Pragmatic accommodation in judging event culmination*

Jingying Xu   Cristina Schmitt
Michigan State University   *Michigan State University*

Abstract

This study investigates Mandarin speakers' acceptability of telic descriptions for incomplete situations, focusing on the role of pragmatic accommodation. Previous research (Xu & Schmitt to appear a, to appear b) has shown that in judging event culmination, when two out three objects were fully consumed or created and the third object was partially affected (e.g., a girl eating two cookies and taking a bite from the third one), participants were able to restrict the domain of the definite/demonstrative DP (but not the noun phrases with the numeral three) to refer only to the fully consumed or created objects and, we argued, because of that, tended to accept the description as matching the event. In the present study, we examined a different type of (non)-culmination in which all objects were partially consumed or created (e.g., a girl taking a bite from each of three cookies/partially building three houses), a context where domain restriction of this type is not possible. Surprisingly, participants accepted sentences with both demonstrative and numeral direct objects as "good enough" descriptions of the event. These findings further challenge the idea of a general mechanism for the acceptance of telic descriptions in (non)-culminating situations, and instead support specific effects depending on how different ingredients of aspectual composition and visual context interact.

Keywords: Mandarin; telicity; non-culmination; incremental-theme predicates; pragmatic accommodation

1   Introduction

In the linguistics literature, there is a consensus that the description of the temporal contour of an event is semantically compositional: properties of the verb and properties of the object combine to build telic or atelic predicates, which are then modified by tense/aspectual markers in the clause, which may yield interpretative effects to the aspectual interpretation of the clause (Verkuyl 1972, 1993; Tenny 1987,

1994; Krifka 1989, 1998; Dowty 1991; Rothstein 2004; 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, an "incremental-theme relation" (Tenny 1987, 1994; Krifka 1989, 1998; Dowty 1991). Verbs such as *eat* and *build* are examples of this type of verb. If the object of an incremental-theme verb has some information about quantity (Verkuyl 1972, 1993), it can "measure the event" (Tenny 1994) and determine its logical end point. For example, in (1), the incremental-theme verb *eat* takes a quantized direct object *the cookies*, and creates a telic predicate which describes a complete cookie-eating event some time before now, i.e., the event ends sometime before now when all the relevant cookies in the context were eaten. Therefore, denying the completion of the event is typically considered infelicitous.

(1)   #She ate the cookies, but she didn't finish eating them.

However, the standard interpretation 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 telic predicate with the verb-final particle *le* (the so-called "verbal *le*"), arguably analyzed as a perfective marker in the literature (Smith 1991, 1997; Klein, Li & Hendriks 2000; Xiao & McEnery 2004; among others), to describe an incomplete event which ends without necessarily reaching its inherent endpoint (Tai 1984; Lin 2004; Soh 2009; Koenig & Lian-Cheng 2008; Martin 2019; among others). In other words, it seems that non-culmination of the event is not required for the proposition with a telic predicate to be considered true. As shown in (2), denying the completion of the event is often considered felicitous. This phenomenon, known as "non-culmination" (Bar-el, Davis & Matthewson 2005), or "incompleteness effect" (Koenig & Lian-Cheng 2008) is claimed to exist in other languages such as Hindi (Singh 1991, 1998) and Thai (Koenig & Muanwuwan 2000) as well.

(2)   *Ta   chi-le na-ji-kuai   binggan, keshi mei chi-wan.*
        3SG eat-LE that-how.many-CL cookie,   but   NEG eat-finish

        Lit: 'She ate those cookies, but she didn't finish eating them.'

It should be noted that in Mandarin, the perfective marker *le* is obligatory in simple clauses, if the predicate is not to be interpreted as a generic statement; furthermore, since Mandarin does not have a definite article equivalent to English *the*, demonstratives are often used in the Mandarin counterpart example sentences as they are considered to have a similar function to the definite article in English (Chen 2004). In other words the sentences in both languages are not identical.

