōu méi sǐ.)
Farmer again kill PFV that-CL ox ox DOU NEG.PFV die
Intended: 'The farmer killed that ox again, but the ox didn't die.'

Sentence (30b) presupposes either the occurrence of the ox's death (under the restitutive reading of *again*), or the occurrence of a previous killing-the-ox event (under the repetitive reading of *again*). In the first case, the ox's death is presupposed, which obviously makes an assertion of another, subsequent killing event infelicitous. In the latter case, sentence (30b) presupposes that the farmer (or somebody else) killed the ox before. But since as we just saw, in the absence of a cardinality adverbial, such a sentence is by default understood as entailing the ox's death, this entailment is inherited by the assertion in (30b).[5]

## 5. The agentivity restriction

As noted in the introduction, the cross-linguistic evidence shows that for the zero-change reading to be felicitous, the subject must be associated with agentive properties, as also confirmed by Liu's (2018) experimental findings presented in section 2. This restriction is illustrated with the contrast between (1) and (4) above, as well as in (31)-(32) below, but here with a non-gradable causative. In (32), we indicate infelicity with the hash symbol from the opening of the sentence, since the first clause is in of itself already ill-formed.

(31) Mòmo shā le nèi-zhī zhāngláng hǎojǐcì, zhāngláng dōu méi sǐ.
Momo kill PFV that-CL cockroach several.time cockroach DOU NEG.PFV die
'Momo killed that cockroach several times, but the cockroach didn't die.'

(32) #Shāchóngjì shā le nèi-zhī zhāngláng hǎojǐcì, zhāngláng dōu méi sǐ.
insecticide kill PFV that-CL cockroach several.time cockroach DOU NEG.PFV die
Lit.: 'The insecticide killed that cockroach several times, but the cockroach didn't die.'

In section 4, we proposed that in (31), the zero-change use is acceptable because the weak (partitive) perfective *le* returns (maximal) parts of kill-the-cockroach events, which can consist in unsuccessful attempts by Momo to kill the cockroach. But then, why can't *le* return incomplete killing the cockroach events in (32)? We summarize Martin's (2020) answer to this question, extending one of her arguments to Mandarin.

In a nutshell, her idea is as follows. A non-agentive causative sentence such as (33a/b) is interpreted along the lines of the paraphrase in (33c):

(33) a. Yí-zhèn fēng guān-le nà-shàn mén. (=first clause of (4))
b. 'Some gust of wind closed the window.'
c. ≈ Some gust of wind event $e'$ caused some change-of-state of the window $e$ causing the state $s$ of the window to be close.

That is, a non-agentive causative statement describes a causal chain with *two* causing events: the causing event $e$ expressed by the VP *and identified with the change-of-state* which brings about the result state of the theme, and an external cause $e'$ for the change of state event $e$, described

[5]Note that we correctly predict *yòu* 'again' to be become acceptable if the predicate first composes with the cardinality adverbial; for instance, *Nóngfū yòu shā le nèi-tóu niú liǎng-cì, (niú dōu méi sǐ.)* 'The farmer killed that ox twice again, but the ox didn't die' is fine.

by the event-denoting subject. Since the perfective applies to an event in the denotation of the VP, and since this event is a change-of-state when the causative verb is used non-agentively, the perfective returns parts of changes-of-state. This makes the denial of any change whatsoever in the next clause infelicitous (as was shown in (4)).
The corresponding anticausative (e.g., *The window closed*) is interpreted in the same way: the external cause causing the change-of-state is not described by an anticausative VP, just as it is not described by a non-agentive causative VP. However, while the external cause of the change is always expressed by the subject of a non-agentive causative, it is only optionally expressed with an anticausative, by adding a *from*-phrase or a similar adjunct. This is, for instance, the case in (34), which, just as (33), describes a causal chain with *two* causing events (the causing event $e$ expressed by the VP, i.e., the change-of-state, and the event $e'$ causing $e$ and expressed by the adjunct).

