An affectedness approach to passives in Mandarin

Jess Law & Colin Hirschberg

1 Introduction

Passives are one of the most researched constructions in natural language, across different linguistic frameworks. There are two cross-linguistically stable properties that collectively define passive sentences. First, passives are marked with *morphological increment* on an active structure: some morphological marker, be it a free or a bound one, is used in an active sentence to generate a passive sentence (Keenan 1985; Keenan and Dryer 2007; Siewierska 2013). Second, passives *re-link* the arguments involved (the agent and the theme) to grammatical positions distinct from their positions in actives (Keenan and Dryer 2007; Siewierska 2013): the theme argument displaces the agent argument and occupy the subject position in passives.[1]

English *be*-passives are often taken to be the prime example of passives with these two features. The morphological increment in the passive in (1-b) comes in two pieces, the auxiliary *be* (inflected for tense) and the past participle *-en* (which is also used in the perfect aspect). In addition, argument re-linking promotes the theme argument *the sandwich* to the subject position and demotes the agent argument to an oblique position, generating the different argument positions in (1-a) and (1-b) (Chomsky 1957; Collins 2005).

(1) a. Mary$^{\text{AGENT}}$ ate the sandwich$^{\text{THEME}}$. *active*
b. The sandwich$^{\text{THEME}}$ **was** eat**en** by Mary$^{\text{AGENT}}$. *passive*

The reader may notice that both morphological increment and argument re-linking are about the passive *form*, rather than about the passive *meaning*. It is natural to wonder whether passive sentences mean something different from their active counterparts. And if they do, whether or not it is possible to map their meaning differences to their differences in form. These are important questions at the syntax-semantics interface that have to be answered both within individual languages as well as across languages (see also footnote 4 for a discussion that these can be framed as questions at the syntax-pragmatics interface). In this article, we investigate *bei*-passives in Mandarin in search of a language-specific theory of passive meaning that can also shed light on a language-general theory of passive meaning.

Mandarin *bei*-passives are interesting for a few reasons. First, they share major morphosyntactic properties with English *be*-passives, especially when the agent argument is absent, according to previous syntax studies (Feng 1995; Huang 1999; Tang 2004, 2008; Liu 2012, 2016).[2] Consider the active-passive pair in (2), the morphological increment is contributed by the passive marker

[1] This definition rules out impersonal passives, which also cannot be explained by the semantic approach developed in this study. We reserve impersonal passives for future research.

[2] When an agent argument is absent, Mandarin passives allow only short-distance dependencies (i.e., A-chains). When an agent argument is present, they allow (long-distance) A'-chain (Feng 1995; Huang 1999). The semantic properties

bei in (2-b), which roughly means 'to cover, to undergo'. The argument re-linking involves the promotion of the theme argument *na-kuai shitou* 'that stone' to the matrix subject position and the demotion of the agent *Lisi* to a lower subject position.

(2) a. Lisi$^{\text{AGENT}}$ reng-le na-kuai shitou$^{\text{THEME}}$.
Lisi throw.away-PERF that-CL stone
'Lisi threw away that stone.' *active*

b. Na-kuai shitou$^{\text{THEME}}$ **bei** Lisi$^{\text{AGENT}}$ reng-le.
that-CL stone PASS Lisi throw.away-PERF
'That stone was thrown away by Lisi.' *passive*

More importantly Mandarin *bei*-passives differ from English *be*-passives in exhibiting robust *semantic constraints*. These constraints are (pre-theoretically) disjunctive in nature. They are discussed in section 2 and previewed as follows:

- *Licensing by telicity* (section 2.1): Transitive telic predicates, which include achievements and accomplishments (like *chi* 'eat' and *reng.diao* 'throw away' with a bounded theme argument), as opposed to stative and activity predicates (like *xihuan* 'like' and *ca* 'wipe'), can easily form *bei*-passives. This licensing parameter is most explicitly documented by Kimurai (1997), Xiao et al. (2006), and Deng et al. (2018). However, none of these studies offer a theoretical discussion of this licensing parameter in relation to passive meaning in Mandarin or passive meaning more generally.

- *Licensing by perfect* (section 2.3): Activity predicates marked with the experiential perfect aspect suffix *-guo* support passive formation. The licensing role of *-guo* is also documented in Xiao et al. (2006) but no theoretical analysis is given there.

- *Licensing by intention transmission* (section 2.2): When a transitive activity predicate is neither telic nor marked with perfect morphology, as in the case of *da* 'hit' and *ma* 'scold' it can still license passive formation if it transmits agent intentions that can be recognized by animate individuals.

These licensing requirements may at first glance seem quirky and language specific, but a survey of the typological literature of passives reveals that they are important factors conditioning passive formation in many languages.[3] We summarize these factors informally as affinity with passives and include some languages in which these affinities have been observed:

- *The passive-telicity affinity*: Telic predicates have been noted to support passive formation in stative passives in English and German (Kratzer 2000) and verbal passives in Hebrew, Spanish, and Italian (Borer 1998).

of Mandarin passives studied in this articles are shared by both short (agentless) and long passives. We have very little to say about the syntactic differences in short and long passives but refer the interested reader to Huang et al. (2009) and references cited there.

[3] We should clarify that many of these passives are regarded as non-canonical, partly because they have additional semantic restrictions. See the articles collected in Alexiadou and Schäfer (2013).

- *The passive-perfect affinity*: Passive morphology in many languages is formed out of the same morphology that also forms the perfect. This affinity is found at least also in English, French, German, Hungarian, and Russian (Beedham 1987; Kratzer 2000; Tommola 2000; Gehrke and Grillo 2009).

- *The passive-animacy affinity*: Animate theme arguments, as compared to inanimate ones, have been noted to give rise to more passives in language production in both Adult English (Ferreira 1994; MacDonald 2013) and Child English (Harris 1978). It has also been shown to facilitate the teaching of passives to English-speaking children (Lempert 1989, 1990). In some languages, like Japanese, animate noun phrases can be passive subjects without being linked to a gap, forming gapless adversative passives (Shibatani 1985; Pylkkänen 2008, a.o.).

While these factors have been observed in the literature to play a role in supporting passive formation, they have not been understood in light of a theory of passive meaning in conjunction with morphological increment and argument re-linking in any natural language. To see this, let us walk the reader through two major approaches to passive meaning: the argument reduction approach and the aspectual approach.[4]

The argument reduction approach, also known as the lexicalist approach, argues that the only meaning difference between an active sentence and a passive one lies in the absence of the external argument (Keenan 1985; Burzio 1986; Baker et al. 1989; cf. Collins 2005).[5] The function of the passive morphology, according to this approach, is to remove or suppress the external argument of a transitive verb like *eat* in (3-a). The outcome of this lexical process is arity reduction (a form of argument structure simplification), which yields an intransitive verb without a syntactically active external argument, as shown in (3-b). The only argument, the internal theme argument, is then mapped to the subject position.

(3) a. $[\![eat]\!] = \lambda x \lambda y \lambda e.\mathsf{eat}(e,x,y)$ active transitive
b. $[\![eaten]\!] = \lambda x \lambda e.\exists y[\mathsf{eat}(e,x,y)]$ passive

This approach fares relatively well with morphological increment and argument re-linking.[6] However, it leaves all three types of affinity—perfect, telicity, and animacy—unexplained. One may argue that these semantic affinities are not core properties of passives. This has indeed been a recurrent argument in the literature on passives, which inevitably leads to the narrowing of the

[4] An approach not discussed here is one in which passives are taken to be *pragmatically* different from actives, in terms of their information structure. This approach is defended in Shibatani (1985) and Wanner (2009) and many studies in the functional literature. We do not include this approach as it rejects morphological increment and argument re-linking as defining properties of passives. However, our semantic approach in terms of affectedness subsumes the pragmatic approach as it answers, in a concrete way, what it means to highlight the prominence of the theme argument with the help of resources that build the argument structure of a verb.

[5] Besides the lexicalist approach, there is also another prominent approach to passives, i.e., the so-called syntactic approach, defended in studies like Chomsky (1957), Collins (2005), and Bruening (2015). These studies derive morphological increment and argument re-linking as syntactic mechanisms and are silent on what passive meaning is. However, they can be combined with the aspectual approach, reviewed next, or the affectedness approach, as developed in the rest of the paper.

[6] Strictly speaking, it is still not clear why argument reduction must be achieved by morphological *increment*. If the conclusion that the external argument is external to the argument structure of the verb, as argued in Marantz (1984) and Kratzer (1996) and subsequent studies, then it is puzzling why additional morphology is needed to just signal the absence of the external argument.

definition of passives and the creation of an ever growing class of non-canonical passives (e.g., Huang 1999; Alexiadou and Schäfer 2013; Bruening 2015).

The aspectual approach to passives is developed as a more adequate model of the syntax-semantics interface of passives. The central thesis of this approach is that passive sentences describe eventualities that are *aspectually richer* than their active counterparts. More specifically, passive eventualities are compositionally *derived* from active eventualities with the addition of a target or result state (Beedham 1987; Borer 1998; Gehrke and Grillo 2009), possibly with the help of a light verb (V_{BECOME}) or a special voice category (Huang 1999). This straightforwardly explains the affinity with perfect and telicity—eventualities with these grammatical components have the right aspectual structure for supporting passives. Morphological increment also follows as a consequence of the derivational nature of aspectual complexity (see also Levin and Hovav 1995; Kratzer 2000; Ramchand 2008). The aspectual meaning can be directly baked into the lexical meaning of passive markers.

Despite its merits, the aspectual approach fails to capture two aspects of passive meaning. First, it is unclear how the passive-animacy affinity can be accounted for. Ideally, this affinity should also be understood in aspectual terms. However, how best to extend the notion of aspect to incorporate animacy remains to be worked out. Second, unlike the argument reduction approach, the aspectual approach actually does not explain argument re-linking. In particular, aspectually more complex eventualities may still have an agent argument, as in the case of causative-resultatives (Rappaport Hovav and Levin 1998, 2010; Ramchand 2008). So, it remains unclear why the theme argument in a passive sentence ends up in the subject position.

To understand the syntax-semantics interface of English passives, the aspectual approach is largely sufficient, as it explains the passive-perfect affinity and the passive-telicity affinity. The passive-animacy affinity can be regarded as some form of 'linguistic performance' that needs not concern a grammatical theory of passives. However, the presence of a language like Mandarin, which shows sensitivity to all three semantic properties, calls for a need for a deeper understanding of passive meaning that is more general than aspectuality. Ideally, this theory should also account for both language-specific and language-general properties of passives. In section 3 of this article, we devise a theory of passives with these features in mind. The core of our theory is the notion of *affectedness*. The *informal* use of affectedness to account for properties of *bei*-passives has featured in many studies, including Kimurai (1997), Huang (1999), and Her (2009). However, in this study we employ a *formalized* notion of affectedness, following Beavers (2011) and related studies (see also Hay et al. 1999; Kennedy and Levin 2008; Beavers 2013; Fleischhauer 2018).

Beavers' approach to affectedness is intimately related to aspectual classes. According to him, predicates are ranked for their affectedness, with telic predicates expressing the highest level of affectedness, followed by activity predicates and then stative predicates. Telic predicates are special because they have a complex aspectual structure, in particular, the presence of a result state following the termination of an eventuality. A result state records how affected the theme argument is along a certain dimension as a result of its participation in an eventuality. We propose that a Mandarin passive sentence expresses that a promoted theme argument has been highly affected. When the theme argument is inanimate, affectedness is understood as the presence of a result state recording the *physical* change of the theme. However, when the theme argument is animate but the verbal predicate is capable of transmitting agent intentions, a high level of affectedness can be achieved by recording change along a *psychological* dimension as a result of intention recognition, in the sense of Grice (1957). Our proposal for Mandarin passives is summarized as follows:

(4) A theme argument denoting an individual x can participate in a passive sentence with a verbal predicate P if and only if one of the followings is met:

a. x undergoes change to a specific degree along a *physical* dimension s lexically provided by P. (This accounts for the passive-perfect affinity and the passive-telicity affinity)

b. x undergoes change to a specific degree along a *psychological* dimension s if P is a verbal predicate capable of transmitting agent intentions.

That Mandarin passives require a high level of affectedness not only unifies their sensitivity to aspect and animacy, but also has additional merits. Specifically, it explains the following properties of Mandarin passives discussed later in this article:

- The absence of thematic liberality in *bei-passives* (section 4.1)
- The interaction between passivization and the progressive aspect (section 4.2)
- The unification of short and long-distance passives (section 4.3)
- The connection between high affectedness and adversity passives (section 4.4)

Lastly, the affectedness approach has merits that make it a credible candidate as a *general theory for passives* across languages. We discuss this point in more detail in section 4.5, taking advantage of the critical conceptualization of affectedness in Beavers (2011) as a family of implicationally related, *gradient*, levels. If a core part of passive meaning is affectedness, as argued in this study, then a natural question is whether or not the notion of passives is gradient in the same way. We provide a tentative affirmative answer to this question, based on data on passives reported in the literature.

2 Licensing *bei*-passives: telicity, animacy, and experiential perfect

In this section, we discuss the empirical evidence motivating the affectedness approach to Mandarin *bei*-passives. Our discussion draws heavily from previous studies on gapped *bei*-passives, including Kimurai (1997), Huang (1999), Xiao et al. (2006), and Deng et al. (2018), which, collectively, also observe similar semantic constraints on Mandarin passives. However, since these studies are either descriptive in nature or have a focus on the syntax, they have not engaged with the semantic nature of these constraints in sufficient detail. For example, Kimurai (1997) and Huang (1999) invoke the informal notion of affectedness in characterising passives but do not identify what affectedness means semantically. Deng et al. (2018) identify telicity as a factor in supporting passives in Manadrin, but do not identify its interaction with perfect and animacy. This section hence fills the empirical gap of characterizing the semantic constraints on Mandarin *bei*-passives more comprehensively.

2.1 Telicity

Following the standard aspectual classification proposed in Vendler (1967) and Dowty (1979), it has been argued that predicates in Mandarin fall into four distinct aspectual classes based on three

parameters: dynamicity, durativity, and telicity, (Peck et al. 2013; see also Lin 2003). Predicates like *xihuan Mali* 'to like Mary' involve duration, but no change (i.e., dynamicity) or an endpoint (telicity), and hence are classified as states. Predicates like *ca zhe-zhang zhuozi* 'wipe this table' are activities as they involve duration and change but not a natural endpoint. Predicates like *reng na-ben shu* 'throw away/discard that book' are achievements as they involve change and an endpoint but no duration. Lastly, predicates like *chi na-ge xigua* 'eat that watermelon' involves change, duration, and an endpoint and hence are accomplishments. These four aspectual classes are summarized in Table 1. We do not get into any further detail about aspectual classification in Mandarin but refer interested readers to Peck et al. (2013) and references cited there.