To account for the source of non-culmination in Mandarin, one approach attributes non-culmination to the semantics of the verb itself (Tai 1984; Lin 2004;

Koenig & Lian-Cheng 2008). Mandarin mono-morphemic verbs would all be 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. Another approach argues that Mandarin verbs in the non-culminating interpretation are not fundamentally different from their English counterparts. Instead, non-culmination may arise from the perfective marker *le* (Smith 1991; Martin 2019; Martin, Sun, Liu & Demirdache 2021). Despite attributing non-culmination to different sources, both accounts argue for a fundamental difference in aspectual composition between English and Mandarin and therefore would predict systematic differences in interpretation that could be measured experimentally.

However, our previous experimental results (Xu & Schmitt to appear a, to appear b) in both languages provide supporting evidence against a fundamental difference between the lexical semantics of incremental-theme verbs or a special role for the particle *le* in Mandarin. Instead, we found that the acceptance of telic descriptions for incomplete situations is common in both languages and we argued that they arise when speakers accommodate a definite/demonstrative that may be violating the maximality presupposition. When two out three objects were fully consumed or created and the third object was partially affected (e.g., a girl eating two cookies and taking a bite from the third one), participants were able to restrict the domain of the definite/demonstrative DP (but not the numeral three) to refer only to the fully consumed or created objects and consequently could accept the proposition as a good description of what happened.

The present study further probes the accommodation account by changing the visual stimuli depicting different types of incompletion. We compare cases in which two and a half out of three objects are consumed/created (and where one could restrict the domain of a definite to a set of two), with cases in which all objects are partially consumed/created (e.g., a girl taking a bite from each of three cookies/partially building three bridges), which does not allow for domain restriction. in these cases, simply eliminating the partially consumed/created object out of the relevant set does not make the statement true. The differences in the results argue against a general accommodation account for all cases in which an incomplete situation is paired with a telic description. Different linguistic components will play different roles depending on the visual context.

The remainder of the paper is organized as follows: Section 2 introduces the standard account. Section 3 reviews previous semantic accounts for non-culmination in Mandarin. Section 4 discusses previous experimental results. Sections 5 presents the experiment. Section 6 provides a general discussion and a conclusion.

2 The standard account for aspectual composition and the "unexpected" readings

In Krifka's (1989, 1998) classical mereological approach, whether a verbal predicate is telic or not depends on (i) whether the verb holds a (strict) incremental theme relation with its direct object (as defined in (3)); (ii) whether the direct object is quantized (4a) or cumulative (4b).

(3) θ is strictly incremental, SINC(θ), iff

    a. $MSE(\theta) \wedge UE(\theta) \wedge MSO(\theta) \wedge UO(\theta)$ [1]

    b. $\exists x, y \in U_P \exists e, e' \in_E [y < x \wedge e < e' \wedge \theta(x,e) \wedge \theta(y,e')]]$

(4)   a. $\forall X \subseteq U_P[QUA_P(X) \leftrightarrow \forall x, y[X(x) \wedge X(y) \rightarrow \neg y <_P x]]$
     (x is quantized if x falls under a quantized predicate X, then it cannot have a proper part y that also falls under X.)

    b. $\forall X \subseteq U_P[CUM_P(X) \leftrightarrow \exists x, y[X(x) \wedge X(y) \wedge \neg x = y] \wedge \forall x, y[X(x) \wedge X(y) \rightarrow X(x \oplus_P y)]]$
     (x is cumulative if x and y falls under a cumulative predicate X, then the sum of x and y falls under X as well.)