(34) The window closed (from the gust of wind).
$\approx$ There was some change-of-state of the window event $e$ causing the state $s$ of the window to be close (and this change-of-state of the window $e$ was itself caused by the gust-of-wind event $e'$).

Less informally, Martin (2020) assumes that causatives and anticausatives have the same event structure involving two components, a causing event and a result state, semantically differing only in the presence vs. absence of Voice (Kratzer 2005, Alexiadou et al. 2006, Schäfer 2008). On the anticausative use, *shā zhāngláng* 'The cockroach get killed/die' consequently has the meaning in (35), whereas on the agentive causative use, *Mòmo shā zhāngláng* 'Momo kill the cockroach' is associated with the meaning in (36b).

(35) [ shā zhāngláng ] $\rightsquigarrow$
$\lambda e.\exists s(\textbf{cause}(e,s) \wedge \textbf{dead}(s) \wedge \textbf{theme}(s,\textbf{the-cockroach}))$

(36) a. $\textit{Voice}_{ag} \rightsquigarrow \lambda x \lambda e.\textbf{agent}(e,x)$
b. [ Mòmo $\textit{Voice}_{ag}$ shā zhāngláng ] $\rightsquigarrow$ (via Event Identification)
$\lambda e.\exists s(\textbf{agent}(e,\textbf{momo}) \wedge \textbf{cause}(e,s) \wedge \textbf{dead}(s) \wedge \textbf{theme}(s,\textbf{the-cockroach}))$

(37) a. $\textit{Voice}_{c} \rightsquigarrow \lambda e' \lambda e.\textbf{cause}(e',e)$
b. [ Shāchóngjì $\textit{Voice}_{c}$ shā zhāngláng ] $\rightsquigarrow$ (via Event Identification)
$\lambda e.\exists s(\textbf{cause}(\textbf{the-insecticide},e) \wedge \textbf{cause}(e,s) \wedge \textbf{dead}(s) \wedge \textbf{theme}(s,\textbf{the-cockroach}))$

As for non-agentive causatives, Martin adopts Schäfer's (2008) and others' idea that Voice comes with different flavours. She proposes that the head introducing causer subjects introduces an eventuality argument $e'$ (saturated by the event description in subject position), specifying (in the typical case) that $e'$ causes the causing event $e$ denoted by the VP, as seen in (37) ((37b) give the meaning of the bare predicate *Shāchóngjì shā zhāngláng* 'the insecticide kill the cockroach'). An alternative solution is to assume with Alexiadou and Anagnostopoulou (2020) that non-agentive causatives lack Voice altogether and simply contain a VP, just as is the case with anticausative verbs, and that in the default context, the event introduced by the subject is interpreted as an external cause for the VP-event. In both cases, a *causer* is not a thematic role: causer subjects do not specify the role played by the subject's referent in the VP-event; rather, they describe an external cause of the VP-event.[6]

[6]As a consequence, if a causer subject denotes an individual (rather than an event) in its literal meaning, as the case

Thus causative VPs have the same semantics in the intransitive, agentive and non-agentive transitive uses: they denote a set of causing events. But Martin's point is that the very same set of causing events is identified differently depending on whether the subject is an agent or a causer, since the causing events involve an agent in the former case, but not in the latter. More precisely, in the agentive transitive use, the causing events in the denotation of the VP involve two participants (an agent and a theme), but in the non-agentive causative or anticausative uses, the causing events in the denotation of the VP involve only one participant (a theme). Thus with an agent, the causing event type denoted by the VP is identified as a set of events composed of an action of $x$ (for the subject's referent cannot be the agent of $e$ without doing anything) and a change-of-state of the theme's referent $y$. In contrast, in the non-agentive uses, the causing event type denoted by the VP is identified as a set of events involving the theme only, that is, as a set of changes-of-state, themselves caused by the event denoted by the subject (or by a *from*-phrase for the anticausative).[7] The proposal is summarized in (38).

(38) a. Causing events in the set denoted by causative VPs used agentively are identified as complex events composed of an action of the subject's referent and an ensuing change-of-state of the theme's referent as their parts.
b. Causing events in the set denoted by causative VPs used non-agentively or by anticausatives are identified as changes-of-state of the theme's referent.