On top of the four standard aspectual classes, we follow Hay et al. (1999), Beavers (2011) and related studies in assuming a fifth aspectual class, termed degree achievements. In English, degree achievements have variable telicity (Kennedy and Levin 2008; Kennedy 2012). However, in Mandarin, they pattern uniformly like atelic predicates. We largely ignore passive formation of degree achievement predicates until section 3, in which we show that degree achievements in Mandarin do not support passive formation and the proposed framework correctly captures this.

Aspectual class	example	dynamic	telic	durative
Accomplishment	chi na-ge xigua 'eat that watermelon'	yes	yes	yes
Achievement	reng na-ben shu 'discard that book'	yes	yes	no
Degree achievement	qie yi-pan rou 'cut a plate of meat'	yes	no	yes
Activity	tui na-liang chizi 'push that cart'	yes	no	yes
State	xihuan Mali 'like Mary'	no	no	yes

Table 1: Vendler-Dowty-Kennedy's aspectual classes

Interestingly, predicates in different aspectual classes respond differently to passive formation. Accomplishments and achievements readily form passives, as demonstrated below:

(5) a. Lisi **chi**-le na-ge xigua
Lisi eat-PERF that-CL watermelon
'Lisi ate that watermelon.'

b. na-ge xigua **bei** Lisi **chi**-le.
that-CL watermelon PASS Lisi eat-PERF.
'That watermelon was eaten by Lisi.' *Accomplishment*

(6) a. Lisi **reng**-le na-ben shu
Lisi throw.away-PERF that-CL book
'Lisi threw that book away.'

b. Na-ben shu **bei** Lisi **reng**-le.
that-CL book PASS Lisi throw.away-PERF.
'That book was thrown away by Lisi.' *Achievement*

However, predicates classified as activities or states have a harder time forming passives, with states more marked than activities, as shown below:

(7) a. Lisi **tui**-le na-liang chezi.
Lisi push-PERF that-CL cart

'Lisi pushed this table.'

b. ??Na-liang chezi **bei** Lisi **tui**-le.
that-CL cart PASS Lisi push-PERF
'That cart was pushed by Lisi.' *Activity1*

(8) a. Lisi **chui**-le yi-ge qiqiu.
Lisi blow-PERF one-CL balloon
'Lisi blew a balloon.'

b. ??You-ge qiqiu **bei** Lisi **chui**-le.
have-CL balloon PASS Lisi blow-PERF
'A balloon was blown by Lisi.' *Activity2*

(9) a. Lisi xihuan zhe-shou ge.
Lisi like this-CL song
'Lisi likes this song.'

b. *Zhe-shou ge **bei** Lisi xihuan(-le).
this-CL song PASS Lisi like-PERF
'This song is/was liked by Lisi.' *State1*

(10) a. Lisi xiangxin(-le) zhe-ge gushi.
Lisi believe-PERF this-CL story
'Lisi believed this story.'

b. *Zhe-ge gushi **bei** Lisi xiangxin(-le).
this-CL story PASS Lisi believe-PERF
'This story is/was believed by Lisi.' *State2*

What sets achievements and accomplishments apart from states and activities is a single parameter: **telicity**—while achievements and accomplishments are telic, states and activities are not. Based on the contrast exhibited by the previous examples, we conclude that *bei* requires its complement clause to consist of a telic predicate.

There are two additional arguments for understanding the patterns so far as interactions with situation aspect. First, the gradient judgment is reminiscent of aspectual coercion, discussed in Dowty (1979) Swart (1998) and Lai et al. (2017). It is known that verbs belonging in one aspectual class may be coerced into another aspectual class, and crucially the coercion is correlated with a change in interpretation. For example, (7-b) and (8-b) can be improved if the context provides a contextual endpoint for the pushing event and the inflating event.[7]

Second, the telicity requirement can be satisfied by a compositional 'aspectual upgrade'. It is well known in the aspectual literature that atelic predicates can be upgraded to be telic once an endpoint is explicitly introduced in a sentence (Krifka 1998; Borer 2005). If telicity is indeed what underlies passive formation in the examples we saw earlier, we should expect the problematic predicates to be rescued if they are enriched with telicity.

Telicity can be introduced with the help of a resultative morpheme or a measure phrase. First, once a resultative morpheme, like *zou* 'away, disappear' or *po* 'broken, burst', is added to an activity predicate, the resulting predicate becomes an accomplishment and can undergo passive formation, as shown below:[8]

[7] See Kratzer (2000) for similar aspectual interactions with adjectival passives in German and English.

[8] The situation with stative predicates is a bit more complex, as many stative predicates are incompatible with a resulta-

(11) Na-liang chezi **bei** Lisi **tui-zou**-le.
that-CL cart PASS Lisi push-AWAY-PERF
'That cart was pushed away by Lisi.' *Activity + resultative*

(12) You-ge qiqiu **bei** Lisi **chui-po**-le.
have-CL balloon PASS Lisi blow-BURST-PERF
'A balloon was blown and burst by Lisi.' *Activity + resultative*

The role of a resultative morpheme is to mark the change of state of a theme argument (Li 1990; Smith 1990, a.o.). In (11), the cart is not only pushed, but is also physically moved away from a salient location. In (12), the balloon is not only inflated, but also bursts as a result of the inflation. In both cases, there is a target state following a process.

Second, the addition of a measure phrase also facilitates the passive formation of predicates that otherwise denote activities (see also Lin (2009, 2015)):

(13) Zhe-zhang zhuozi **bei** Lisi **ca**-le san-bian.
this-CL table PASS Lisi wipe-PERF three-times
'This table was wiped three times by Lisi.' *Activity + measure phrase*

(14) Zhe-ge qiu **bei** Lisi **ti**-le yi-xia.
this-CL ball PASS Lisi kick-PERF one-time
'This ball was kicked once by Lisi.' *Activity + measure phrase*

In these examples, the predicates selected by *bei* include a so-called verbal classifier that is used to count the relevant events. As a consequence, a verbal classifier, together with the verbal meaning, specifies a target state. For example, the predicate *ca-le san-bian* 'wipe three times' characterizes events where wipping actions have been repeated *at least three* times. Any event involving less than three wiping actions would not be included. In this sense, a predicate with a measure phrase is also telic (see also Krifka 1989).

The facilitating effect of resultative morphemes and measure phrases further corroborates the role of telicity in licensing passive formation. But why should passive formation interact with telicity? Passives involve promotion of a theme argument, while telicity involves an individual, denoted by the said theme argument, undergoing a particular type of change, known as a bounded change, over the course of an event. *To say that passives favor telicity is to say that passives favor the promotion of individuals undergoing bounded changes.* This characterization matches a fundamental assumption about Mandarin *bei* passives—the subject of a *bei* passive bears an *affectee* role—which is advocated in Huang (1999) and widely agreed upon in subsequent research on Mandarin passives. Beavers (2011) links affectedness to change and proposes that the internal argument involved in a telic predicate undergoes bounded change and hence is strongly affected. Deferring a discussion of Beavers' framework and how it can be extended to analyze Mandarin passives in more detail in section 3, below we turn to two more factors that facilitate passive formation in Mandarin that do not seem to be directly related to telicity. We eventually argue that these factors point to a more general conceptualization of affectedness, which lies at the heart of the meaning of *bei*-passives passives.

tive morpheme or a measure phrase. We focus on activity predicates in this paper.

2.2 Intention transmission

When the theme argument is animate, there is more variability in the predicate types that can undergo passivization. Activity verbs that impact *animate* individuals like *da* 'hit', *ma* 'scold' and *kua* 'praise' can directly undergo passivization without the need to be turned into a telic predicate, as evidenced by the following examples:

(15) a. Lisi da-le **Wangwu**.
Lisi hit-PERF Wangwu
'Lisi hit Wangwu.'
b. **Wangwu** bei Lisi da-le.
Wangwu PASS Lisi hit-PERF
'Wangwu was hit by Lisi.'

(16) a. Lisi ma-le **Wangwu**.
Lisi scold-PERF Wangwu
'Lisi scolded Wangwu.'
b. **Wangwu** bei Lisi ma-le.
Wangwu PASS Lisi scold-PERF
'Wangwu was scolded by Lisi.'

(17) a. Lisi kua-le **Wangwu**.
Lisi praise-PERF Wangwu
'Lisi praised Wangwu.'
b. **Wangwu** bei Lisi kua-le.
Wangwu PASS Lisi praise-PERF
'Wangwu was praised by Lisi.'

It is important to highlight that the passivization is licensed by a *combination* of the verb type and the animacy of the theme argument. Switching the theme arguments in these sentences to an inanimate object thwarts the licensing.[9]

(18) a. Lisi da-le **shabao**.
Lisi hit-PERF sandbag
'Lisi hit the sandbag.'
b. ??**Shabao** bei Lisi da-le.
sandbag PASS Lisi hit-PERF
'The sandbag was hit by Lisi.'

(19) a. Lisi ma-le **na-chang baoyu**.
Lisi scold-PERF that-CL storm
'Lisi blamed the storm.'
b. *__Na-chang baoyu__ bei Lisi ma-le.
that-CL storm PASS Lisi scold-PERF
'That storm was blamed by Lisi.'

[9] The change in the animacy of the theme argument often subtly changes the meaning of a verb. The fact that passive formation is sensitive to this meaning shift is further evidence that passive formation in Mandarin has a semantic component.

Keeping the animacy of the theme argument but changing the predicates also disrupts passive licensing: Predicates like *tui* 'push' and *ti* 'kick' still need a resultative particle or a measure phrase when undergoing passive formation, as demonstrated below:

(20) a. Lisi tui-le **Wangwu**.
Lisi push-PERF Wangwu
'Lisi pushed Wangwu.'

b. **Wangwu** bei Lisi tui-le ??(yixia).
Wangwu PASS Lisi push-PERF once
'Wangwu was pushed once by Lisi.'

c. **Wangwu** bei Lisi tui-??(kai)-le.
Wangwu PASS Lisi push-AWAY-PERF
'Wangwu was pushed (away) by Lisi.'

(21) a. Lisi ti-le **Wangwu**.
Lisi kick-PERF Wangwu
'Lisi taught Wangwu to smoke.'

b. **Wangwu** bei Lisi ti-le ?(yi-jiao).
Wangwu PASS Lisi kick-PERF once
'Wangwu was kicked once by Wangwu.'

c. **Wangwu** bei Lisi ti-?(shang-)le.
Wangwu PASS Lisi kick-INJURED-PERF
'Wangwu was kicked and injured by Wangwu.'

To understand how this verb-animacy complex licenses passive formation, it is important to take into consideration both the contribution of verbs and the contribution of animate themes. We argue that verbs like *da* 'hit, beat', *ma* 'scold' and *kua* 'praise' *transmit agent intentions* to animate themes, while verbs like *tui* 'push' and *ti* 'kick' do not. What are the agent intentions involved? *Da* 'hit, beat' and *ma* 'scold' encodes, as part of their lexical meaning, that the agent is performing these actions with the goal of the recipient recognizing that they want to cause pain and stress. This is the reason behind the subtle semantic shift when these verbs take inanimate themes. Verbs like *ti* 'kick' and *tui* 'push' do not encode agent intentions in the same way. A kicking or pushing action may be intentional or not.

If intention transmission is indeed responsible for the licensing of passives, it is expected that disrupting intention transmission should also undermine passive licensing. This expectation is borne out by the following examples, which have an adverb *buxiaoxin* 'carelessly' modifying the verb undergoing passive formation. All the passive forms are degraded without an additional measure phrase.

(22) a. Lisi buxiaoxin da-le **Wangwu**.
Lisi carelessly hit-PERF Wangwu
'Lisi hit Wangwu.'

b. **Wangwu** bei Lisi buxiaoxin da-le (??yi-dun).
Wangwu PASS Lisi carelessly hit-PERF once
'Wangwu was accidentally hit by Lisi once.'

(23) a. Lisi buxiaoxin ma-le **Wangwu**.
Lisi scold-PERF Wangwu
'Lisi scolded Wangwu.'
b. **Wangwu** bei Lisi buxiaoxin ma-le (??yi-dun).
Wangwu PASS Lisi carelessly scold-PERF once
'Wangwu was accidentally scolded by Lisi once.'

Although the role of intention transmission has not been noted in the passive literature, it is not entirely new in the literature on affectedness. In German, it has been noted that animacy plays a role in object realization. Animate themes are realized as direct objects while inanimate ones as obliques, unless resultative predicates are present. Based on this, Fleischhauer (2018) argues that animate themes have additional psychological dimensions not available for inanimate themes. Changes on these additional dimensions have similar effects as telicity. In section 3, we offer a way to incorporate intention transmission in an affectedness approach to passives.

2.3 *Guo*: the experiential perfect aspect

Besides telicity and the successful transmission of agent intentions to animate themes, the experiential aspectual marker, *-guo*, has also been noted to independently facilitate atelic predicates in passive formation.[10] Some examples are provided below:

(24) Zhe-zhang zhuozi **bei** Lisi **ca*(-guo)**.
this-CL table PASS Zhangsan wipe-EXP
'This table has been wiped by Zhangsan.' *Activity + guo*

(25) Zhe-ge qiu **bei** Zhangsan **ti*(-guo)**.
this-CL ball PASS Zhangsan kick-EXP
'This ball was kicked by Zhangsan.' *Activity + guo*

An immediate questions is whether *-guo* supports passive formation by adding telicity to a verbal predicate. Based on standard telicity diagnostics, active atelic transitive verbs with *-guo* as an aspectual suffix remain atelic.

(26) *Shi-fenzhong zhinei, Lisi jiu ca-guo(-le) zuozi.
ten-minute within Lisi just wipe-EXP table
Intended 'Lisi wiped the table in ten minutes.'

(27) *Shi-fenzhong zhinei, zhuozi jiu bei ca-guo-le.
ten-minute within table just BEI wipe-EXP-PERF
Intended 'The table was wiped in ten minutes.'

So, we can conclude that it is not telicity that facilitates passive formation in these cases. Rather, the facilitation stems from some contribution of *-guo* that is independent of telicity.

What should this contribution look like? We argue that it should capture three properties:

(28) The aspectual contribution of *-guo* that helps it support passive formation

[10] The progressive aspect disrupts passive formation, even with telic predicates. See section 4.2 for a discussion.

a. This contribution should not be shared by the perfective *-le*, which lacks the ability to support passive formation.
b. This contribution should be distinct from telicity, to explain the fact that a *guo*-marked predicate is atelic.
c. However, this contribution should be connected to the licensing effect of telicity, to pave way for a uniform account of passive licensing.

Let us start with the last property, as it is related to telicity, which we have discussed in section 2.1. At the heart of telicity is the notion of a *telos*, the point at which a theme participant obtains a certain target state entailed by a predicate by participating in eventualities described by the predicate.

What would be a property that a theme participant can gain by participating in a *-guo*-marked atelic predicate? Interestingly, Chappell (2001) argues that *-guo* as an experiential perfect marker has an *evidential component*. This echoes the evidential approach to experiential perfect, as defended in Hill (2017). If this view is on the right track, then we may argue that *-guo* as an experiential perfect marker can contribute a special kind of telos, one that leads to the presence of (indirect) evidence for an event. Concretely, we can model this telos as an *evidential telos* and the state following it as an *evidential state*.