In principle, verbs of consumption and creation such as *eat* and *build* hold a strict incremental theme relation with their direct object. This means that if the object conveys information about quantity, it can "measure the event" and determine its natural end point. Therefore, the telicity of the VP depends on whether the direct object is quantized: a quantized direct object results in a telic predicate (as in (5a) and (6a)), whereas a cumulative direct object leads to an atelic predicate (as in (5b) and (6b)). In contrast, non-incremental theme verbs like *push* do not allow the object to measure out the event, regardless of whether the direct object is quantized or not (as in (7)). It is important to note that none of the sentences below are ungrammatical, but the unacceptable sentences in (5a) and (6a) are not interpreted as if the VP predicate has reached its logical end-point.

(5)	a. She ate the/three cookies in/#for ten minutes.	TELIC
	b. She ate cookies for/#in ten minutes.	ATELIC
(6)	a. She built the/three toy houses in/#for ten minutes.	TELIC
	b. She built toy houses for/#in ten minutes.	ATELIC
(7)	a. She pushed the/three carts for/#in ten minutes.	ATELIC

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1 MSE: *mapping to subevents*; UE: *uniqueness of events*; MSO: *mapping to subobjects*; UO: *uniqueness of objects*.

b. She pushed carts for/#in ten minutes.   ATELIC

As is well known, the interpretation can be further affected by the tense/aspectual markers in the sentence. According to the widely adopted definition of the perfective aspect by Klein (1994), the perfective operator takes a predicate of events and returns a set of intervals such that every interval in this set includes the running time of an event from the extension of the predicate (as defined in (8)). English simple past tense sentences are often treated as aspectually perfective, introducing a phonologically null PFV operator (Klein 1994) or a default topic time (Bohnemeyer & Swift 2004). As a result, a telic predicate in the past tense entails the completion of the event, which accounts for the infelicity of sentences like (1).

(8) $\| PFV \| = \lambda P \lambda t \exists e [P(e) \wedge \tau(e) \subseteq t]$

Although the standard account predicts that expressions with strict incremental-theme verbs taking a quantized direct object in the past tense should only permit culminating readings, many authors since Verkuyl acknowledge that non-culminating readings are indeed possible, especially with consumption verbs like *eat* and, to a lesser extent, creation verbs like *build*. This is illustrated by the following examples:

(9)   Rebecca ate the apple for five minutes before dropping it on the floor. (Piñón 2008)

(10)   The ant ate the apple for a week before it rotted into the ground.   (Smollett 2005)

(11)   Eat your soup!   (Rothstein 2004)

(12)   Steven built a Lego tower for three hours.   (Smollett 2005)

To allow for more flexibility in aspectual interpretation, remedies for the standard account include general pragmatic accommodation (Krifka 1998), or some formal mechanism including shifting the verb meaning to an activity reading (Rothstein 2004), and the use of a contextually conditioned degree maximizing operator (leading to event culmination) or a positive degree binding operator (leading to non-culmination) for measuring the degree of realization of the event denoted by the VP predicate (Piñón 2008).

In a similar vein, previous semantic accounts for the non-culmination phenomenon in Mandarin have primarily attributed the source of non-culmination either to differences in verb semantics compared to English (Tai 1984; Lin 2004; Koenig & Lian-Cheng 2008; among others), or some sort of partitive operator functioning at the VP level (Zhang 2018, 2020) or the grammatical aspect level (Smith 1997; Martin 2019; Martin et al. 2021), which allows for the partial realization of the event. We review some of these accounts in the next section.

3   Previous semantic accounts for non-culmination in Mandarin

It is generally assumed that the non-culmination phenomenon in Mandarin reflects 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 object DP (Zhang 2018, 2020). 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.

3.1   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 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. The underlying assumption is that the corresponding English verbs do entail completion.

Making use of scales, 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 telicity marker (Gu 2022), as shown by the contrast between sentences (2) and (13)).

(13)   #*Ta chi-diao-le   na-ji-kuai   binggan, keshi mei chi-wan.*
   3SG eat-drop-LE that.how.many-CL cookie,   but   not eat-finish

   Lit: 'She ate up those cookies, but she didn't finish eating them.'

