

Grammatical versus pragmatic accounts for event non-culmination in Mandarin: An experimental study

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1 Introduction

As is well known, the telicity of a verbal predicate compositionally depends on the choice of the verb and the choice of the direct object (Verkuyl 1972, Dowty 1979, Tenny 1994, Krifka 1989, 1998, among others). For a verbal predicate to be telic, it is necessary that the predicate be composed of a verb that can hold a particular relation with its object, i.e., the so-called “incremental-theme verbs” (Dowty 1979, Krifka 1989, 1998, e.g., *eat* and *build*). Incremental-theme verbs combine with their objects in such a way that, if the object has some information about quantity, i.e., being “quantized” (Krifka 1989, 1998), it can “measure the event” (Tenny 1994) and determine its natural end point. For example, in (1a), the incremental-theme verb *eat* takes a quantized direct object *three cookies*, and creates a telic predicate which describes a cookie-eating event with an inherent endpoint, i.e., the event ends when all three cookies are eaten. Therefore, denying the completion of the event is typically infelicitous.

- (1) a. #She ate three cookies, but she didn’t finish eating them.

However, the standard description of telic predicates has been challenged for Mandarin (Tai 1984, Lin 2004, Soh 2009, Koenig & Lian-Cheng 2008, Zhang 2018, 2020, Martin 2019, among others). Many researchers point out that Mandarin allows a supposedly telic predicate (hereafter referred to as “telic predicate”) combined with the perfective marker *le* to describe an incomplete event which ends without reaching its inherent endpoint (Tai 1984, Lin 2004, Soh 2009, Koenig & Lian-Cheng 2008, Zhang 2018, 2020, Martin 2019, among others). It should be noted that the perfective marker is obligatory, if one does not want a generic interpretation. As shown in (2), denying the completion of the event is often considered felicitous. This phenomenon is known as “non-culmination” (Bar-el *et al.* 2005), or the “incompleteness effect” (Koenig & Lian-Cheng 2008).

- (2) *Ta chi-le san-kuai binggan, keshi mei chi-wan.*
3SG eat-LE three-CL cookie, but NEG eat-finish

Lit: ‘She ate three cookies, but she didn’t finish eating them.’

The non-culmination phenomenon raises a significant question: should theories that assume telic predicates categorically build culminating events when the proper tense/aspect markers are present be discarded and replaced for certain languages (henceforth, the “semantics account”)? Or should we retain this core idea, while incorporating mechanisms to account for the “unexpected” interpretations—whether

through pragmatic accommodation tied to specific linguistic elements or in a more general way (henceforth, the “pragmatic account”)?

The semantic account, argues for a fundamental difference in the aspectual or verbal systems of English and Mandarin, proposing different semantics either for the incremental-theme verbs (Tai 1984, Lin 2004, Koenig & Lian-Cheng 2008, among others) or the perfective aspect *le* (Smith 1997, Martin 2019, Martin *et al.* 2021, among others) in Mandarin. The alternative pragmatic account assumes no fundamental difference between the lexical semantics of incremental-theme verbs or the way these verbs combine with their direct objects in the two languages. Instead, differences in judgments arise from varying factors that trigger different degrees or types of pragmatic accommodation (Xu & Schmitt to appear). The present study argues against the semantic account and provides supporting evidence for the pragmatic account using experimental data. To adjudicate between these two views, we offer a fine-grained examination of the aspectual interpretation of incremental-theme predicates in Mandarin adults, controlling for verb-type, determiner-type of the direct object, and presence vs. absence of perfective *le*. Our findings show no radical differences between English and Mandarin incremental-theme verbs, and no significant role for perfective *le*. Moreover, we observe a determiner-type difference (replicating previous findings from Xu & Schmitt (to appear)), suggesting that demonstratives may trigger pragmatic accommodation, leading to acceptance of telic descriptions of incomplete situations.

2 Previous semantic accounts

It is generally assumed that the non-culmination phenomenon in Mandarin indicates a fundamental difference between the aspectual or verbal systems of English and Mandarin. Various accounts have been proposed to identify the grammatical source of this difference; however, no consensus has been reached regarding its locus. Proposed sources include verb semantics (Tai 1984, Lin 2004, Koenig & Lian-Cheng 2008, among others), the perfective marker *le* (Smith 1997, Martin 2019, Martin *et al.* 2021), or the referential properties of the direct object (Soh & Kuo 2005). In this paper, we will focus on the first two perspectives—verb semantics and verbal *le*—as the primary sources of non-culmination, representing the two main camps in this debate.¹

2.1 Verb semantics as the source of non-culmination

One line of research locates the source non-culmination in Mandarin in the verb semantics (Tai 1984, Lin 2004, Koenig & Lian-Cheng 2008, among others). It is

¹Both camps adopt a unified approach to the non-culmination phenomenon associated with both incremental-theme verbs and non-incremental change-of-state verbs (such as *sha* ‘kill’ in (1)). In this paper, we will only focus on non-culmination in telic incremental-theme predicates.