There is suggestive evidence that this evidential telos is available for *-guo* but not for *-le*. For one thing, it has been widely noted that *-guo* has a *discontinuity* requirement not shared by *-le* (Chao 1968; Yeh 1996; Pan and Lee 2004; Wu 2008). This requirement is most obvious when a verb takes a resultative predicate signaling the presence of a target state. Once suffixed by *-guo*, it is required that all events and any target states denoted by the verbal complex to no longer hold at the speech time. So, (29-a) is most naturally used in a context in which the computer is no longer broken at the speech time. This is evidenced by the infelicitous continuation in (29-b).

(29) a. Lisi nong-hua-*guo* zhe-tai diannao.
Lisi make-BREAK-PERF this-CL computer
'Lisi broke this computer before. (It has been fixed now.)'
b. #Shishishang, zhe diannao haishi huai-de.
in.fact this computer still broken-MOD
'In fact, this computer is still broken.'

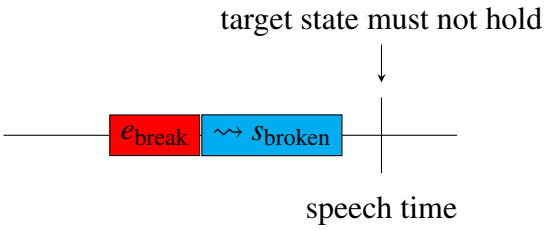


Figure 1: Target state must be discontinued for experiential *-guo*

The discontinuity inference can be understood as a consequence of *-guo*'s evidential telos. The evidential telos requires that all the eventualities denoted by a possibly complex verbal predicate must terminate, so that they can only be indirectly inferred based on the evidence in the subsequent

evidence state.

Although an evidential telos is one type of telos, its presence does not necessarily make a telic predicate. Whether *-guo* contributes telicity in the strict sense also depends on its aspectual property. If a reference time is required to be within an evidence state, then *-guo*-marked predicate is predicted to be atelic, just like the perfect in English.

Note that suffixation by *-le* does not create the same type of evidential telos. (30-a) is most naturally used in a context in which the computer is still broken at the speech time. However, that the result state holds at the speech time can be easily cancelled, as shown in (30-b).

(30) a. Lisi nong-hua-le zhe-tai diannao.
Lisi kill-DIE-PERF this-CL person
'Lisi broke this computer. (It is still broken)'

b. Buguo houlai ta you ba diannao xiu-hao-le.
but afterwards he again BA computer fix-WELL-PFV
'But he later fixed the computer.'

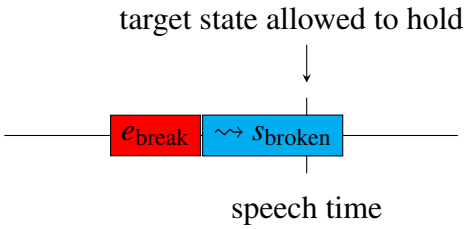


Figure 2: Target state holds at the speech time for *-le*

What this suggests is that *-le* does not make assertions about a result state. This is expected if *-le* marks perfectivity rather than perfect.

In fact, according to some accounts, *-le*'s aspectual contribution is limited. For example, in Wu (2005), *-le* never introduces any end point. Rather, it picks out a salient point, known as the significant point, in an event. For telic predicates, it picks out the natural end points (which are also the beginning points of the target states). For atelic but dynamic predicates, it picks out the initial points, as natural end points are missing. For stative predicates, the significant point is undefined.

(31) $[\![\text{-le}]\!] = \lambda P \lambda e \exists t \begin{cases} P(e) \wedge \mathsf{SigP}(e) \prec t, \text{ if } \mathsf{SigP}(e) \text{is defined} \\ \text{undefined, otherwise} \end{cases}$

a. $\mathsf{SigP}(e) = \mathsf{init}(e)$, if P is atelic but dynamic
b. $\mathsf{SigP}(e) = \mathsf{fin}(e)$, if P is telic
c. $\mathsf{SigP}(e) = \mathsf{undefine}$, if P is stative

Since $\mathsf{SigP}(e)$ does not entail the presence of a result state or its relationship to the reference time, there is no guarantee for the presence of a telos or a result state.

On the contrary, we propose that *-guo* has a semantics as suggested in (32).

(32) $[\![\text{-guo}]\!] = \lambda P \lambda e \exists t \exists s (P(e) \wedge \mathsf{fin}(e) \prec t \wedge \mathsf{es}(s,e) \wedge t \in \tau(s))$

Unlike *-le*, *-guo* has an end point, i.e., $\mathsf{fin}(e)$, this end point is the evidential telos and the beginning

point of the evidence state s, which is related to e via the evidence state relation, $\mathsf{es}(s,e)$. The perfect semantics requires that the reference time t be within the evidence state, which also yields the atelic property of *-guo*-marked predicates.

The evidential approach to *-guo* laid out here satisfies all the three properties raised earlier. First, the aspectual contribution of *-guo* is telicity-like, in the sense that it introduces an evidential telos and an evidential state, which mirrors a classical telos and a target state. Second, it is distinct from telicity in two ways in the presence of an aspectual component that requires the reference time to be included in the evidence state, which disrupts the possible telicity inference coming from the presence of the evidential telos. Third, this contribution is also not shared by *-le*.

By analyzing *-guo* as a perfect marker, it's ability to support passive formation in Mandarin can be recast in a more general form as a *passive-perfect* affinity, which is found in many languages, including English, German, Hungarian, and Russian (Beedham 1987; Kratzer 2000; Gehrke and Grillo 2009). In section 3, we discuss an implementation of *-guo*'s aspectual contribution in terms of a general notion of affectedness.

2.4 Interim summary

The data reported in this section show that gapped *bei*-passives in Mandarin require licensing. The licensing conditions are summarized as follows:

- Telic predicates can be passivized.
- Atelic predicates cannot be passivized unless
  - they are modified to become telic predicates
  - they are suffixed with the experiential perfect marker *guo*
  - they transmit agent intentions

Although telicity, animacy, and perfect seem disjunctive and unconnected at first glance, we have argued that they can be subsumed under a general notion of *affectedness*, as *quantized change*, also known as *bounded change*. The connection between telicity and quantized change is already clear from many classical treatments of telicity (Dowty 1979; Krifka 1989; Beavers 2011). However, how animacy and experiential perfect are connected to bounded change has to be made more explicit, preferably under the same analytic rubric. In the next section, we start by establishing the connection between telicity and bounded change with the help of the scalar approach to change, developed in previous studies like Beavers (2011) (see also Hay et al. 1999; Kennedy and Levin 2008). Then, we generalize the scalar approach to capture the roles of intention transmission and experiential perfect in giving rise to bounded change in supporting passive formation in Mandarin.

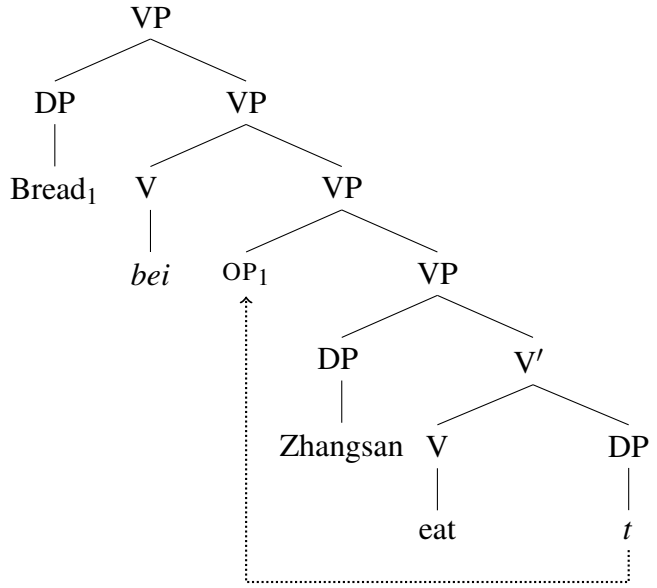
3 An affectedness approach to change

In the standard analysis of a *bei*-passive developed in Feng (1995), Huang (1999), Liu (2012, 2016), among many others, *bei* syntactically links the subject DP to a gap inside the VP. For example, the structure of the sentence in (33) is analyzed as (34). A null operator OP is based-generated as the patient argument of the verb *chi* 'eat' and undergoes an A-movement, or A′-movement (in the case of long-distance passives; see section 4.3), to adjoin to the lower VP. OP

links the subject of *bei* to its trace through co-indexation. This syntactic process is the same as the one generating *tough*-constructions in English.

(33) Mianbao bei Zhangsan chi-le.
bread PASS Zhangsan eat-PERF
'The bread was eaten by Zhangsan.'

(34)



Semantically, Huang suggests that *bei* is a semi-lexical verb meaning 'undergo' and assigns an affectee or experiencer role to the subject. In this sense, the passive sentence generated in the figure can informally be paraphrased as: the bread was affected by participating in an eating event whose agent is Zhangsan. In other words, the bread is the affectee of the eating event.

Although the syntactic consequences of the analysis have been explored and debated in numerous studies (Huang 1999; Tang 2004; Shi and Hu 2005; Tang 2008; Huang et al. 2009; Liu 2016; Pan and Hu 2021), its semantic implications still remain largely unexplored, primarily because it is unclear what semantic content goes into the affectee or experiencer role. In this paper, we provide a formal implementation for the affectee role assigned in a *bei*-passive. Building on the formal implementation, we show that affectedness is the essential semantic feature of *bei* passives, underlying the various restrictions observed in Section 2.

3.1 Affectedness

The notion of affectedness is intuitively understood as the property of having undergone some change (Fillmore 1970; Jackendoff 1990; a.o.). Along this line, Beavers (2011) defines affectedness as a relationship between a theme participant x, a scale participant s, and an event e. Changes of x as x participates in the course of e are measured on s. A telic predicate entails more affectedness on the theme participant than an atelic predicate because it entails more change. For example, the first sentence in (35) entails a specific locational change of the cart, so it yields a contradiction if the change is subsequently negated. By contrast, an atelic predicate does not entail change, as evidenced by the felicitous negation of the change in the continuation in (36).

(35) John pushed the cart away, #but it didn't move.

(36) John pushed the cart, but it didn't move.

It has long been hypothesized that the patient argument in (36) is less affected than the one in (35). This captures a long-standing intuition about affectedness—affectedness is a matter of degree (Hopper and Thompson 1980). Beavers argues that the gradient nature of affectedness can be understood in terms of entailments about a theme participant's change on a scale (see also Dowty 1979; Levin and Hovav 1995; Hay et al. 1999).[11] The Affectedness Hierarchy, sketched in (37), is developed to model different types of scalar changes.[12]

(37) The Affectedness Hierarchy

quantized change > **non-quantized** chang > **potential** change > **unspecified** change

For any predicate ϕ and individual x,

a. x undergoes **quantized** change iff the change refers to a specific degree on a specific scale provided by ϕ (i.e., x is the theme argument of accomplishment/achievement verbs like *break*, *eat*, *destroy*, etc.);
b. x undergoes **non-quantized** change iff the change is a non-specific degree on a specific scale provided by ϕ (i.e., x is the theme argument of degree achievement verbs like *cut*, *cool*, *slice*, etc.);
c. x has **potential** for change iff the change is a non-specific degree on a non-specific scale compatible with ϕ (i.e., x is the theme argument of surface contact verbs like *wipe*, *punch*, *hit*, etc.);
d. x is **unspecified** for change iff x does not undergo change on any scale compatible with ϕ (i.e., when x is the theme argument of activity or stative verbs like *see*, *smell*, *follow*, etc.)

From the discussion of the licensing effect of telicity, it is clear that the aspectual category relevant for passive licensing, i.e., achievements and accomplishments, correspond to the category of **quantized change**. However, is the notion of quantized change sufficient to also capture the licensing effects of intention transmission and perfect? There are two logically possible approaches.

In the first approach, quantized change is the right notion to capture telicity, intention transmission and experiential perfect. It is just a matter of adjusting the meaning of intention transmission and the meaning of experiential perfect to fit the definition of quantized change. This is arguably

[11] Telicity have been subject to extensive research. Different conceptualizations have been proposed in the literature, including conceptualizations in terms of event properties (Krifka 1989), event-time homomorphism (Krifka 1998), the absence and presence of a result predicate at the lexical-conceptual representation (Dowty 1979; Levin and Hovav 1995), verbal functional projections occupied by a theme argument (Borer 2005), degrees of change experienced by a theme participant (Beavers 2011; Kennedy and Levin 2008; Kennedy 2012).

[12] Our informal sketch does not make use of the same terminology as Beavers (2011). Importantly, we dispense with the notion of a result state, for two reasons. First, the notion of a result state is derivative in the scalar framework. A result state is obtained when a change reaches a certain contextual standard or the endpoint of a scale. Given sufficient rich scale structures like those proposed in Kennedy and McNally (2005) and related studies, there is no need to have a separate notion for result states. Second, the notion of a result state is tied to the phenomenon of telicity (see Dowty 1979; Levin and Hovav 1995). Since we argue for a more general notion of quantized change that does not fully align with traditional telicity, we dispense with result states, whether as a notion of meta-language representation, as in Beavers (2011), or as a component in the lexical-syntactic structure, as in Dowty (1979), Levin and Hovav (1995), and related studies.

a simpler route, as the definition of quantized change is known. In the second approach, quantized change characterizes themes of telic predicates only. To model the facilitating effects of intention transmission and experiential perfect, a more general notion of affectededness is needed. Importantly, in this approach it is not just about adjusting the meaning of intention transmission and experiential perfect to fit the definition of quantized change. Rather, it requires a new mechanism that computes the affectedness involved in intention transmission and experiential perfect so that resulting affectedness level ends up equivalent to that of quantized change, despite the fact that they do not exhibit quantized change.

At the writing of this article, we do not have sufficient evidence to choose one way or other. We would eventually like to develop the second approach. However, that would require a more substantial engagement with measuring affectedness in intention transmission and experiential perfect that goes beyond the scope of this article. For this reason, we develop the easier approach of the two, with the goal of making it precise enough to generate predictions that can guide the development of future research on the topic. This reasoning has led us to propose the following semantic requirement for *bei*-passives in Mandarin:

(38) **Strong affectedness** of *bei*-passives
Bei requires the theme argument serving as the passive subject to undergo **quantized change** along some dimension, which can be a physical, psychological, or evidential dimension.

The term **strong affectedness** is used instead of quantized change as it more transparently communicates the relevance of affectedness in the determination of the meaning of passives. We also hope that the name is neutral enough to stay even if it turns out that generalizing all the affectedness categories in passive licensing to quantized change turns out to be a bad idea. In the next few subsections, we formalize Beavers' conception of quantized change in the framework developed by Kennedy and Levin (2008) and Kennedy (2012). See footnote 12 for why we do not use the formal implemnetation in Beavers (2011).