So why is the zero-change construal available on the agentive transitive use of *shā* 'kill' or *shāo* 'burn', but not on its non-agentive transitive use? Martin's answer already sketched above is as follows. When Voice is active licensing the projection of an external argument, e.g., the agent in (31), the causing event is necessarily understood as involving an action performed by this agent. Thus, the degree of event realization $d_e$ may have a positive value while the degree of change $d_c = 0$, and/or the partitive aspectual marker *le* can return an incomplete *P*-event consisting of an (unsuccessful) action. When, however, Voice is not active, and an agent argument not licensed, the causing event is necessarily understood as some (causing) change-of-state event undergone by the theme, just as with anticausatives. Therefore, the degree of event realization $d_e$ is necessarily set to the same value as the degree of change $d_c$, and/or the partitive aspectual marked *le* must return at least a part of a change. Asserting in the subsequent discourse (as in (32)) that the theme has undergone no change-of-state whatsoever, and thus that such change was not even initiated, is infelicitous, and can only but generate a contradiction.
An argument supporting (38) concerns the interpretation of time-span adverbials (see Martin 2020 for additional arguments). A time-span adverbial measures the time span between

in (37b), the denotation of such subjects is 'widened' to an event of a contextually retrievable property, involving the original denotation as a theme (recalling the reinterpretation of subjects in so-called pancake sentences). This reinterpretation process is ignored for simplicity in (37b).

[7] 'Causing change-of-state events' denoted by non-agentive causative VPs or by anticausative VPs should not be confused with Levin and Rappaport Hovav's (1995) internally caused events. Internally caused verbs are inchoative verbs such as *rust* that do not participate in the causative alternation in English and express changes which do not have external causes. Rappaport Hovav (2020) convincingly shows that there is no coherent semantic characterization of internally caused verbs and rightly observes that for many verbs classified as internally caused, it clearly is possible to isolate causes which are external to the entity undergoing the change (e.g., when metal rusts, there are surely external causes for this event). Similarly, the causing event (identified with the change-of-state) expressed by non-agentive causatives or anticausatives according to Martin can have an external cause, *but* the crucial point is that this external cause is not expressed by the VP.

the onset and the telos of the events denoted by the predicate, i.e., causing events in the case of a causative predicate. The telos of these events typically coincides with the onset of the result state. Let us compare causatives modified by such a time-span adverbial when used non-agentively, as in (39b), and agentively, as in (39a).

(39) a. Mòmo wǔ fēnzhōng jiù shā le nèi-zhī zhāngláng, (qíshí zhāngláng
Momo five minute JIU kill PFV that-CL cockroach in.fact cockroach
búdào yì fēnzhōng jiù sǐ le)
less.than one minute JIU die PFV
'Momo killed that cockroach in five minutes, in fact, the cockroach died in less than a minute.'

b. Shāchóngjì wǔ fēnzhōng jiù shā le nèi-zhī zhāngláng, (#qíshí zhāngláng
insecticide five minute JIU kill PFV that-CL cockroach in.fact cockroach
búdào yì fēnzhōng jiù sǐ le)
less.than one minute JIU die PFV
Intended: 'The insecticide killed that cockroach in five minutes, in fact, the cockroach died in less than a minute.'

We see that in the first clause of (39b), the time-span adverbial measures the cockroach's change-of-state – the dying event, just as in its anticausative counterpart in (40):

(40) Zhāngláng wǔ fēnzhōng jiù sǐ le.
cockroach five minute JIU die PFV
'The cockroach died in five minutes.'

This accounts for why the continuation in parenthesis in (39b) is odd: the second clause specifies that the change-of-state $e''$ culminated in less than a minute, whereas the first clause specifies that the causing event $e$, which is by assumption identified with $e''$, culminated in five minutes. By contrast, in (39a), the adverbial measures the time span of the causing event $e$, this time composed of one of Momo's action $e'$ *and* the cockroach's change-of-state $e''$. Therefore, the continuation in parenthesis is not contradictory, because it might be that the time span of the change-of-state $e''$ is much shorter than the time span of the causing event $e$ (of which $e''$ is a *proper* part only).