- (1) *Jingke sha-le Qin-wang, keshi Qin-wang mei si.*
Jingke kill-LE Qin-king, but Qin-king NEG die
Lit: ‘Jingke killed the king of Qin, but the king of Qin did not die.’

argued that Mandarin monomorphemic verbs are activity or manner verbs which do not encode a result component and therefore do not entail event culmination, regardless of the properties of the direct object.

Using the scalar theory, Koenig & Lian-Cheng (2008) argue that, in Mandarin, sentences with “state-change stem verbs” (including the incremental-theme verbs such as *read* and *eat*) describe events with degree changes that fall within a range of $d_0 < d \leq d_N$ (with d_N representing the normative degree, i.e., the expected or standard level of completion for an event). In contrast, in languages like English, the corresponding sentences require the degree change to equal d_N , meaning the event must fully culminate at the normative degree.

These authors also claim that Mandarin VPs only entail culmination when combined with a resultative morpheme, which is analyzed as a telicization marker (Gu 2022), as shown in the contrast between sentences (2) and (3).

- (3) #*Ta chi-diao-le san-kuai binggan, keshi mei chi-wan.*
 3SG eat-drop-LE three-LE cookie, but NEG eat-finish
 Lit: ‘She ate up three cookies, but she didn’t finish eating them.’

2.2 Verbal *le* as the source of non-culmination

Another line of research attributes the source of non-culmination in Mandarin to verbal *le*, which is arguably analyzed as a perfective marker in the literature (Smith 1991, 1997, Klein *et al.* 2000, Xiao & McEnery 2004, among others).² Smith (1991, 1997) argues that verbal *le* marks only termination or an arbitrary final endpoint of an event after it starts. More recently, following Altshuler’s (2014) proposal for a typology of perfectivity, Martin (2019) (also Martin *et al.* 2021) argues that Mandarin verbal *le* is a weak perfective operator with a partitive meaning. Unlike the strong perfective operator (e.g. the null perfective operator in English), which takes a VP predicate as its argument and returns a set of intervals that include the complete eventuality (4a), the weak perfective operator only requires the event to reach a maximal stage by ceasing to develop, without necessarily reaching full completion (4b).

- (4) a. $\| PFV_{C+M} \| = \lambda P \exists e [MAX(e, P) \wedge P(e)]$ Strong perfective
 b. $\| PFV_M \| = \lambda P \exists e [MAX(e, P)]$ Weak perfective

According to Martin, the weak perfective operator only requires there to be a proper part of the event in the world of evaluation and does not specify how large this part should be. In other words, a telic description with verbal *le* can be true of

²The syntax and semantics of verbal *le* have long been of great interest to Chinese philologists and linguists and remain highly controversial. In most of the literature, verbal *le* is fundamentally analyzed as a perfective aspect marker. However, some scholars argue that verbal *le* is a resultative predicate (Sybesma 1997), or a quantity/telicity marker (Wang 2018). In addition, verbal *le* is often contrasted with sentential *le* (which occurs in the sentence-final position), commonly analyzed as a discourse marker encoding current relevance (Li & Thompson 1989). Despite these distinctions, some researchers propose that both versions of *le* are instances of the same morpheme, given their identical phonological form and shared change-of-state-related meaning (Shi 1990, Huang & Davis 1989, Wang 2021).

incomplete situations in which only a very small part of the entire VP event (e.g., 10%) has been realized.

To summarize, both the verb-based account and the partitive account make the strong prediction that an incremental-theme verb with a quantized direct object combined with verbal *le* should always be true in incomplete situations (e.g., the assertion in (2)). However, as some scholars have noted, non-culminating interpretations appear harder to achieve when the direct object is a numeral DP, compared to a demonstrative DP (Soh & Kuo 2005, Zhang 2018, 2020), suggesting that a pragmatic explanation may be more accurate. As we will show, our experimental results in both English and Mandarin confirm this observation.