3.2 Scalar change

As discussed in the last section, affectedness is essentially about change (Hay et al. 1999; Kennedy and Levin 2008; Beavers 2011; Kennedy 2012). Change is ultimately a *comparative* notion (Kennedy and Levin 2008; Kennedy 2012). If someone is short in t_1 and tall in t_2, their height has changed. However, if someone is happy at t_1 and smart at t_2, we cannot say there is any change as the two states cannot be compared. Central to the notion of change then is a common dimension of measurement, which enables studies like Hay et al. (1999), Kennedy and Levin (2008), and Kennedy (2012) to dynamicize the notion of measurement to model change. Along the lines of Kennedy (1997) and Kennedy and Levin (2008), this dimension is understood as a *scale* for measurement.[13] In this subsection, we introduce the scalar approach to change, first developed in Kennedy and Levin (2008) and later enriched through the work of Beavers (2011). Since Kennedy and Levin (2008) and Beavers (2011) use related but slightly different formal languages, we will stick with the formal apparatus of Kennedy and Levin (2008) but incorporate the empirical and analytical

[13] This arguably follows the intuition, often associated with logical empiricism, that if no scale is available to measure a dimension, the dimension cannot be said to exist.

insights of Beavers (2011). To facilitate understanding, we incrementally build up the semantics from states and measurement to changes and comparisons.

In the scalar approach of Kennedy (1997), adjectives do not denote states, but measure functions. An adjective like *wide* names a measure function from an object to its width:

(39) *an adjectives as a measure function*
$[\![wide]\!] = \lambda x.\mathbf{m}_{\text{WIDTH}}(x)$ $e \to d$

Hay et al. (1999) highlights that adjectives do not just yield *stable* measurements of individuals, but such measurements are a function of *time*. This can be done by giving a measure function an extra time argument.

(40) *a measure function with temporal awareness*
$[\![\text{wide}]\!] = \lambda x \lambda t.\mathbf{m}_{\text{WDITH}}(x)(t)$ $e \to i \to d$

If instead of having just one time argument, a measure function may have two such arguments, then we can build a **differential** function to model change: given the heights of an individual x at t and t', we can compute the difference in height of x at the two time points. To model this, Kennedy and Levin (2008) assume that an adjective can be upgraded to a differential function by a special operator **diff**, defined in (41). The function of **diff** is to map any 'static' measure function, which computes the measurement of an individual relative to one time point, to a 'dynamic' one, which computes the same measurement, but relative to two time points, and yields a differential. A differential measure function defined based on the adjective *wide* is given in (42). For readability, we follow Kennedy and Levin (2008) and abbreviate $\mathbf{m}_{\text{HGHT}}(x)(t) - \mathbf{m}_{\text{HGHT}}(x)(t')$ as $\mathbf{m}_{\Delta\text{HGHT}}(x)(t)(t')$.

(41) $\mathbf{diff} = \lambda g \lambda x \lambda t \lambda t'.g(x)(t) - g(x)(t')$ $(e \to i \to d) \to e \to i \to i \to d$

(42) *a differential measure function*
$\mathbf{diff}([\![\text{wide}]\!]) = \lambda x \lambda t \lambda t'.\mathbf{m}_{\text{HGHT}}(x)(t) - \mathbf{m}_{\text{HGHT}}(x)(t')$
$=_{\text{abbr.}} \lambda x \lambda t \lambda t'.\mathbf{m}_{\Delta\text{HGHT}}(x)(t)(t')$ $e \to i \to i \to d$

Hay et al. (1999) and Kennedy and Levin (2008) make an important connection between a differential function like (42) and a verbalized adjective, (also known as a de-adjectival verb), like *widen*. According to them, a verb like *widen* can be analyzed as a differential function with the *-en* morphology corresponding to the **diff** operator. In addition, the two time arguments can be *anchored to an event*, such that one time point corresponds to the *event initiation time* ($\mathsf{init}(e)$) and the other time point the *event finality time* ($\mathsf{fin}(e)$). In this way, a differential function is generalized to an *event-related* differential function, as shown in (44), with the help of a **change** function, defined in (43). We follow Kennedy and Levin (2008) and call an event-related differential function a measure-of-change function. A pictorial illustration of such a function is given in Figure 3. Note that the two time arguments t and t' in (41) are replaced by just one event argument in (43).[14]

(43) $\mathbf{change} = \lambda g \lambda x \lambda e.g_{\Delta}(x)(e)$ $(e \to i \to d) \to e \to v \to d$

[14] For this approach to work, instantaneous eventualities such as semel-factives and achievements cannot have the same temporal value for $\mathsf{init}(e)$*and*$\mathsf{fin}(e)$. In other words, their duration can be extremely short but they have to take a nontrivial amount of time.

(44) *a measure-of-change function*
change($[\![\text{wide}]\!]$) = $\lambda x \lambda e.\mathbf{m}_{\Delta\text{WIDTH}}(x)(\mathsf{fin}(e))(\mathsf{init}(e))$ $\quad e \rightarrow v \rightarrow d$

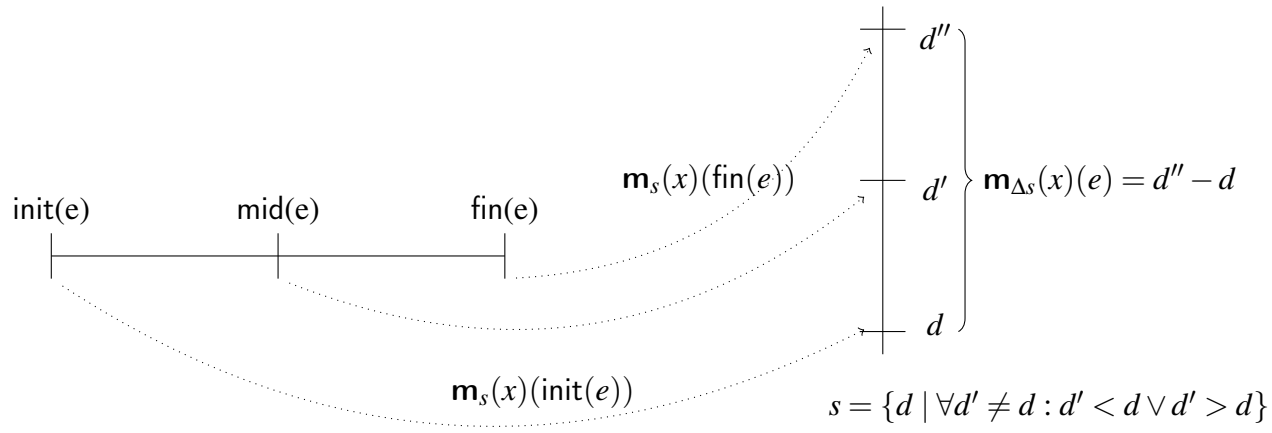


Figure 3: event-related measure-of-change function

3.3 Types of scalar changes

With the notion of a scalar change, i.e., a change along a scale, in place, we can distinguish between different types of scalar changes using the now familiar concept of *comparison*, which we have employed to compute a differential earlier. The idea is that by comparing a scalar change, obtained by a measure-of-change function, with some salient values on a scale, we can determine different kinds of scalar changes.

In Hay et al. (1999) and Kennedy and Levin (2008), this value is determined by the structure of the scale named by the adjectival core of a verbalized adjective. Beavers (2011) generalizes this idea to verbs without an adjectival core, essentially arguing that there are many more scalar verbs beyond those with an adjectival core and all scalar verbs encode scales with particular scale structures.

Incremental-theme verbs Verbs determine the range of dimensions (or scales) along which changes can be measured. The scales for incremental-theme verbs like *chi* 'eat' and *shao* 'burn' are highly constrained. They basically only induce changes along the physical extent of their objects, which essentially tracks the part-whole structure of these objects. Given this intuition, I assume that incremental-theme verbs involve a condition of change, as exemplified in (45) and (46).

(45) $[\![chi]\!] = \lambda x \lambda e.\mathsf{eat}(e) \wedge \mathsf{th}(e) = x \wedge \mathbf{m}_{\Delta\text{PHY.EXT}}(x)(e) = \overbrace{\mathbf{m}_{\text{PHY.EXT}}(x)}^{\text{standard}}$

(46) $[\![shao]\!] = \lambda x \lambda e.\mathsf{burn}(e) \wedge \mathsf{th}(e) = x \wedge \mathbf{m}_{\Delta\text{PHY.EXT}}(x)(e) = \overbrace{\mathbf{m}_{\text{PHY.EXT}}(x)}^{\text{standard}}$

In this paper, we assume that all the predicates are defaultly pluralized, i.e., if $P(x) \wedge P(y)$ is true,

then $P(x \oplus y)$ is true. $\mathbf{m}_{\Delta\text{PHY.EXT}}$ is a measure function mapping an individual to the degree of its physical extent, i.e., its amount. An incremental theme is a theme whose physical extent is incrementally affected as the theme participates in the event denoted by a verb. This is essentially 'mapping to (sub)objects' and 'mapping to (sub)events' in Krifka (1998). Note that since the physical extent of an object is bounded, the change comes to a natural end when the physical extent of an object is exhausted. Consequently, as long as an incremental-theme verb combines with a theme with a specific physical extent, the theme delimits the event denoted by the verb, creating a telic predicate, as shown below.

(47) $[\![\textit{eat three apples}]\!]$

$= \lambda e.\exists x.\mathsf{apples}(x) \wedge |x| = 3 \wedge \mathsf{eat}(e) \wedge \mathsf{th}(e) = x \wedge \mathbf{m}_{\Delta\text{PHY.EXT}}(x)(e) = \mathbf{m}_{\text{PHY.EXT}}(x)$

$= \lambda e.\exists x.\mathsf{apples}(x) \wedge |x| = 3 \wedge \mathsf{eat}(e) \wedge \mathsf{th}(e) = x \wedge \mathbf{m}_{\Delta\text{PHY.EXT}}(x)(e) = |x|$

We assume that achievement verbs, like *sha* 'kill' are also incremental-theme verbs, which affect some physical aspect of their theme arguments. In the case of *sha* 'kill', we assume it is the health aspect of a theme argument that is being changed: to kill someone is to cause changes along the health dimension so that there is no more amount of health left for that individual. The concrete definition is given in (48), The only difference between an accomplishment verb and an achievement verb lies in the time needed for the entailed changes to take place: for accomplishment verbs, the changes take some time, whereas for achievement verbs, they take just a moment.

(48) $[\![\textit{sha}]\!] = \lambda x \lambda e.\mathsf{kill}(e) \wedge \mathsf{th}(e) = x \wedge \mathbf{m}_{\Delta\text{HEALTH}}(x)(e) = \mathbf{m}_{\text{HEALTH}}(x)$

Degree-achievement verbs Degree-achievement verbs also specify different dimensions of measurement, but these dimensions are not the physical extents of those objects. For example, the verbs *liang* 'cool' and *qie* 'cut' lexically encode the scale of coolness and the scale of granularity respectively. In addition, the change led by this kind of verb is indeterministic. Unlike incremental-theme verbs, a degree-achievement verb implies that its theme argument undergoes some change, but does not specify to what extent it has changed. This is modeled with the help of a condition requiring the existence of a nontrivial differential, i.e., '$\mathbf{m}_{\Delta\text{TEMP}}(x)(e) > 0$'.

(49) $[\![\textit{liang}]\!] = \lambda x \lambda e.\mathsf{cool}(e) \wedge \mathsf{th}(e) = x \wedge \mathbf{m}_{\Delta\text{TEMP}}(x)(e) > 0$

(50) $[\![\textit{qie}]\!] = \lambda x \lambda e.\mathsf{cut}(e) \wedge \mathsf{th}(e) = x \wedge \mathbf{m}_{\Delta\text{GRNL}}(x)(e) > 0$

Holistic-theme verbs The third class of verbs includes *tui* 'push' and *kan* 'see', commonly called 'holistic-theme verb'. These verbs do not imply the existence of change. For example, the sentence *Max saw Sue* does not entail that Mary undergoes a change. For this reason, we distinguish the holistic-theme verbs from the previous two classes of verbs by assuming that they do not have a built-in measurement component. This should not be taken to mean that these verbs entail no change in their theme participants. Rather, they do not entail change but are compatible with various types of changes of their theme participants.

(51) $[\![\textit{tui}]\!] = \lambda x \lambda e.\mathsf{push}(e) \wedge \mathsf{th}(e) = x$

(52) $[\![\textit{kan}]\!] = \lambda x \lambda e.\mathsf{see}(e) \wedge \mathsf{th}(e) = x$

3.4 Affectedness as scalar change

Based on these types of verbs, we can implement the Affectedness Hierarchy of Beavers (2011) using scalar changes. Briefly, we propose that the three types of verbs fall into three levels of affectedness: strong, intermediate, and weak, which corresponds to quantized change, non-quantized change, and potential change in Beavers' original wording. Each affectedness level is encapsulated into a different affectee thematic function, whose definitions are given in (53).

(53) a. x is strongly affected in e iff $\mathbf{m}_{\Delta S}(x)(e) = d$, where d is a specific degree on the scale s
b. x is intermediately affected in e iff $\mathbf{m}_{\Delta S}(x)(e) > 0$
c. x is weakly affected in e otherwise.

A **strong affectee** is obtained if an theme argument and a verb together leads to a scale s with a deterministic change on the theme argument. This scale may come from a scalar verb, as in the case of accomplishments, achievements, and degree achievements. The scale may optionally have a standard of comparison provided by a combination of the verbal meaning and the reference of a theme argument, as in the case of incremental-theme verbs. Alternatively, the standard may be left unspecified in the case of degree achievements. Lastly, the standard may also come from adjectives in resultative constructions or delimiting measure phrases, as illustrated below.

(54) a. Zhangsan ca-ganjing-le na-liang che.
Zhangsan wipe-clean-PERF that-CL car
'Zhangsan wiped the car clean.'
b. $\exists e.\mathsf{wipe}(e) \wedge \mathsf{ag}(e) = \mathsf{zs} \wedge \mathsf{th}(e) = [\![\text{the car}]\!] \wedge \mathsf{m}_{\Delta\text{CLEAN}}([\![\text{the car}]\!])(e) \geq \mathsf{std}_{\text{CLEAN}}$

(55) a. Zhangsan ti-le zhe-ge qiu yixia.
Zhangsan kick-ASP this-CL ball once
'Zhangsan kicked this ball once.'
b. $\exists e.\mathsf{kick}(e) \wedge \mathsf{ag}(e) = \mathsf{zs} \wedge \mathsf{th}(e) = [\![\text{the ball}]\!] \wedge \mathsf{m}_{\Delta\text{CONTACT}}([\![\text{the ball}]\!])(e) = 1$

(54) entails that the car became clean because of the wiping. According to the standard approach to degree adjectives, that the car is clean is true if and only if the cleanliness of the car achieves a contextually determined standard degree, i.e., std. Similarly, (55) entails that the ball was kicked once in the kicking event. In other words, measuring the number of times the ball was kicked yields a specific degree. As a result, although the meanings of *ca* 'wipe' and *ti* 'kick' do not imply a bounded change on their theme arguments, the adjective and the measure phrase bring in a specific degree.