3.2   Perfective *le* as source of non-culmination

Another line of research attributes the source of non-culmination in Mandarin to the perfective marker *le*. The syntax and semantics of verbal *le* is under debate in the literature. Although verbal *le* is commonly analyzed as a perfective aspect

marker (Smith 1991, 1997; Klein et al. 2000; Xiao & McEnery 2004; among others), some scholars argue that verbal *le* is a resultative predicate (Sybesma 1997), or a quantity/telicity marker (Wang 2018). Zhao (2023) argues that the so-called verbal *le* can be a perfective marker, or a resultative particle which combines with the verb to form a resultative verb compound (RVC), similar to the particle *diao* 'drop' in (13). According to Zhao, since RVCs need to be marked aspectually to convey an episodic reading in simple clauses, *le* can only function in simple clauses like (2) as a perfective marker and not as a resultative particle.[2]

Smith (1991, 1997) argues that perfective *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 requires the VP predicate to not only reach the maximal stage but also full completion (14a), the weak perfective operator only requires the event to reach a maximal stage by ceasing to develop, without necessarily reaching full completion (14b).

(14)   a. $\parallel PFV_{C+M} \parallel = \lambda P \exists e[MAX(e,P) \wedge P(e)]$ Strong perfective

       b. $\parallel PFV_M \parallel = \lambda P \exists e[MAX(e,P)]$ Weak perfective

According to Martin and colleagues (Martin 2019; Martin et al. 2021), while an incremental-theme verb with a definite direct object in English might allow for a non-culminating interpretation due to the non-maximal reading of the definite (e.g, *John ate the pizza* can be true if John ate most of the pizza), the weak perfective operator in Mandarin only requires there to be a proper part of the event realized in the world of evaluation without specifying how large this part should be. This allows a telic description with verbal *le* to be true of incomplete situations in which only a very small part of the entire event (e.g., only 10% of the pizza is eaten) has been realized.

To summarize, both the verb-based account and the partitive account predict distinct behaviors for English and Mandarin incremental-theme predicates: while English telic incremental-theme predicates are only compatible with complete situations, Mandarin telic incremental-theme predicates are compatible with both complete and incomplete situations.[3]

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2 In addition, verbal *le* is often contrasted with sentential *le* (which occurs in the sentence-final position), commonly analyzed as a discourse marker with the change-of-state meaning (Li & Thompson 1989; Soh & Gao 2006; Soh 2009). 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).

3 Both accounts adopt a unified approach to the non-culmination phenomenon associated with both

4 Experimental evidence for the pragmatic account

Experimental results show more variability in actual judgments in both languages than the descriptive and formal accounts would predict. Participants often give non-categorical answers in assessing telic descriptions of incomplete events in both English (van Hout 1998; Ogiela 2007; Ogiela, Schmitt & Casby 2014; Anderson 2017; van Hout, Arche, Demirdache, del Real, Sanz, Gavarró, Marzo, Hommes, Kazanina, Liu et al. 2017; Patt, Wagner & Arunachalam 2020; Xu & Schmitt to appear a) and Mandarin (Chen 2006, 2008, 2017; van Hout et al. 2017; Liu 2018; Li 2019; Xu & Schmitt to appear a, to appear b). 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 used in the direct object, the number of object items (singular vs. plural) in the displays, and the degree of incompleteness in the different experiments.

Xu & Schmitt (to appear a) established a baseline for both English and Mandarin using identical methods.[4] 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'), and 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) (hereafter referred to as the "3rd Object Incomplete" situations).[5] In each trial, participants watched the video, and judged whether the test sentence,

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incremental-theme verbs and change-of-state verbs (such as *sha* 'kill' in (1)). This paper only focuses on non-culmination involving incremental-theme predicates.

(i)   *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.'

4 Xu & Schmitt (to appear a) also reported results from Mandarin-speaking children.

5 Sentences 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 sentences with demonstrative DPs, but only tested those with numeral DPs in the complete situations.

uttered by the performer, was true or false based on the video.