3 Experimental evidence for the pragmatic account

In this section we summarize experimental results that show more variability in actual judgements in both languages than the descriptive and formal accounts would predict, if no pragmatic factors interfered. Participants often give non-categorical answers in assessing telic descriptions of incomplete events in both English (van Hout 1998, Ogiela 2007, Ogiela *et al.* 2014, Anderson 2017, van Hout *et al.* 2017, Patt *et al.* 2020, Xu & Schmitt to appear) and Mandarin (Chen 2006, 2008, 2017, van Hout *et al.* 2017, Liu 2018, Li 2019, Xu & Schmitt to appear). However, few studies specify which ingredients or contexts contribute to this non-categorical behavior and the comparisons are hard to make as many of these studies vary significantly across several dimensions, such as the types of verbs used, the determiners in the direct objects, the number of object items (singular vs. plural), and the degree of incompleteness in the situations.

Xu & Schmitt (to appear) established a baseline by testing English-speaking adults and Mandarin-speaking adults using identical methods.³ We tested English-speaking adults and Mandarin-speaking adults using a Truth-Value Judgment Task with the same verb-types, determiner-types, and videos across both languages. Specifically, we tested four incremental-theme verbs, including two consumption verbs ‘eat’ and ‘drink’ (Mandarin: *chi* ‘eat’ *he* ‘drink’), and two creation verbs ‘build’ and ‘draw’ (Mandarin: *zao* ‘build’ *hua* ‘draw’). Since Mandarin does not have a definite article equivalent to English *the*, demonstratives are used in Mandarin as they are considered to serve the function of both the demonstratives and the definite article in English (Chen 2004). Thus, we compared demonstratives (‘these’ and ‘those’) with the numeral ‘three’ in both English and Mandarin. Examples of experimental sentences in each language are given below. Each test sentence was paired with two videos: one showing a complete situation (e.g., a boy eating three cookies completely) and the other an incomplete situation (e.g., a girl eating two cookies completely and taking a bite from the third one).⁴ In each trial, participants watched the video, and judged whether the test sentence, uttered by the performer, was true or false based on the video.

³Xu & Schmitt also tested Mandarin-speaking children.

⁴Sentences with demonstrative DP objects in the complete situation are quite odd since the use of demonstratives in English implies two contrastive sets (Clark & Marshall 1981), e.g., the complete vs. incomplete sets, which are not available in the complete situations. Therefore, the English task did not test demonstratives with the complete situations.

- (5) a. **Mandarin**
Wo chi-le {na-ji-kuai, san-kuai} binggan.
 1SG eat-LE {that-how.many-CL, three-CL} cookie
 ‘I ate {those, three} cookies.’
- b. **English**
 I ate {those, three} cookies.

Both groups showed a determiner-type effect but no verb-type effect. In both English and Mandarin, participants rejected sentences with numerals but accepted those with demonstratives for the incomplete situations across verb-types (as shown in Fig.1). The overwhelming rejection of sentences with numeral direct objects in incomplete situations suggests that, like their English counterparts, Mandarin incremental-theme verbs are also sensitive to the quantity information of the direct object, contrary to the verb-based account predicts (Tai 1984, Lin 2004, Koenig & Lian-Cheng 2008). These findings also challenge the characterization of verbal *le* as a terminative marker (Smith 1991, 1997) or a partitive operator (Martin 2019), at least in sentences with a numeral direct object.

The high acceptance of sentences with demonstratives aligns with the findings by Ogiela (2007, also Ogiela *et al.* 2014) regarding the definite determiner in English adults. Following Ogiela, we attribute this to the contextual accommodation of the referent for the demonstrative DPs, which is not possible for the numeral DPs. Numeral DPs, such as ‘three cookies’, indicate a quantity quite explicitly. Therefore, sentences in (5) with a numeral direct object would always be rejected if the three cookies were not completely eaten. In contrast, demonstrative/definite DPs pick out the contextually relevant set of objects, allowing participants to interpret ‘those cookies’ as referring only to the two fully eaten cookies.