An predicate entailing an **intermediate affectee** is similar to a predicate entailing a strong affectee in that the scale for measurement is provided by the predicate and positive change is entailed. However, it differs from the latter in not having a specific degree on the scale for which the change can be compared. In Mandarin, a sentence with a degree achievement verb like (56) has intermediate affectedness as it entails positive change (i.e., the beef is cut) but there is no objective standard to compare the change to, as cutting can proceed indefinitely.

(56) a. Zhangsan qie-le yi-kuai mutou.
Zhangsan cut-ASP one-CL wood
'Zhangsan cut a piece of wood.'

b. $\exists e \exists x.\mathsf{wood}(x) \wedge \mathsf{cut}(e) \wedge \mathsf{ag}(e) = \mathsf{zs} \wedge \mathsf{th}(e) = x \wedge \mathsf{m}_{\Delta \mathrm{GRNL}}(x)(e) > 0$

Lastly, a **weak affectee** results when a predicate does not entail change along a specific scale but is compatible with it. In Mandarin, a sentence with an active verb like (57) falls into this class. This is because although pushing a cart most often does result in movement, it does not entail it (the cart may be screwed to the floor).

(57) a. Zhangsan tui-le na-liang chezi.
Zhangsan push-ASP that-CL cart
'Zhangsan pushed that cart.'
b. $\exists e.\mathsf{push}(e) \wedge \mathsf{ag}(e) = \mathsf{zs} \wedge \mathsf{th}(e) = [\![\text{that cart}]\!]$

3.5 Strong affectedness reference

Given the fine-grained nature of the the Affectedness Hierarchy, we are now ready to link Mandarin *bei*-passives with a particular affectedness level, namely, **strong affectedness**. We argue that the passive semi-verb *bei* imposes on a strong affectiveness condition, defined in (58), on the VP combining with it. In particular, $\text{S-AFF}_S(P)(x)$ says: a predicate P strongly affects x relative to a contextually salient scale S iff there is a specific degree d such that for any event e, $P(x)(e)$ entails that measuring the change of x in e along the scale S exceeds the standard defined on S

(58) $\text{S-AFF}_S(P)(x)$ is true iff $\forall e.P(x)(e) \rightarrow \mathsf{m}_{\Delta S}(x)(e) \geq \mathsf{stnd}_S$

Lexically, we model S-AFF as a presupposition triggered by *bei*, as shown in (59).

(59) $[\![bei]\!] = \lambda P \lambda x \lambda e : \text{S-AFF}_S(P)(x).P(x)(e) \qquad (e \rightarrow v \rightarrow t) \rightarrow e \rightarrow v \rightarrow t$

We defend this proposal, in the next few subsections, by demonstrating how telicity, animacy, and existential perfect help satisfy this strong affectedness component of *bei*.

3.5.1 Telicity and strong affectedness

When *bei* combines with a VP projected from an incremental-theme verb, the requirement of the affectedness reference is satisfied. For example, the VP in (60) denotes an event–individual relation like (61). For simplicity, we ignore the contribution of the particle *le* here but will return to this issue in Section 3.5.2.

(60) Na-ge xigua **bei** **chi**-le.
that-CL watermelon PASS eat-PERF.
'That watermelon was eaten.'

(61) $[\![chi\text{-}le]\!] = \lambda x \lambda e.\mathsf{eat}(e) \wedge \mathsf{th}(e) = x \wedge \mathbf{m}_{\Delta \mathrm{PHY.EXT}}(x)(e) = \mathsf{m}_{\mathrm{PHY.EXT}}(x)$.

This VP has an incremental theme. As such, they have a non-arbitrary standard of comparison corresponding to the maximal physical extent of the theme, as shown in (61). What this means is that the theme argument is a strongly affected. As suggested in the previous subsection, *bei* requires that the VP has affected reference. This requirement is satisfied by the bounded change component of the verb, as shown by the combination of *bei* and the VP in (62).

(62) $[\![\textit{bei chi-le}]\!] = \lambda x \lambda e : \textsf{S-AFF}_{\textsc{phy.ext}}([\![\textit{chi-le}]\!])(x).[\![\textit{chi-le}]\!](x)(e)$

(63) $\textsf{S-AFF}_{\textsc{phy.ext}}([\![\textit{chi-le}]\!])(x)$ is true iff $\exists d \forall e.[\![\textit{chi-le}]\!](x)(e) \rightarrow \textsf{m}_{\Delta\textsc{phy.ext}}(x)(e) = d$

In this example, the affectedness reference is evaluated relative to the scale of physical extent, which is salient because of the meaning of *chi* 'eat'. Since the verb *chi-le* strongly affects its theme argument, i.e., the latter undergoes bounded change, it is entailed that the change of the theme argument has a least upper bound degree. The presupposition is certainly satisfied.

Let us then turn to degree achievement and activity verbs, both of which are unnatural with *bei* without additional morphology, as repeated below:

(64) ??Na-kuai mutou **bei** **qie**-le.
that-CL wood PASS cut-PERF.
'That piece of wood was cut.'

(65) ??Na-liang chezi **bei** **tui**-le.
that-CL cart PASS push-PERF.
'That cart was pushed.'

As already mentioned earlier, both degree achievement and holistic-theme verbs do not provide a specific standard of comparison so they are both atelic. For concreteness, a degree achievement verb like *qie* 'cut' is proposed to affect its theme argument at an intermediate level, while a holistic-theme verb like *tui* 'push' at a weak level. When they combine with *bei* and the passive subject, they fail to support the strong affectedness condition introduced by *bei*.

Of course, both degree achievement verbs and active verbs can combine with a resultative adjective or a delimiting measure phrase to yield a telic predicate. This is because these expressions provide a specific standard of comparison for a predicate denoting scalar change. For example, in (66), the measure phrase brings in a distance scale and a specific degree, as illustrated by the definition of the VP in (67). For simplicity, we will not delve into the compositional derivation of the VP meaning. In addition, meter is treated as a unit function from degrees to numbers.

(66) Na-liang che bei tui-le sanshi mi.
that-CL cart PASS push-PERF thirty meter
'That cart was pushed for thirty meters.'

(67) $[\![\textit{push thirty meters}]\!] = \lambda x \lambda e.\textsf{push}(e) \wedge \textsf{th}(e) = x \wedge \textsf{meter}(\textsf{m}_{\Delta\textsc{dst}}(x)(e)) = 30$

It is clear that (67) provides a specific degree of distance. As a result, the active verb gets strengthened from an atelic predicate, one that entails possibly positive unbounded change, to a telic predicate, one that entails bounded change.

3.5.2 Experiential perfect and affectedness

We have seen how telicity satisfies the strong affectedness requirement by contributing bounded change in a certain scale. In this subsection, we take up the generalization, established in section 2.3, that a degree achievement verb or a holistic-theme verb suffixed with the experiential perfect marker *guo* becomes compatible with *bei*, despite its atelicity, as demonstrated by the following examples.

(68) Zhe-zhang zhuozi **bei** Lisi **ca-?(guo)**-(le).
this-CL table PASS Lisi wipe-EXP-PERF
'This table had already been wiped by Lisi.'

(69) Zhe-ge qiu **bei** Zhangsan **ti-??(guo)**-(le).
this-CL ball PASS Zhangsan kick-EXP-PERF
'This ball was kicked by Zhangsan.'

The challenge is two-fold. On one hand, we need to understand why *-guo* supports passive formation in light of the affectedness approach laid out so far. On the other hand, we need to also account for why a semantically close aspectual marker *-le* does not show the same kind of facilitation.

Let us start with the first task: the facilitation effect of *-guo*. It is clear that to understand this effect, we need to generalize the affectedness approach. Since the core of the affectedness approach lies in the measurement component, it is this component that we generalize. Recall that the measurement component associated with a dynamic atelic predicate has the following form:

(70) $\mathbf{m}_{\Delta?}(x)(e) \geq 0$ potential change

To model the facilitation effect of *-guo*, we need to adjust the measure function in two ways. First, instead of using the initial and final point of an event to compute the differential, the presence of *-guo* as an aspectual marker provides a new set of temporal anchors, which are the initial point of the event and the initial point of the **evidence state**, which is a kind of result state. Let us refer to the interval picked out by these two points as I. The revised measurement function is as follows:

(71) $\mathbf{m}_{\Delta?}(x)(I) \geq 0$

This is not enough to satisfy the strong affectedness requirement, which also requires that the comparison standard to be a specific non-zero standard on a scale. But what is this scale? This requires us to solve for the question mark. We argue, based on the research linking the experiential aspect to an evidential marker, that the scale involved is an evidential scale (Chappell 2001). Concretely, the measure function associated with a V-*guo* complex in which V is atelic is given in (72). The semantics proposed for *-guo*, based on the discussion in section 2.3 and this section, is given in (73). We identify the interval I as the initial point of an eventuality e and the initial point of the evidence state s.

(72) $\mathbf{m}_{\Delta\text{EVID}}(x)(I) \geq \mathsf{std}_{\text{EVIDENCE}}$

(73) $[\![\text{guo}]\!] = \lambda P \lambda x \lambda e. \exists t \exists s \exists I \left(\begin{array}{c} P(x)(e) \wedge \mathsf{fin}(e) \prec t \wedge \mathsf{es}(s,e) \wedge t \in \tau(s) \wedge \\ I = [\mathsf{init(e)}, \mathsf{init(s)}] \wedge \\ \mathbf{m}_{\Delta\text{EVID}}(x)(I) \geq \mathsf{std}_{\text{EVIDENCE}} \end{array} \right)$

When *-guo* combines with an activity predicate, like *ca* 'wipe', which lacks a scalar component, *-guo* provides both an evidential scale and a standard on the scale, which allows the verbal complex *ca-guo*, whose semantics is provided in (74), to undergo passive formation.[15]

[15] One may wonder what happens if *-guo* combines with a telic predicate like *chi* 'eat' and *shao* 'burn'. As discussed in section 2.3, *-guo* requires that the target state of a telic predicate to end. For this reason, telic predicates with irreversible target states have to undergo aspectual shift when combining with *-guo*. For example *chi-guo na-ge pingguo* means not just that the eating of an apple is completed, but also that the target state has ended, which is

$$(74) \qquad [\![\text{ca-guo}]\!] = \lambda x \lambda e. \exists t \exists s \exists I \left(\begin{array}{c} \mathsf{wipe}(e) \wedge \mathsf{th}(e) = x \wedge \\ \mathsf{fin}(e) \prec t \wedge \mathsf{es}(s,e) \wedge t \in \tau(s) \wedge \\ I = [\mathsf{init(e)}, \mathsf{init(s)}] \wedge \\ \mathsf{m}_{\Delta \text{EVI}}(x)(I) \geq \mathsf{std}_{\text{EVIDENCE}} \end{array} \right)$$

Now, let us tackle the second task: the impossibility for *-le* to support passive formation. What we need to rule out, is for verbal measurement involving *-le* to undergo the same kind of upgrade argued to be available for *-guo*. Since there are two components in the aspectual upgrade of *guo*, let us rule them out separately. First, while *-guo* makes available an interval I through its aspectual semantics, *-le* does not. As discussed in section 2.3 and argued in Wu (2005), *-le* introduces a significant point, rather than a finality point for an eventuality. Importantly, the significant point of an atelic predicate is underspecified, meaning that there are many possible intervals between the initial point of an event and another point that may serve as the value for I in the case of *-le*. For this reason, there is no guarantee that the theme argument undergoes any change, let alone being strongly affected, in this interval. In addition, *-le* also lacks an evidential semantics. For this reason, it does not provide an evidential scale for measuring change in the evidence. As a consequence, there is no lexically provided scale that an atelic predicate can use for determining whether a change has reached a standard or not. For these two reasons, *-le* does not facilitate passive formation in the same way that *-guo* does.

3.5.3 Intention transmission and strong affectedness

In this subsection, we show how the notion of strong affectedness can be extended to model the role of intention transmission in facilitating passive formation. Although this extension is motivated primarily based on the similarity in telicity and intention transmission in passive formation in Mandarin, a similar extension to bring together telicity and theme animacy has been made in Fleischhauer (2018) based on differential object marking in German (see also de Hoop 2015; de Swart and de Hoop 2018).

The main idea underlying this extension is that animate individuals may undergo changes along more dimensions than inanimate individuals (de Hoop 2015; de Swart and de Hoop 2018; Fleischhauer 2018). These additional dimensions include cognitive, emotional neurological or social dimensions. Certain types of eventualities are intimately tied to changes along these dimensions. For example, hitting is intended to cause pain, scolding and criticizing to cause shame, and praising to cause pride, in an individual. To fully understand how causation and change take place along these dimensions require substantial future research. However, in this study we use a single dimension of sentience, abbreviated as SENT, as an simplified and imprecise way of approximating these valid but vague additional dimensions.

Additionally, we assume that the dimension of sentience can only be called upon if an animate individual is taken as the theme argument by a verb denoting an actions with agent *intentions*, such as *da* 'hit' (the intention is to inflict pain, for example) or *ma* 'scold' (the intention is to convey disapproval). For a lack of better terminology, we have been calling these verbs intention-transmitting verbs. Intuitively, the agent argument of an intention-transmitting verb always intends to result in a certain change on the animate theme argument's sentient dimension. As is standardly assumed in Gricean pragmatics, *intentional acts count as successful as soon as the intentions are*

impossible given world knowledge. For

recognized. If we further assume that sentient individuals are capable of perceiving the intentions communicated by intention-transmitting verbs, then the combination of an animate theme and an intention-transmitting verb patterns like an achievement with respect to affectedness.

Take *da* 'hit' in (75) as an example. The sentience condition SENT, defined in (76), is formalized as a bi-conditional, which basically says: the theme argument of the verb *da* 'hit' undergoes a bounded change at the sentience scale iff the theme argument is animate. In other words, if the theme argument is inanimate, it may not undergo any change.

(75) $[\![da]\!] = \lambda x \lambda e.\mathsf{hit}(e) \wedge \mathsf{th}(e) = x \wedge \mathsf{SENT}(x)(e)$

(76) $\mathsf{SENT}(x)(e)$ is true iff x is animate iff $\mathsf{m}_{\Delta\mathrm{SENT}}(x)(e) \geq \mathsf{stnd}_{\mathrm{SENT}}$

For verbs denoting actions without clear intentions, like *ti* 'kick' and *tui* 'push', we simply assume that they do not involve the extra SENT component. Alternatively, it can be postulated that these verbs also contain a sentience condition, but the involved scale of sentience relating to an animate theme argument has no non-zero standard, i.e., it is an open scale.