## 6. Comparison with Hindi

This section offers a brief comparison of Mandarin with Hindi, on the basis of data from Rajesh Bhatt (p.c.). Examples (41a) show that the Hindi counterpart of *burn* accepts zero-change readings without a cardinality adverbial. However, in striking contrast with Mandarin, (41b) with the adverbial is *less* felicitous than (41a) without the adverbial.

(41) a. us=ne agarbatti jalaa-yii lekin agarbatti bilkul
he=ERG incense.stick.F burn-TRANS-PFV.F but incense.stick.F absolutely
nahiin jal-ii
NEG burn-UNACC-PFV.F
'He burned the incense stick, but it didn't burn.'

b. ?us=ne do/kai baar agarbatti jalaa-yii lekin agarbatti
he=ERG two/many time incense.stick.F burn-trans.-PFV.F but incense.stick.F
ek baar bhii nahiin jal-ii
one time even NEG burn-UNACC-PFV.F
'He burned the incense stick twice/many times, but it didn't burn even once.'

Furthermore, the Hindi counterpart of *break*, which expresses according to Singh (1998) a non-gradual change when used to express cup-breaking events, does not allow zero-change construals, neither with nor without a cardinality adverbial, as seen in (42)-(43) (the first clause of sentence (43) is only acceptable if the cup gets fixed in between the breakings).

(42) us=ne pyaalaa toR-aa #lekin pyaalaa nahiiN TuuT-aa
he=ERG cup broke.TRANS-PFV but cup NEG broke-PFV
Intended: 'He broke the cup, but the cup didn't break at all.'

(43) #us=ne do/kai baar pyaalaa toR-aa lekin pyaalaa nahiiN TuuT-aa
he=ERG two/many time cup broke.TRANS.-PFV but cup NEG break-PFV
Intended: 'He broke the cup several times, but the cup didn't break at all.'

Most interestingly, the zero-change construal remains acceptable in the absence of perfective aspect with (unmodified) gradable verbs, as seen in (44), and it remains unacceptable in the absence of perfective aspect with (unmodified) non-gradable verbs, as seen in (45).

(44) us-kaa agarbatti jalaa-naa kaafi ajiib thaa; tabhii agarbatii nahiiN
he-GEN incense.stick burn.INF a.lot strange was so incense.stick NEG
jalii
burn.UNACC-PFV.F
'His burning the incense stick (the way he did it) was strange. Therefore it didn't burn.'

(45) us-kaa pyaalaa toR-naa kaafi ajiib thaa; #tabhii pyaalaa nahiiN
he-GEN cup break.INF a.lot strange was so cup NEG
TuuTaa
break.UNACC-PFV
Intended: 'His breaking the cup (the way he did it) was strange. Therefore it didn't break.'

What can we conclude from these contrasts? First, that in Hindi just like in Mandarin, zero-change construals of gradable verbs are available even in the absence of aspectual (perfective) marking on the verb. This suggests that the source of these readings does not always lie in the perfective in Hindi either, but perhaps in the degree argument tracking the degree of event realization, as we argued for in Mandarin. Furthermore, as was the case in Mandarin too, non-gradable causative verbs do not seem to have zero-change uses in Hindi, no matter whether these predicates are perfectivized or not (aspectually bare). In striking contrast with Mandarin, however, cardinality adverbials cannot 'salvage' the zero-change use with non-gradable verbs, whether these verbs are perfectivized or not. How could we account for these cross-linguistic differences? Recall that on our proposal, the zero-change construal of non-gradable verbs in

Mandarin derives from the scopal interaction between the cardinality adverbial and the perfective (as shown in (29)). It may be that the source of these contrasts between Hindi and Mandarin lies either in the meaning of the perfective across the two languages, or/and in the scopal configurations available (that is, whether the cardinality adverbial can scope higher than the perfective). It goes without saying that more extensive comparative empirical work is required to answer these novel questions.

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