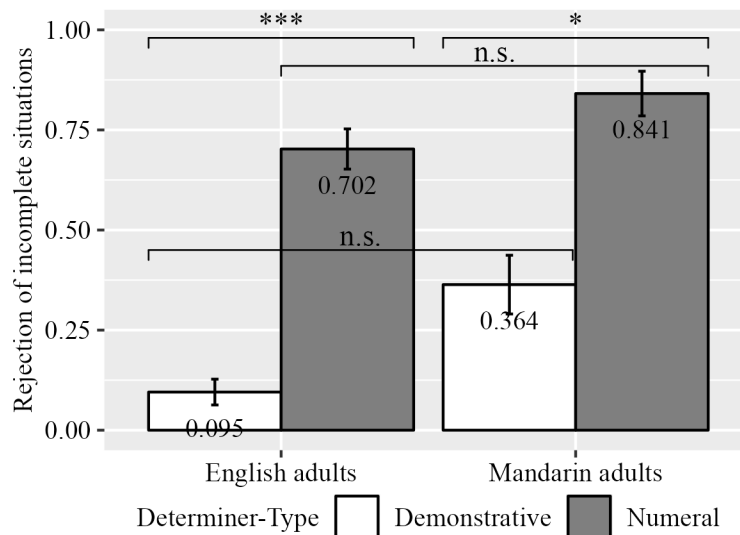


Figure 1: Mean rejection rates of incomplete situations by English and Mandarin adults in Xu & Schmitt (to appear)

These results argue against the traditional account that Mandarin is fundamentally different from English in the aspectual or verbal system, opening up a possibility for an identical treatment of both languages. However, in all previous studies examining event culmination in Mandarin (Chen 2006, 2008, 2017, van Hout *et al.* 2017, Liu 2018, Li 2019 and Xu & Schmitt to appear), verbal *le* is always present in the test sentences, making it hard to determine its exact role. In Xu & Schmitt's study, could verbal *le* function as partitive operator and elicit greater acceptance of incomplete situations with demonstratives? To answer this question, it is essential to compare sentences with and without verbal *le* within the same scenario to clarify its impact.

4 The current study

4.1 Setting the stage

The current study has two main objectives:

- (i) To test whether we can replicate Xu & Schmitt's (to appear) findings on Mandarin adults' judgments of telic descriptions of incomplete situations in a more complex situation, controlling for determiner-type and verb-type;
- (ii) To test the role of Mandarin verbal *le* in the verification of telic descriptions of incomplete event: does it behave like a terminative marker (as suggested by Smith (1991, 1997))/partitive operator (as suggested by Martin 2019)?

To examine the specific role of verbal *le*, it is necessary to set a baseline with test sentences without any aspect markers. However, in Mandarin sentences lacking aspectual inflection cannot stand alone, showing what is known as the "incompleteness effect" (Lu 1986, Tang & Lee 2000, Tsai 2008, among others), as in (6). The only way to interpret this type of sentences without the aspectual marker is to interpret them as generic statements, which would be inappropriate for what we are trying to test.

- (6) #*Wo chi san-kuai binggan.*
1SG eat three-CL cookie
Lit 'I ate/eat three cookies.'

Some researchers attribute the incompleteness effect to the lack of "tense anchoring" for the event (Tang & Lee 2000, Tsai 2008). One way to eliminate this incompleteness effect is by embedding the clause within a matrix clause which provides the tense temporal anchoring, as shown in (7). This biclausal context allows us to contrast the embedded clauses with and without *le*.

- (7) *Wo chi-(le) san-kuai binggan hou, jiu qu gan bie-de shi le.*
1SG eat-(LE) three-CL cookie after then go do other thing LE
'After I ate three cookies, I went to do something else.'

4.2 Methodology and participants

We adopted the same experimental method as in Xu & Schmitt (to appear): a Truth Value Judgement Task. Participants first watched a video clip showing either a com-

plete or an incomplete situation and were then asked to judge whether the test sentence with a telic incremental-theme predicate was true or false based on the video. The study was conducted online using the JATOS experiment platform. Participants were Mandarin-speaking adults living in Southeast China. They were randomly assigned to one of the between-subjects conditions (No LE Condition: $n = 21$; Verbal LE Condition: $n = 25$).