Using the compatibility with resultative predicates as a diagnostic for the types of changes inducible by events introduced by a verb, we can tell that verbs like *da* 'hit' and *ma* 'scold' indeed induce changes along sentient dimensions not shared by verbs like *ti* 'kick' or *tui* 'push'. As shown in Table 2, while *da* 'hit' is compatible with both physical and emotional changes, verbs like *ti* 'kick' and *tui* 'push' are only compatible with physical changes. They are incompatible with emotional changes at all, in contrast to verbs like *ma* 'scold', which are compatible with emotional changes.

Change	Resultative	*da* 'hit'	*ti* 'kick'	*tui* 'push'	*ma* 'scold'
Physical	shang 'injured'	✓	✓	?	*
	zou 'away'	✓	✓	✓	✓
Emotional	ku 'cry'	✓	?	*	✓
	can 'beaten up'	✓	*	*	✓

Table 2: Changes associated with different verbs

What these patterns show us is *not* that these verbs are capable of providing all the scales for encoding the relevant changes, but that some of them have the *potential* of incorporating a relevant scale given favorable environments. For example, when *da* 'hit' and *ma* 'scold' combine with an animate internal argument, emotional changes are at least a possibility for the individual denoted by the internal argument. By contrast, emotional changes are impossible with verbs like *ti* 'kick' and *tui* 'push'.

We are now in a position to account for why a *bei*-passive with the verb *da* 'hit' or *ma* 'scold' are judged more acceptable when the subject is animate. The relevant examples are repeated below.

(77) Wangwu bei Lisi da-le.
Wangwu PASS Lisi hit-PERF
'Wangwu was hit by Lisi.'

(78) Wangwu bei Lisi ma-le.
Wangwu PASS Lisi scold-PERF

'Wangwu was scolded by Lisi.'

Since the theme arguments in these two sentences are animate and the predicates involved transmit agent intentions, bounded changes on the sentience scale are activated, which then satisfy the strong affectedness requirement imposed by *bei*.

3.6 Interim summary

Overall, the restrictions on the selection of VP complements by *bei* result from the strong affectedness condition encoded in the lexical meaning of *bei*. Simply put, all VPs that can combine with *bei* must strongly affect the subject of *bei*. Building on Beavers's (2011) view of affectedness, we formalize strong affectedness as quantized change on theme arguments using degree semantics (Kennedy and Levin 2008; Kennedy 2012). Based on our formal implementation, we argue that telicity, intention transmission, and experiential perfect share the core property of being scalar with a particular scale structure—they all induce changes that can be measured on a scale with an objective endpoint or a contextual standard. In the next section, we discuss how the affectedness approach help shed light on additional properties of *bei*-passives.

4 Predictions

The present analysis investigates passives from a semantic perspective. In addition to formulating the strong affectedness requirement, which elucidates the restrictions on passivization, it generates novel empirically verified predictions that are not covered in a pure syntactic perspective.

4.1 Interactions with thematic liberality

Active sentences in Mandarin may have canonical or non-canonical arguments in their subject and object positions (Huang 1997; Lin 2001; Li 2014). For example, the subject of the verb *chi* 'eat' is typically an agent and the object typically a theme, as shown in (79). When the subject and object have typical thematic roles, a verb is said to have canonical subjects and objects.

(79) **Zhangsan**$^{\text{AGENT}}$ chi-le **mian**$^{\text{THEME}}$.
Zhangsan eat-PERF noodles
'Zhangsan ate noodles.' *Canonical subject and object*

However, a verb in an active sentence may also take non-canonical arguments as its subject and object. For example, (80) and (81) involve non-canonical subjects featuring an instrument and a time. (82) and (83) involve non-canonical objects featuring a time and a location.

(80) **Dawan**$^{\text{INSTRUMENT}}$ chi-le mian.
big.bowl eat-PERF noodles
'Someone ate noodles with a big bowl.' *Instrument as subject*

(81) **Baitian**$^{\text{TIME}}$ chi-le mian.
daytime eat-PERF noodles
'Someone ate noodles in day time.' *Time as subject*

(82) Zhangsan chi-le **shangwu**$^{\text{TIME}}$.
Zhangsan eat-PERF morning
'Zhangsan ate in the morning.' *Time as object*

(83) Zhangsan chi-le **shitang**$^{\text{LOCATION}}$.
Zhangsan eat-PERF canteen
'Zhangsan ate at a canteen.' *Location as object*

Zhang (2018) observes that non-canonical objects do not delimit an event. For this reason, they cannot help give rise to telic predicates. This is supported by the aspectual diagnostics in (84) and (85). In (84), the temporal adverbial *yi-nian* 'one year' is inserted between the verb and the non-canonical object and it functions like a durative adverbial corresponding to *for a year* in English. The fact that the sentence is well formed shows that the predicate *chi-le shitang* 'ate at a canteen' is atelic. When a temporal adverbial is used before the verb with the marker *jiu* 'just', then it functions like an 'bounded' *in*-adverbial, which requires telicity. (85) shows that the same predicate fails this test, precisely because it lacks telicity.

(84) Zhangsan chi-le yi-nian **shitang**.
Zhangsan eat-PFV one-year canteen
'Zhangsan ate at a canteen for a year.' *Durative*

(85) *Zhangsan yi-ge xiaoshi jiu chi-le **shitang**.
Zhangsan one-CL hour only eat-PERF canteen
Intended: 'Zhangsan ate at a canteen in an hour.' *Bounded*

If non-canonical objects cannot form telic predicates, they cannot satisfy the high affectedness requirement of *bei*. As a consequence, we should expect that they do not participate in *bei*-passives in Mandarin. Hirschberg (2022) observes that this expectation is indeed met, as supported by the unacceptability of (86) and (87), in which the non-canonical arguments occur as passive subjects.

(86) ***Shitang**$^{\text{LOCATION}}$ bei Zhangsan chi-le.
canteen PASS Zhangsan eat-PERF
Intended: 'Food was eaten by Zhangsan in the canteen.' *Subject as location*

(87) ***Shangwu**$^{\text{TIME}}$ bei Zhangsan chi-le.
morning PASS Zhangsan eat-PERF
Intended: 'Food was eaten by Zhangsan in the morning.' *Subject as time*

One may question if the ill-formedness of (86) and (87) is indeed due to the lack of telicity. There may be other reasons why a non-canonical object do not undergo passive formation. For example, passivization may be restricted to canonical arguments only. One can test this by passivizing a non-canonical object in a telic predicate. Although predicates with a non-canonical object are by default atelic, they can be turned into telic predicates with the help of a resultative predicate. For example, by adding *kua* 'collapse' as a resultative predicate to the verb *chi* 'eat', *chi-kua-le shitang* 'to eat until the canteen collapses' becomes a telic predicate. This can be verified with the help of the aspectual diagnostics we saw earlier. The fact that this predicate is incompatible with a durative adverbial, as shown in (88), but compatible with an interval adverbial, as shown in (89), confirms its telic status.

(88) *Zhangsan chi-**kua**-le yi-nian **shitang**.
Zhangsan eat canteen/morning eat-PERF one-year
'Zhangsan spent a year eating at a canteen/in the morning.' *Durative*

(89) Zhangsan yi-ge xiaoshi jiu chi-kua-le **shitang**.
Zhangsan one-CL hour only eat-PERF canteen
Intended: 'Zhangsan ate (food) at a canteen in an hour.' *Bounded*

With the help of a resultative predicate, observe that even non-canonical objects can be promoted to be passive subjects:

(90) **Shitang** bei Zhangsan chi-kua-le.
canteen PASS Zhangsan eat-COLLAPSE-PERF
'Zhangsan ate at a Canteen (so frequently/greedily) to the degree that it collapsed.'

(91) **Shangwu** bei Zhangsan chi-diao-le.
morning PASS Zhangsan eat-COMPLETE-PERF
'Zhangsan spent the entire morning eating.'

This follows straightforwardly from our analysis of *bei*-passives as requiring a high level of affectedness of their surface subjects: the presence of a resultative predicate allows non-canonical arguments to be interpreted as strong affectees in an event, which allow them to participate in passivization in Mandarin. Note that a pure syntactic approach to Mandarin passives would have a much harder time accounting for the incompatibility of passives and non-canonical objects. Based on the widely assumed light verb syntax (Huang 1997; Lin 2001; Li 2014), a non-canonical object is introduced by a different light verb from a theme argument but still occupies the canonical object position in a syntactic structure. As a consequence, syntactic rules would not prevent a non-canonical object from being promoted to be a passive subject, unless such rules make reference to the semantic content of these light verbs.

4.2 Interactions with the progressive aspect and negation

It is well known that situation aspect and viewpoint aspect interact in many natural languages (Dowty 1979; Smith 1990, 1994). For example, the progressive aspect, which is a viewpoint aspect, has the effect of disabling the end point of a telic predicate, which turns the otherwise telic predicate into an atelic one (Dowty 1979; Landman 1992). In fact, this is partly responsible for the so-called 'imperfective paradox'. If the endpoint is indeed suspended with a progressive, it is predicted that *bei*-passives should not be compatible with predicates marked as having the progressive aspect. This subsection is devoted to the discussion of this prediction.

In Mandarin, the progressive aspect is marked with the pre-verbal adverb *zhengzai* (sometimes abbreviated as just *zai*), as exemplified in (92) and (93). When the progressive adverb is present, the verb cannot take on any overt aspectual suffix.

(92) Zhangsan **zhengzai** da Lisi.
Zhangsan at.this.moment hit Lisi
'Zhangsan is beating up Lisi.'

(93) Zhangsan **zhengzai** chi pingguo.
Zhangsan at.this.moment eat apple

'Zhangsan is eating an apple.'

In Mandarin an adverb typically occurs between the subject and the verb (see Huang et al. 2009). Based on this, there are two positions to insert an adverb in a passive sentence: between the surface subject and *bei*, as high adverbs, and between the external argument in the lower clause and the main verb, as low adverbs. These two adverbial positions are visualized in (94).

(94) Subject (High Adv) bei Ext-Arg (Low Adv) V __

Interestingly, low adverbs can only be manner adverbs, but not temporal adverbs, as shown in (95) and (96) (see also Huang et al. 2009). The resistance against temporal adverbs also applies to the progressive adverb, as shown in (97) and (98).

(95) Lisi **bei** Zhangsan henhen-de/*zuotian da-le.
Lisi PASS Zhangsan fircely/yesterday hit-PFV
Intended 'Lisi was beaten up by Zhangsan fiercely/yesterday.'

(96) Pingguo **bei** Zhangsan qiaoiao-de/*zaoshang chi-le.
apple PASS Zhangsan sneakly/morning eat-PFV
Intended 'The apple was eaten by Zhangsan sneakly/in the morning.'

(97) *Lisi **bei** Zhangsan zhengzai da.
Lisi PASS Zhangsan at.this.moment hit
Intended 'Lisi is being beaten up by Zhangsan.'

(98) *Pingguo **bei** Zhangsan zhengzai chi.
apple PASS Zhangsan at.this.moment eat
Intended 'The apple is being eaten by Zhangsan.'

For this reason, while the low adverb position may provide useful information about the clause size of the complement of *bei*, its resistance to temporal adverbs makes it unusable for observing the potential interactions between the progressive aspect and strong affectedness.

Fortunately, the high adverb position can house a temporal adverb, including the progressive adverb. If the verb is atelic but is capable of transmitting agent intentions, as in the case of *da* 'to hit, beat', the inclusion of a progressive marker is relatively acceptable, as shown in (99). However, if the verb is telic and the theme argument is inanimate, then the progressive marker severely degrades the sentence, as shown in (100).

(99) Lisi (?zhengzai) **bei** Zhangsan da.
Lisi at.this.moment PASS Zhangsan hit
'Lisi is being beaten up by Zhangsan.'

(100) Pingguo (*zhengzai) **bei** Zhangsan chi.
apple at.this.moment PASS Zhangsan eat
Intended 'The apple is being eaten by Zhangsan.'

At first glance, this contrast may seem puzzling. However, we argue that this follows from the interplay of (a)telicity and the progressive semantics, which also creates the imperfective paradox. According to the paradox, a progressive-marked atelic predicate entails completion but a progressive-marked telic predicate has no such entailment. Consider the entailment in (101), which features an

atelic predicate and (102), which features a telic predicate: while (101-a) entails (101-b), (102-a) does not entail (102-b).

(101) a. Zhangsan was beating Lisi.
b. Zhangsan beat Lisi. entailed

(102) a. Zhangsan was eating an apple.
b. Zhangsan ate an apple. not entailed

Since strong affectedness with intention transmitting atelic predicates is achieved with intention transmission, the progressive marking still yields the entailment that an event described by the predicate took place. This is sufficient for transmitting agent intention. However, since the strong affectedness with telic predicates is achieved via the presence of a telos, the progressive marking disrupts the entailment of the telos and renders it impossible to satisfy strong affectedness.

Next, let us turn to negation. It has been reported by Shi and Hu (2005) that negation cannot occur in the complement clause of *bei*, as shown in (103) and (104).

(103) *Lisi **bei** Zhangsan **bu/mei** da.
Lisi PASS Zhangsan not/not hit
Intended 'Lisi is not beaten up by Zhangsan.'

(104) *Pingguo **bei** Zhangsan **bu/mei** chi(-diao).
apple PASS Zhangsan at.this.moment eat-RES
Intended 'The apple was not eaten up by Zhangsan.'

This is expected given the affectedness semantics. *Bei* requirement that its subject is a strong affectee in the eventuality denoted by its complement clause. However, negation in the lower clause leads to the assertion that there are no such eventualities. As a result, the strong affectedness requirement of *bei* cannot be satisfied.

However, if negation can be evaluated after *bei* has combined with the lower clause and have its strong affectedness requirement satisfied, then we predict that passive sentences with negation should be well formed. This prediction is borne out by (105) and (106).

(105) Lisi bushi/mei **bei** Zhangsan da(-le).
Lisi not PASS Zhangsan hit
'Lisi was not beaten up by Zhangsan.'

(106) Pingguo bushi/mei **bei** Zhangsan chi-(le).
apple not PASS Zhangsan eat
Intended 'The apple was not eaten by Zhangsan.'

4.3 Unifying short and long-distance passives

Since passives often involve linking the passive subject to a gap in the original theme argument position, a core question in the research on passives concerns how best to understand this linking. In the classical analysis for English passives, the linking involves an argument chain, more commonly known as an A-chain, created by A-movement. It is generally believed that the status of the linking remains unchanged whether the external argument is explicitly realized or not.

(107) The sandwich was eaten _____ (by Mary).

Unlike English, it has been argued that Mandarin has two types of linking in passives, depending on whether the external argument is explicitly realized. When the external argument is not present, *bei*-passives, known as short *bei*-passives, exhibit A-movement. However, when the external argument is present, it is believed that the linking involves an A'-chain via A'-movement of a null operator (recall from section 3).

(108) Diannao bei ban-zou-le _____.
computer PASS move-away-PFV
'The computer was moved away.'