(15) 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 English and Mandarin participants accepted the test sentences in complete situation at ceiling levels. For incomplete situations (Fig.1), both groups showed a determiner-type effect but no verb-type effect, rejecting sentences with numerals more often than those with demonstratives across verb-types. 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, providing evidence for the same mode of combination between incremental-theme verbs and their direct objects in the two languages, contrary to the verb-based account predicts (Tai 1984; Lin 2004; Koenig & Lian-Cheng 2008). The high acceptance of sentences with demonstratives aligned with the findings by Ogiela (2007, also Ogiela et al. 2014) regarding the definite determiner in English adults. Following Ogiela, we attributed 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 (15) 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.
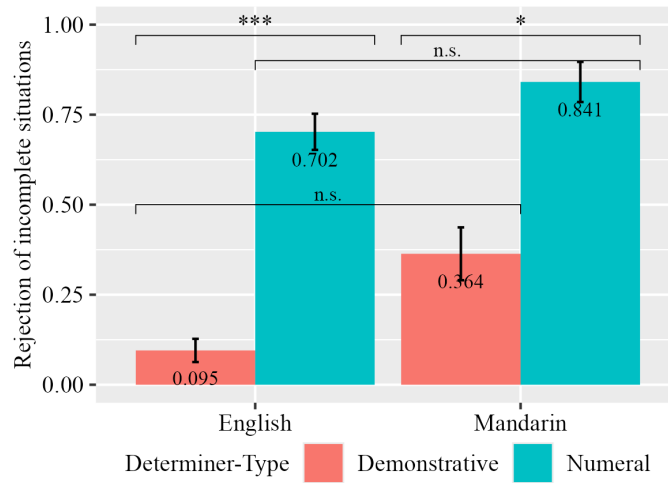
Figure 1   Mean rejection rates of incomplete situations by English and Mandarin adults in Xu & Schmitt (to appear a)

Xu & Schmitt (to appear b) further investigated the role of verbal *le* in Mandarin speakers by testing the same verbs and determiner-types in a biclausal context which permits the embedded clause to be aspectually unmarked without forcing a habitual reading (Tang & Lee 2000; Tsai 2008; Zhao 2023) (as shown in (17)). The same visual stimuli as in Xu & Schmitt (to appear a) was used except that, after completing/discontinuing the first action, the video continued with the character performing another action (e.g., closing a curtain).

(16)   *Ta*   {*chi-∅*, *chi-le*}   {*na-ji-kuai*,   *san-kuai*} *binggan hou*, *jiu*   *qu*
        3SG {eat-∅, eat-LE} {that-how.many-CL, three-CL} cookie   after then go

        gan bie-de shi   le.
        do   other   thing LE

        'After she ate those cookies, she went to do something else.'

The results of the incomplete situations (Fig.2) consistently showed a determiner-type effect in sentences with and without verbal *le*, replicating the results of Xu & Schmitt (to appear a). Importantly, the presence of verbal *le* did not significantly impact the responses in either the numeral or demonstrative conditions individually, providing evidence against 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.

To summarize, our previous work provides experimental evidence for no radical difference between the lexical semantics of incremental-theme verbs (contrary to
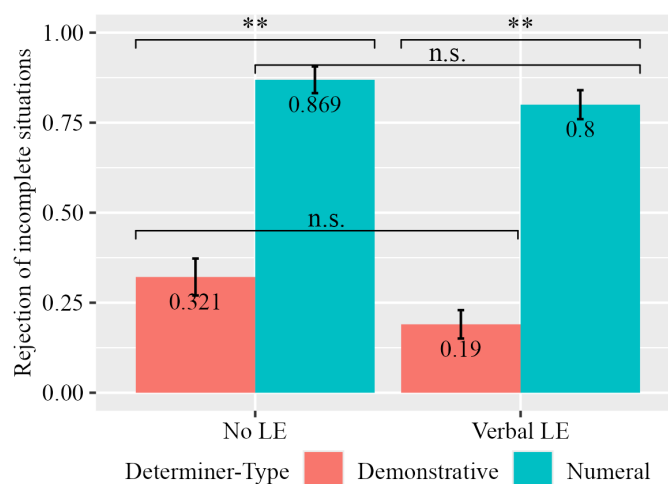
Figure 2   Mean rejection rates of incomplete situations by English and Mandarin adults in Xu & Schmitt (to appear b)