4.3 Design and materials

The same verbs (consumption verbs: *chi* ‘eat’ *he* ‘drink’; creation verbs: *zao* ‘build’ *hua* ‘draw’) and determiner-types (demonstratives *zhe* ‘this’ and *na* ‘that’ vs. numeral *san* ‘three’) as in Xu & Schmitt (to appear) were tested with and without verbal LE as between-subjects conditions in a biclausal context (see sample test sentences in (8)). The same visual stimuli as in Xu & Schmitt (to appear) was used (Fig.2) except that, after completing/discontinuing the first action, the video continued with the character performing another action (e.g., closing a curtain). The second event always matched what was being described by the sentence. Participants judged whether the test sentence was a true or false based on the video. Fillers were included in each trial at a ratio of 3:1.⁵

- (8) *Ta chi-{le, ∅} {na-ji-kuai, san-kuai} binggan hou, jiu qu gan
3SG eat-{LE, ∅} {that-how.many-CL, three-CL} cookie after then go do
bie-de shi le.
other thing LE
‘After she ate {those, three} cookies, she went to do something else.’*

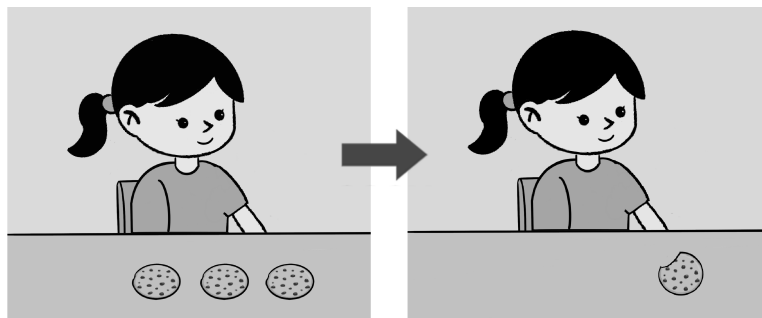


Figure 2: First and last scenes of a sample video of an incomplete situation.

4.4 Results

The rejection rates of the test sentences were analyzed across different conditions. For the **complete situations**, the rejection rates were very low in both the No LE Condition (1.2%) and Verbal LE Condition (2%), indicating near-ceiling performance. To examine the participants’ rejection of **incomplete situations**, we fitted

⁵The fillers served to enhance engagement and obscure the main test goals. They consist of three types: first, descriptions about a ladybug that consistently appears in all videos, providing a familiar and intriguing element for participants; second, background details, such as “there’s a basketball on the ground”; and third, action details, like “she used a crayon to paint.”

the data to several mixed-effects logistic regression models, incorporating varying combinations of predictors and random effects structures. The predictors included Verb-Type (Consumption vs. Creation Verbs, with Consumption Verbs as the referential level), Determiner-Type (Numeral vs. Demonstrative, with Numeral as the reference level), and LE-Type (No LE vs. Verbal LE, with No LE as the reference level). Random effects accounted for variability by Subject and Item. Upon evaluating the impact of including Verb-Type in the models, it was found that Verb-Type did not significantly improve model fit. Therefore, Verb-Type was removed from the final model.

The final model, which includes main effects of Determiner-Type and LE-Type, with Subject and Item as random effects, provides the best fit for the data (Model syntax: Response ~Determiner-Type + LE-Type + (1 + Determiner-Type + LE-Type | Individual) + (1 | Item)). Table 1 shows the parameter estimates of the main effects for the final model. The baseline rejection rate (for Numeral under the No LE Condition) is significantly greater than zero, indicating that items in baseline condition are likely to be rejected at a significant rate. The use of the **Demonstrative** leads to a significantly lower rejection rate of incomplete situations compared to the Numeral. However, **Verbal LE** does not show a significant impact towards rejection rates.

	Estimate	SE	z-value	p-value
(Intercept)	5.924	2.221	2.667	0.00766 **
Demonstrative	-7.084	2.208	-3.209	0.00133 **
Verbal LE	-3.720	2.221	-1.675	0.09390

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 1: Parameter estimates of the main effects from the best-fitted model

Fig.3 shows the mean rejection of incomplete situations by Determiner-Type and LE-Type. Table 2 presents pairwise contrasts between different conditions (with p -values adjusted by the Bonferroni correction), specifically comparing Numeral vs. Demonstrative for both the No LE Condition and the Verbal LE Condition, as well as comparing the presence or absence of verbal *le* for both Numeral and Demonstrative. Numeral consistently shows a higher rejection rate than Demonstrative. The presence of verbal *le* does not significantly impact the responses in either the Numeral or Demonstrative conditions individually. This is reflected by the non-significant results when comparing the No LE Condition vs. the Verbal LE Condition within each Determiner-Type.