(109) Diannao bei Lisi ban-zou-le _____.
computer PASS Lisi move-away-PFV
'The computer was moved away by Lisi.'

A primary motivation for invoking A′-movement in long *bei*-passives is that their subjects can be linked to an argument gap across clausal boundaries, as exemplified in (110), in which each embedded clause is included in a pair of square brackets (see also Feng 1995; Huang 1999; Huang et al. 2009, a.o.).[16]

(110) Diannao bei [Zhangsan jiao [Lisi ban-zou-le _____]].
computer PASS Zhangsan ask Lisi move-away-PERF
'The computer was moved by Lisi as a result of Zhangsan asked them to do it.'

Nevertheless, simply taking *bei*-passives to arise via A'-movement vastly over-generates. Replacing the embedding verb in (110) with an attitude verb, like *xiangxin* 'believe', renders the sentence unacceptable, as shown below.

(111) *Diannao bei Zhangsan **xiangxin** Lisi ban-zou-le _____.
computer PASS Zhangsan believe Lisi move-away-PERF
Intended 'The computer was moved by Lisi and Zhangsan believed this.'

A defining feature of A′-movement is its blindness to clausal boundaries and to a large extent, also its insensitivity to embedding predicates (but see Cinque (1990), Truswell (2007), and arta Abrus´ an (2014) for the role of factivity and event structures). Consider the following classical examples with A′-movement of a *wh*-phrase in English:

(112) a. Who did you ask Mary to talk to _____?
b. Who did you believe that Mary talk to _____?

If long *bei*-passives indeed only involve A′-movement, the contrast in (110) and (111) is mysterious. However, if *bei*-passives (both short and long) also involve a semantic constraint of strong affectedness, then we have a natural explanation for the contrast: the directive verb *jiao* 'ask' is *causative* while the stative verb *xiangxin* 'believe' is not.

[16] Additional motivations for positing A′-movement in long *bei*-passives include island sensitivity, acceptance of resumptive pronouns, and admission of the particle *suo* (Huang et al. 2009). However, Her (2009) has rebutted the relevance of resumptive pronouns and *suo* in diagnosing A′-movement.

Why would the presence of causation make a difference? Intuitively, in (111) the existence of the moving away eventuality of the computer is not causally connected to the eventuality of Zhangsan believing its existence. The moving away eventuality may exist or not, and it is not caused by Zhangsan's belief that it exists.

However, the situation is very different with (110). In this sentence there are two eventualities, as illustrated in Table 3. There is an eventuality in which Zhangsan asked Lisi to move away the computer, and another one in which Lisi moved the computer away. More importantly, these two eventualites stand in a causal relation—it is by Zhangsan's order that Lisi moved the computer away.

Event	Agent/Causer	Affectee
e_{ask} (*jiao*)	Zhangsan	Lisi
$e_{\mathsf{move.away}}$ (*ban-zou*)	Lisi	Diannao 'the computer'

Table 3: Thematic roles in (110)

To model that affectedness can be compositionally passed up the verbal spine, let us first assume Pylkkänen's (2008) analysis of causatives. We represent the meaning of an active sentence like (113) with a causative embedding verb as (114).

(113) Zhangsan jiao Lisi ban-zou-le diannao.
Zhangsan ask Lisi move-away-PERF computer
'Zhangsan asked Lisi to move the computer.'

(114) $\exists e \exists e'.\mathsf{ask}(e) \wedge \mathsf{ag}(e) = \mathsf{zs} \wedge \mathsf{cause}(e, e') \wedge \mathsf{ag}(e') = \mathsf{ls} \wedge \mathsf{move\text{-}away}(e') \wedge \mathsf{th}(e') = \iota x.\mathsf{cpt}(x)$

If we further develop an algorithm to transmit affectedness across events introduced by directive predicates, then it is possible to link the surface subject as a strong affectee to the gap, which is also a strong affectee. The precise formulation of such an algorithm requires systematic investigation of how causation and affectedness are compositionally assembled in natural language and is beyond the scope of the present paper. However, as a starting point, we suggest the following inference rule for allowing the linking of the surface subject of a *bei*-passive and a gap via an affectedness chain across verbal predicates.

(115) Cumulativity of affectedness:
For any event e_1 and e_2, and any individual x and y, if x is an $\mathsf{affectee}_{\mathsf{str}}$ of e_1 and the agent/causer of e_2, and y an affectee of e_2, then x is an agent of and y an $\mathsf{affectee}_{\mathsf{str}}$ of the summed event $e_1 + e_2$.

An inference rule like this is best understood in terms of restructuring, in the sense of Wurmbrand (2001) and related studies. The restructuring is semantically motivated to form a causative-affectedness chain. Since only causative verbs can form a causative-affectedness chain, this explains why this type of causative restructuring is restricted to directive verbs, which have a causative meaning in their core. Attitude verbs like *xiangxin* 'believe' lack a causative meaning and hence do not participate in restructuring. For this reason, no causative-affectedness chain can be formed across clauses selected by attitude predicates. Importantly, if restructuring has indeed applied, it

would also mean that there is no need to posit A′-movement in long *bei*-passives (contra Feng 1995; Huang 1999; Liu 2016). This allows for a unified treatment of short and long passives.

4.4 Gapless adversative passives

It is generally assumed that in a *bei*-passive, the external argument, if present, is part of the passive predicate. In other words, *Lisi*, the external argument of the verb *chi* 'eat', is the actual subject, rather than an oblique subject, of the lower clause, enclosed in a pair of square brackets in (116).

(116) na-ge xigua **bei** [Lisi **chi**-le _____].
that-CL watermelon PASS Lisi eat-PERF.
'That watermelon was eaten by Lisi.'

Unlike English *be*-passives, which must involve a gap following a transitive verb, *bei*-passives may not involve any gap in the lower clause, as demonstrated by the following examples:

(117) Jianyu bei [fanren taozou-le].
Prison PASS inmate run.away-PERF
'The prison was affected by the inmates because of their running away from it.'

(118) Lisi bei [Wangwu jichu-le yi-ji quanleida].
Lisi PASS Wangwu hit-PERF one-CL home.run
'Lisi was affected by Wangwu because of his hitting a home run on him.'

In (117), the lower clause has an intransitive verb *taozou* 'run away'. The passive subject *jianyu* 'the prison' does not arise as an internal argument of the verb due to its intransitive nature. Similarly, in (118), the passive subject *Lisi* cannot arise as the internal argument of the transitive verb as the internal argument is realized by the indefinite noun phrase *yi ji quanleida* 'a home run'.

Without a gap, how should we understand the relationship between the the passive subject and the lower predicate? Scholars like Huang (1999), Liu (2016) and Pylkkänen (2008) argue that gapless passives in fact involve an affected argument, introduced either by an applicative head in the form of a malfactive (Pylkkänen 2008) or by a Voice head in the form of an experiencer or affectee (Huang 1999; Liu 2016). The affectedness treatment is motivated by the observation that gapless passives must involve some form of affectedness with the subject adversely affected by the event denoted by the lower predicate.

If our analysis is on the right track, the strong affectedness component proposed for gapped *bei*-passives can be naturally extended to capture the affectedness requirement of gapless passives. We do not provide a concrete extension in this article but note that an exention would look similar to the extension involved in intention transmission predicates. This is because gapless passives require their affectee subjects and lower subjects to both be animate (or institutional) (see Shibatani 1985, 1988; Lin 2015).

4.5 Cross-linguistic extension of affectedness in passives

What we have shown so far is that Mandarin *bei*-passives involve strong affectedness, which explains why they require semantic licensing. However, it is worth asking whether affectedness in passives is a language-specific property of Mandarin or a general property shared by passives

across languages. This question requires in-depth typological research that is beyond the scope of this paper, but we would like to get the discussion started here by highlighting some relevant observations in the literature that point to a nuanced but affirmative answer.

Empirically, as briefly reviewed in the introduction section, passives in many languages show sensitivity to animacy, perfect, and telicity. For example, Bolinger (1977) observes a contrast in (119-a) and (119-b), which he attributes to the need for the theme argument of a regular *be*-passive to be affected by the agent argument. Since *the stranger* in (119-b) denotes a human, who has intentions that can be recognized by the animate theme argument, the theme is affected as long as the individual it denotes recognizes those intentions. The same cannot be said if the theme denotes an individual being approached by a non-intention-bearing individual, like the train in (119-a). Contrasts like this should remind us of the role of intention transmission, which is a factor relevant for determining passive formation in Mandarin.

(119) a. *I was approached by the train.
b. I was approached by the stranger. (Bolinger, 1977, 68)

That related meaning constraints show up in passives in both Mandarin and English should not be taken lightly, for two reasons. First, Mandarin and English belong to different language families and are typologically quite distinct (Huang 2014). If affectedness sensitivity is found in the passives in both languages, there is a much bigger chance that it is a cross-linguistically stable property of passives. Second, while passives are subject to robust semantic constraints in Mandarin, they are seemingly less so in English, at least with *be*-passives. For this reason, it is theoretically highly informative if it turns out that affectedness is a relevant notion in characterizing permissive passives like *be*-passives.

To understand these affectedness-like meaning constraints in passives, it seems desirable to consider the possibility that the surface subject position of a passive sentence is not as semantically empty as generative linguists used to think, not just in Mandarin, but also in many other languages.

Giving semantic content to the passive subject position is compatible with most contemporary approaches to argument structure. In the Kratzerian approach, external arguments are introduced by a *voice* category, which may optionally bear semantic content, like agency or causation (Kratzer 1995; Pylkkänen 2008). Although affectedness is usually understood as a property of a subset of theme arguments, there is no reason why it cannot be associated with the *voice* category. In fact, it is suggested in Kratzer (2000) that *voice* category can host an EXPERIENCER or POSSESSOR when the predicate is stative. In Alexiadou and Anagnostopoulou (2004), it is argued that *voice* may realize a meaning similar to BECOME or RESULT in passives or anticausatives. If the conclusion from these studies is on the right track, then the meaning of the subject position, i.e., the position introduced by *voice*, is likely dependent on the meaning of the predicate. In fact, one may even argue that passive formation is a way to ensure that the theme argument receives additional affectedness meaning dependent on the meaning of the predicate, much like the idea of allosemy in Distributed Morphology (Anagnostopoulou and Samioti 2011; Marantz 2013). Lastly, this idea also goes well with the constructivist approach to argument structure, in which an argument may accumulate more semantic properties as it 'rolls up' the verbal spine (Halle and Marantz 1993; Ramchand 2008, a.o.). The additional semantic properties for passives may as well be affectedness, as argued in this study.

If one indeed pursues an affectedness approach to analyze passives in natural language, then

there are two hypotheses to consider:

(120) Uniform (strong) affectedness hypothesis
Passives in all natural languages require a certain level of affectedness, say, strong affectedness. Languages may differ in how to satisfy strong affectedness.

(121) Variable affectedness hypothesis
Passives in all natural languages require some form of affectedness or other. The strength of the affectedness required is language-specific or construction-specific.

The uniform hypothesis would make all languages like Mandarin, in requiring strong affectedness in all of their passives. This may seem like a non-starter, as it leaves to be explained why languages seem to differ on the permissiveness of their passives. For example, while many transitive stative predicates can undergo passive formation in English, it is generally not the case in Mandarin, even with the help of the experiential perfect marker *-guo*.

(122) The story is liked by many.

(123) ??Zhe-ge gushi bei henduo ren xihuan-guo.
this-CL story PASS many people like-EXP
Intended 'The story is liked by many people.'

It is not impossible to solve the dilemma by appealing to other factors. For one thing, it is known that English is tolerant of aspectual coercion. It is possible that English just resorts to aspect coercion to coerce a result state for statives. To pursue this line of reasoning, one would need to explain when coercion is available and when it is not. Alternatively, one can also tap into the distinctions in the perfect aspects in the two languages. It is quite possible that the passive-perfect morphology *-en* in English bears a meaning that is different from *-guo* in Mandarin.

The variable affectedness hypothesis is weaker than the uniform affectedness hypothesis (without aspectual coercion), as it allows passives to vary in how much affectedness they require. This is readily compatible with the view, due to Beavers (2011) and discussed in section 3, that affectedness is gradient in nature. If passives incorporates the gradient nature of affectedness, then it leads to the expectation that passives are also a gradient notion.

Gradation in passives has the potential to explain an interesting phenomenon, namely, that many languages have more than one type of passive construction. For example, English has at least two types of verbal passives, *be*-passives and *get*-passives (Haegeman 1985; Fox and Grodzinsky 1998; Biggs and Embick 2020, a.o.). Extant research suggests that these two passives differ in *dynamicity* (Biggs and Embick 2020). For example, (124-a) requires that the house underwent a change of state, from not being hidden to being hidden, whereas the change of state is not necessary in (124-b). Citing contrasts like this, Biggs and Embick (2020) argue that *get*-passives have an additional event indicating causation and change. Since any change can be measured on a theme argument, we can re-interpret this to mean that *get*-passives require a higher level of affectedness on its subject argument than *be*-passives.

(124) a. The house got hidden.
b. The house was hidden.

This difference in the level of affectedness should presumably explain the contrast in (125):

since being followed by hikers does not involve a high enough level of affectedness, the relevant predicate can undergo *be*-passive formation but not *get*-passive formation.

(125) a. *The North Star got followed by hikers.
b. The North Star was followed by hikers.

What exactly the right levels of affectedness should be used to characterize the differences in *be*-passives and *get*-passives would have to await future research. The levels of affectendess in the Affectedness Hierarchy will likely need to be enriched and refined for understanding affectedness in passives. However, the affectedness framework offers a unified way of understanding these differences, which is impossible in a purely syntactic approach. If the affectedness approach is successful, we have the benefit of reuniting many passives that do not look like English *be*-passives under the same semantic rubric of affectedness.[17]

5 Conclusion

In this paper, we have investigated the semantic requirements on theme argument in the subject position of *bei*-passive sentences in Mandarin. Taking cues from the telicity interactions in passives, we conclude that the semantic requirements should be understood as strong affectedness, modeled as quantized change in the Affectedness Hierarchy of Beavers (2011). We have shown how a generalized understanding of strong affectedness can be extended to account for the roles of intention transmission and the experiential perfect aspect in facilitating passive formation. We also suggest how the affectedness approach can be extended for understanding the similarities and differences of passives across languages.

References

Alexiadou, A. and E. Anagnostopoulou (2004). Voice morphology in the causative-inchoative alternation: Evidence for a non-unified structural analysis of unaccusatives. In A. Alexiadou, E. Anagnostopoulou, and M. Evereart (Eds.), *The Unaccusativity Puzzle: Explorations of the Syntax-Lexicon Interface*, pp. 114–136. Oxford: Oxford University Press.

Alexiadou, A. and F. Schäfer (Eds.) (2013). *Non-canonical passives*. John Benjamins Publishing Company.