Tai 1984; Lin 2004; Koenig & Lian-Cheng 2008) between English and Mandarin, and no special terminative/partitive function of verbal *le* (contrary to Smith 1991; Martin 2019; Martin et al. 2021). We have also shown that in the "3rd Object Incomplete" context, the definite and demonstrative determiners enable the same form of pragmatic accommodation in English and Mandarin. What initially appears as a "non-culminating" reading ultimately turns out to be a culminating one. This leads to the prediction that in situations where definite or demonstrative DPs cannot be pragmatically accommodated, we may find different results.

5   The current experiment

The current experiment aimed to test a different type of incompletion, focusing on the scenarios in which each of the three object items is partially consumed or created (hereafter referred to as the "Each Object Incomplete" situation), along with the use of verbal *le* in Mandarin. Specifically, the experiment addresses the following questions:

i. Do the differences between demonstratives and numerals disappear in the "Each Object Incomplete" situation?

ii. Are participants more or less likely to accept the "Each Object Incomplete" situation compared with the "3rd Object Incomplete" situation? Would

the "Each Object Incomplete" situation trigger a different accommodation strategy?

iii. How does verbal *le* affect participants' judgments in the "Each Object Incomplete" situation?

5.1 Methodology and participants

We adopted the same experimental method as in Xu & Schmitt (to appear a) and Xu & Schmitt (to appear b): a Truth Value Judgement Task. Participants first watched a video clip showing either a complete 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 two between-subjects conditions (No LE Condition: $n = 12$; Verbal LE Condition: $n = 13$).

5.2 Design and materials

The experiment used the same test sentences as in Xu & Schmitt (to appear b), with the same incremental-theme verbs: *chi* 'eat', *he* 'drink', *zao* 'build', *hua* 'draw', and same determiner-types: demonstratives *zhe* 'this' and *na* 'that' vs. numeral *san* 'three' (see sample test sentences in (17)).

(17) a. *Ta* {*chi-∅*, *chi-le*} *na-ji-kuai* *binggan hou, jiu qu gan bie-de*
   3SG {eat-∅, eat-LE} that-how.many-CL cookie after then go do other

   shi le.
   thing LE

   'After she ate those cookies, she went to do something else.'

   b. *Ta* {*zao-∅*, *zao-le*} *san-zuo fangzi hou jiu qu gan bie-de*
   3SG {build-∅, build-LE} three-CL house after then go do other-DE

   shi le.
   thing LE

   'After he built three houses, he went to do something else.'

Each test sentence was paired with two videos, one showing a complete situation (e.g., a boy eating three cookies completely; a girl building three toy houses completely) and the other an incomplete situation, in which each object was partially affected with none of them being fully consumed or created. In the consumption events, each object was minimally consumed (e.g., a girl taking a bite from each