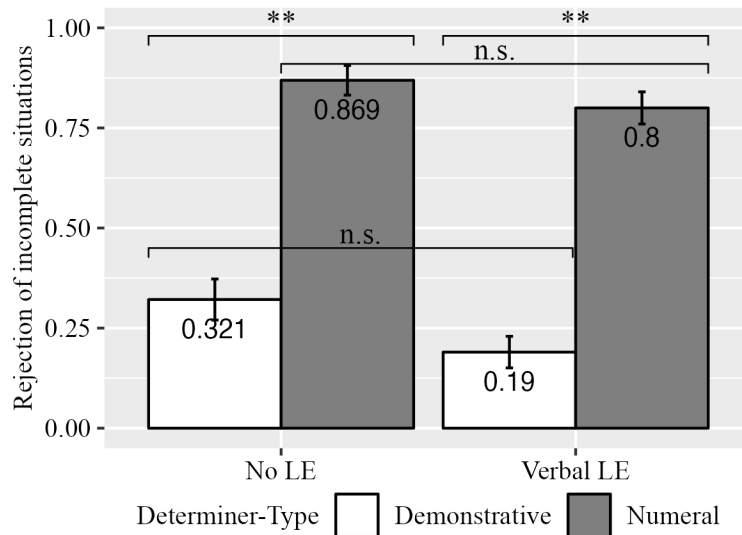


Figure 3: Mean rejection rates of incomplete situations by English and Mandarin adults

Condition	Contrast	Estimate	SE	z-value	p-value
No LE	Num. vs. Dem.	7.08	2.208	3.209	0.008**
Verbal LE	Num. vs. Dem.	7.08	2.208	3.209	0.008**
Numeral	No LE vs. Verbal LE	3.72	2.221	1.675	0.5634
Demonstrative	No LE vs. Verbal LE	3.72	2.221	1.675	0.5634

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 2: Estimated marginal means for key contrasts (p -values adjusted by the Bonferroni correction)

5 Discussion

Our results replicate the findings from Xu & Schmitt. We found the same determiner-type but no verb-type effect in our participants regardless of the presence or absence of verbal *le*. This provides evidence against the semantic accounts.

If Mandarin monomorphemic incremental-theme verbs are manner verbs that do not entail event culmination (much like *push*-type verbs) (Tai 1984, Lin 2004, Koenig & Lian-Cheng 2008) and this is the source of “non-culmination”, in principle, we would receive categorical acceptances for both demonstratives and numerals in descriptions of incomplete situations. However, this contradicts our current findings. The overwhelming rejection of sentences with numeral direct objects in incomplete situations suggests that, like their English counterparts, Mandarin incremental-theme verbs are also sensitive to the quantity information in direct objects. This provides evidence for the same verb semantics and the same mode of combination between the verb and its direct object in English and Mandarin.

If verbal *le* is a terminative marker (Smith 1991, 1997)/partitive operator (Martin 2019) and this is the source of “non-culmination”, sentences with verbal *le* should be accepted significantly more often than those without *le* as descriptions of incomplete situations. However, this is not what we found, either. Our results show that verbal *le* behaves more like a standard perfective marker (Klein *et al.* 2000), or the strong perfective operator in Altshuler (2014) and Martin (2019).

The possibility of an identical treatment of English and Mandarin incremental-theme predicates has been suggested by (Zhang 2018, 2020), although she assumes that there are two readings with numerals, which is incompatible with our results. Our study is the first one to provide empirical evidence supporting no fundamental difference between English and Mandarin in the aspectual calculus of incremental-theme predicates. We propose a pragmatic account, arguing that there is no intrinsic difference in the lexical semantics of incremental-theme verbs or how these verbs combine with direct objects in the two languages. Non-culmination, we suggest, can arise in both languages through pragmatic accommodation triggered by specific ingredients in the aspect calculus, particularly demonstrative DPs in this study. Unlike numeral DPs, such as ‘three cookies’, which indicate a specific quantity, demonstrative DPs pick out the relevant set of objects in the context. Therefore, when a character eats two and a half cookies, participants might reject the sentence with a numeral DP, as the three cookies are not fully eaten. However, with a demonstrative DP ‘those cookies’, participants might interpret the phrase as referring only to the two fully eaten cookies, leading them to judge the sentence as true. It remains to be examined whether different types of non-culmination (other than not finishing the third element in the set) trigger distinct types of accommodation, which would then strengthen the pragmatic account.

6 Conclusion

The present study provides a detailed examination of the aspectual interpretation of incremental-theme predicates in Mandarin adults. We find no radical differences between English and Mandarin incremental-theme verbs, nor any significant contribution from perfective *le*. We argue that non-culmination may arise in both languages through pragmatic accommodation triggered by specific aspectual elements as well as the context.

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