Anagnostopoulou, E. and Y. Samioti (2011). Idiomatic meaning and the structure of participles. In *Selected Papers from the 19th ISTAL*.

arta Abrus´ an, M. (2014). *Weak Island Semantics*. Oxford: Oxford University Press.

Baker, M., K. Johnson, and I. Roberts (1989). Passive arguments raised. *Linguistic Inquiry 20*(2), 219–251.

Beavers, J. (2011). On affectedness. *Natural Language and Linguistic Theory 29*(2), 335–370.

[17] That said, the affectedness approach also faces an important limitation, namely, it is unable to extend to impersonal passives, whose surface subject is athematic (Perlmutter 1978) and the aspectual property atelic (Primus 2011).

Beavers, J. (2013). Aspectual classes and scales of change. *Linguistics 51*(4), 681–706.

Beedham, C. (1987). The English passive as an aspect. *Word 38*, 1–12.

Biggs, A. and D. Embick (2020). On the event-structural properties of the English *get*-passives. *Linguistic Inquiry 53*, 211–254.

Bolinger, D. (1977). Passive and spatiality: the passive of prepositional verbs. In A. Makkai, V. B. Makkai, and L. Heilmann (Eds.), *Linguistics at the Crossroads*, Lake Bluff. Jupiter Press.

Borer, H. (1998). Deriving passives without theta roles. In D. K. Lapointe, Steven G. Brentari and P. M. Farrell (Eds.), *Morphology and its relation to Phonology and Syntax*, pp. 60–99.

Borer, H. (2005). *The Normal course of events*, Volume Volume II of *Structuring sense*. Oxford University Press.

Bruening, B. (2015). The nature of the passive, with an analysis of Vietnamese. *Lingua 165*, 133–172.

Burzio, L. (1986). *Italian Syntax*. Reidel Publishers.

Chao, Y. R. (1968). *A Grammar of Spoken Chinese.* Berkeley: University of California Press.

Chappell, H. (2001). The experiential perfect as an evidential marker in Sinitic languages. working paper or preprint.

Chomsky, N. (1957). *Syntactic structures*. Mouton.

Cinque, G. (1990). *Types of A′-dependencies*. Cambridge, Massachusetts: MIT Press.

Collins, C. (2005). A smuggling approach to the passive in English. *Syntax 8*(2), 81–120.

de Hoop, H. (2015). Against affectedness. In P. de Swart and L. Hogeweg (Eds.), *Addenda. Artikelen voor Ad Foolen*, Nijmegen: Radboud University, pp. 169–176.

de Swart, P. and H. de Hoop (2018). Shifting animacy. *Theoretical Linguistics 44*, 1–23.

Deng, X., Z. Mai, and V. Yip (2018). An aspectual account of *ba* and *bei* constructions in child Mandarin. *First Language 38*, 243–262.

Dowty, D. R. (1979). *Word meaning and Montague grammar*, Volume 7. Dordrecht, The Netherlands: Kluwer Academic Publishers.

Feng, S. (1995). The passive construction in Chinese. *Studies in Chinese Linguistics 1*, 1–28.

Ferreira, F. (1994). Choice of passive voice is affected by verb type and animacy. *Journal of Memory and Language 33*, 715–736.

Fillmore, C. (1970). The grammar of *hitting* and *breaking*. In R. Jacobs and P. S. Rosenbaum (Eds.), *Readings in English transformational grammar*, Waltham, pp. 120–133. Ginn.

Fleischhauer, J. (2018). Animacy and affectedness in Germanic. *Open Linguistics 4*, 566–588.

Fox, D. and Y. Grodzinsky (1998). Children's passive: A view from the 'by'-phrase. *Linguistic Inquiry 29*(2), 311–332.

Gehrke, B. and N. Grillo (2009). How to become passive? In *Explorations of Phase Theory*.

Grice, H. P. (1957). Meaning. *Philosophical Review 66*, 377–388.

Haegeman, L. (1985). The *get*-passive and Burzio's generalization. *Lingua 66*, 53–77.

Halle, M. and A. Marantz (1993). Distributed morphology and the pieces of inflection. In K. Hale and S. J. Keyser (Eds.), *The View from Building 20*, pp. 111–176. Cambridge, Massachusetts: MIT Press.

Harris, M. (1978). Noun animacy and the passive voice: A developmental approach. *Quarterly Journal of Experimental Psychology 30*, 495–504.

Hay, J., C. Kennedy, and B. Levin (1999). Scale structure underlies telicity in 'degree achievements'. In T. Matthews and D. Strolovitch (Eds.), *Proceedings of Semantics and Linguistic Theory 9*, Ithaca, NY, pp. 127–144. CLC Publications.

Her, O.-S. (2009). Unifying the long passive and the short passive: On the *bei* construction in Taiwan Mandarin. *Language and Linguistics 10*, 421–470.

Hill, N. W. (2017). *Perfect experiential constructions: the inferential semantics of direct evidence*, pp. 131–160. Berlin, Boston: De Gruyter Mouton.

Hirschberg, C. (2022). *The argument structure of Mandarin bei-passives*. B.a. thesis, UC, Santa Cruz.

Hopper, P. J. and S. A. Thompson (1980). Transitivity in grammar and discourse. *Language 56*, 251–299.

Huang, C.-T., Y.-H. A. Li, and Y. Li (2009). *The Syntax of Chinese*. Cambridge: Cambridge University Press.

Huang, C.-T. J. (1997). On lexical structure and syntactic projection. *Chinese Languages and Linguistics 3*, 45–89.

Huang, C.-T. J. (1999). Chinese passives in comparative perspective. *Tsing Hua Journal of Chinese Studies 29*, 423–509.

Huang, C.-T. J. (2014). On syntactic analyticity and parametric theory. In A. Li, A. Simpson, and W.-T. D. Tsai (Eds.), *Chinese syntax in a cross-linguistic perspective*, Volume Oxford Studies in Comparative Syntax. Oxford University Press.

Jackendoff, R. (1990). *Semantic structures*. Cambridge, Mass.: MIT Press.

Keenan, E. L. (1985). Passive in the world's languages. In *Language typology and syntactic description*, Volume 3, Cambridge, pp. 243–281. Cambridge University Press.

Keenan, E. L. and M. S. Dryer (2007). Passive in the world's languages. In T. Shopen (Ed.), *Language typology and syntactic description*, Cambridge, pp. 325–361. Cambridge University Press.

Kennedy, C. (1997). *Projecting the Adjective: The Syntax and Semantics of Gradability and Comparison*. Ph. D. thesis, University of California, Santa Cruz, Santa Cruz.

Kennedy, C. (2012). The composition of incremental change. In V. Demonte and L. McNally (Eds.), *Telicity, change, and state: a cross-categorial view of event structure*, New York, pp. 103–121. Oxford University Press.

Kennedy, C. and B. Levin (2008). Measure of change: The adjectival core of degree achievements. In L. McNally and C. Kennedy (Eds.), *Adjectives and Adverbs*, pp. 156–182. Oxford: Oxford University Press.

Kennedy, C. and L. McNally (2005). Scale structure, degree modification, and the semantics of gradable predicates. *Language 81*(2), 345–381.

Kimurai, H. (1997). The semantic properties of the chinese passive sentence and their syntactic reflections. *Cahiers de Linguistique Asie Orientale 26*, 21–35.

Kratzer, A. (1995). Stage-level and individual-level predicates. In G. N. Carlson and F. J. Pelletier (Eds.), *The Generic Book*, pp. 125–175. Chicago: The University of Chicago Press.

Kratzer, A. (1996). Severing the external argument from its verb. In J. Rooryck and L. Zaring (Eds.), *Phrase Structure and the Lexicon*, pp. 109–137. Dordrecht, The Netherlands: Kluwer Academic Publishers.

Kratzer, A. (2000). Building statives. In L. J. Conathan (Ed.), *Proceedings of the 26th Annual Meeting of the Berkeley Linguistics Society: General session and parasession on Aspect*. Berkeley Linguistics Society.

Krifka, M. (1989). Nominal reference, temporal constitution and quantification in event semantics. In R. Bartsh, J. Van Benthem, and P. van Emde Boas (Eds.), *Semantics and Contextual Expression*, Dordrecht, Netherlands, pp. 75–115. Foris.

Krifka, M. (1998). The origins of telicity. In S. Rothstein (Ed.), *Events and Grammar*, pp. 197–236. Dordrecht: Kluwer Academic Publishers.

Lai, Y.-Y., C. Lacadie, T. Constable, A. Deo, and M. M. Piñango (2017). Complement coercion as the processing of aspectual verbs: evidence from self-paced reading and fMRI. In W. Y. Hampton, J. (Ed.), *Compositionality and Concepts in Linguistics and Psychology*, Volume Volume 3 of *Language, Cognition, and Mind*, https://doi.org/10.1007/978-3-319-45977-6_8.*Springer.*

Landman, F. (1992). The progressive. *Natural Language Semantics 1*(1), 1–32.

Lempert, H. (1989). Animacy constraints on preschool children's acquisition of syntax. *Child Development 60*, 237–245.

Lempert, H. (1990). Acquisition of passives: the role of patient animacy, salience, and lexical accessibility. *Journal of Child Language 17*, 677–696.

Levin, B. and M. R. Hovav (1995). *Unaccusativity*. Cambridge, Massachusetts: MIT Press.

Li, A. Y.-H. (2014). Thematic hierarchy and derivational economy. *Language and Linguistics 15*, 295–339.

Li, Y. (1990). On V-V compounds in Chinese. *Natural Language and Linguistic Theory 8*(2), 177–207.

Lin, J.-W. (2003). Temporal reference in Mandarin Chinese. *Journal of East Asian Linguistics 12*(3), 259–311.

Lin, T.-H. J. (2001). *Light Verb Syntax and the Theory of Phrase Structure*. Ph. D. thesis, University of California, Irvine, Irvine, CA.

Lin, T.-H. J. (2009). Licensing "gapless" *bei* passives. *Journal of East Asian Linguistics 18*(2), 167–177.

Lin, T.-H. J. (2015). Gapless *bei* passives licensed by accomplishment events. *Journal of East Asian Linguistics 24*, 193–215.

Liu, N. (2012). *On the syntax, semantics, and typology of non-canonical passives*. Ph. D. thesis, Beijing Language and Culture University, Beijing.

Liu, N. (2016). The structures of Chinese long and short *bei*-passives revisited. *Language and Linguistics 17*, 1–34.

MacDonald, M. C. (2013). How language production shapes language form and comprehension. *Frontiers in Psychology 4*.

Marantz, A. (1984). *On the Nature of Grammatical Relations*. Cambridge, Massachusetts: MIT Press.

Marantz, A. (2013). Locality contextual allomorphy across the interfaces. In *Distributed Morphology Today: Morphemes for Morris Halle*, pp. 95–115. The MIT Press.

Pan, H. and X. Hu (2021). The passive construction in Chinese. In *Oxford Research Encyclopedia of Linguistics*. Oxford University Press.

Pan, H. and P. P.-l. Lee (2004). The role of pragmatics in interpreting the Chinese perfective markers *-guo* and -le. *Journal of Pragmatics 36*, 441–466.

Peck, J., J. Lin, and C. Sun (2013). Aspectual classification of Mandarin Chinese verbs: A perspective of scale structure. *Language and Linguistics 14*, 663–700.

Perlmutter, D. (1978). Impersonal passives and the unaccusative hypothesis. In *Berkeley Linguistic Society*, Volume IV, pp. 157–189. University of California, Berkeley.

Primus, B. (2011). Animacy and telicity: Semantic constraints on impersonal passives. *Lingua 121*, 80–99.

Pylkkänen, L. (2008). *Introducing Arguments*. Cambridge, Massachusetts: MIT Press.

Ramchand, G. C. (2008). *Verb Meaning and the Lexicon*. Cambridge Studies in Linguistics. Cambridge, United Kingdom: Cambridge University Press.

Rappaport Hovav, M. and B. Levin (1998). Building verb meanings. In M. Butt and W. Geuder (Eds.), *The projection of arguments: Lexical and compositional factors*, pp. 97–134. CSLI Publications.

Rappaport Hovav, M. and B. Levin (2010). Reflections on manner/result complementarity. In E. Doron, M. Rappaport Hovav, and I. Sichel (Eds.), *Syntax, lexical semantics, and event structure*, Oxford, pp. 21–38. Oxford University Press.

Shi, D. and J. Hu (2005). The syntactic status of "*bei*". *Dangdai Yuyanxue [Contemporary Linguistics] 7*, 213–224.

Shibatani, M. (1985). Passives and related constructions: a prototype analysis. *Language 61*(4), 821–848.

Shibatani, M. (1988). Introduction. In M. Shibatani (Ed.), *Passive and voice*, Amsterdam and Philadelphia, pp. 1–8. John Benjamins Publishing Company.

Siewierska, A. (2013). Passive constructions. In D. Matthew and M. Haspelmath (Eds.), *WALS Online*, (Available online at http://wals.info/chapter/107.). https://doi.org/10.5281/zenodo.7385533.

Smith, C. S. (1990). Event types in mandarin. *Linguistics 28*(2), 309–336.

Smith, C. S. (1994). Aspectual viewpoint and situation type in mandarin chinese. *Journal of East Asian Linguistics 3*(2), 107–146.

Swart, H. d. (1998). Aspect shift and coercion. *Natural Language and Linguistic Theory 16*(2), 347–385.

Tang, S.-W. (2004). Ergativization and Chinese passives. *Zhongguo Yuwen [Studies of the Chinese Languages] 301*, 291–301.

Tang, S.-W. (2008). Syntactic analysis of Chinese passives. *Dangdai Yuyanxue [Contemporary Linguistics] 10*, 308–319.

Tommola, H. (2000). *On the perfect in North Slavic*, pp. 441–478. Berlin, New York: De Gruyter Mouton.

Truswell, R. (2007). Extraction from adjuncts and the structure of events. *Lingua 8*, 1355–1377.

Vendler, Z. (1967). *Linguistics in Philosophy*. Ithaca: Cornell University Press.

Wanner, A. (2009). *Deconstructing the English passive*. Berlin and New York: Mouton de Gruyter.

Wu, J.-S. (2005). The semantics of the perfective *LE* and its context-dependency: An SDRT approach. *Journal of East Asian Linguistics 14*(4), 299–336.

Wu, J.-S. (2008). Terminability, wholeness and semantics of experiential *guo*. *Journal of East Asian Linguistics 17*(1), 1–32.

Wurmbrand, S. (2001). *Infinitives: Restructuring and clause structure*. Mouton de Gruyter.

Xiao, R., T. McEnery, and Y. Quian (2006). Passive constructions in English and Chinese. *Languages in Contrast 6*, 109–149.

Yeh, M. (1996). An analysis of the experiential Guo_{EXP} in Mandarin: A temporal quantifier. *Journal of East Asian Linguistics 5*(2), 151–182.

Zhang, N. N. (2018). Non-canonical objects as event kind-classifying elements. *Natural Language and Linguistic Theory 36*, 1395–1437.