of the three cookies, as shown Fig.3). The hypothesis is that if participants accept videos with a higher degree of incompleteness, they would be likely to accept videos with a lower degree of incompleteness as well. For the creation events, each object was created up to the point of being recognizable as the created object (e.g., a boy building three house-like constructions, leaving one block aside for each construction, as shown in Fig.4). This prevents participants from rejecting the sentence simply because they do not consider the partially constructed items to be the relevant objects (e.g., they might not view a structure without a roof as a "house"). By ensuring each partially created object retains recognizable features, we aimed to focus participants' judgments on the degree of completion rather than object identification. The second event always matched what was being described by the sentence. Participants judged whether the test sentence was true or false based on the video. Fillers were included in each trial at a ratio of 3:1.[6]
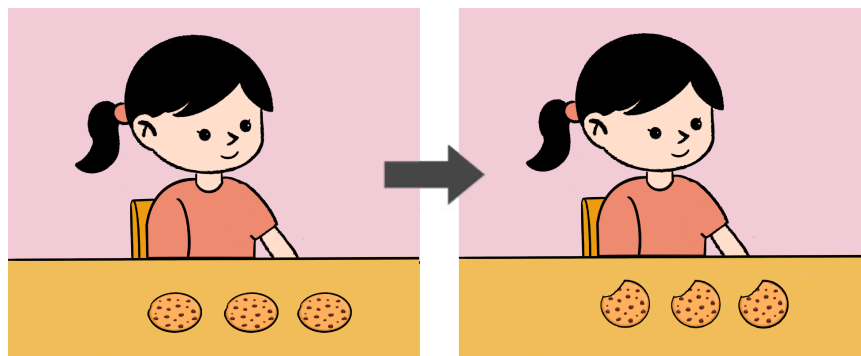

Figure 3 Scenes from a sample video depicting an incomplete situation for the sentence 'After she ate these cookies, she went to do something else.'

6 The fillers served to enhance engagement and obscure the main test goals. They consist of (i) descriptions of a ladybug that consistently appears in all videos but in different places, providing a familiar and intriguing element for participants; (ii) background details, such as "there's a basketball on the ground"; and (iii) action details, like "she used a crayon to paint."
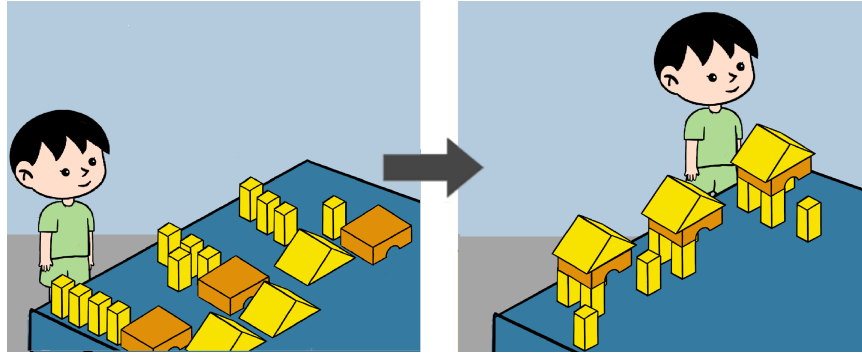
Figure 4   Scenes from a sample video depicting an incomplete situation for the sentence 'After he built three houses, he went to do something else.'

5.3   Results

We analyzed the rejection rates of test sentences across different conditions. The rejection rates for **complete situations** remained very low across conditions, indicating near-ceiling performance: 3.8% in the No LE condition, and 0% in the Verbal LE condition. To examine the participants' rejection of **incomplete situations**, we fitted the data to a mixed-effects logistic regression model, including 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) as fixed effects, while accounting for Subject and Item as random effects (Model syntax: Response $\sim$ Determiner-Type + LE-Type + (1 + Determiner-Type | Individual) + (1 | Item)).

Table 1 shows the parameter estimates for the fixed effects of the model. The analysis indicates a significant main effect for Verbal LE: the use of Verbal LE leads to a significantly higher rejection rate of incomplete situations. However, no significant effects were found for Demonstrative or Consumption Verb.

Predictor	Estimate	SE	z-value	p-value
(Intercept)	-3.6405	0.8370	-4.349	1.37e-05 ***
Demonstrative	-0.5051	0.4549	-1.110	0.26686
Verbal LE	2.6087	0.9085	2.872	0.00408 **
Consumption Verb	0.7069	0.4600	1.537	0.12440
Note:				*p<0.05; **p<0.01; ***p<0.001

Table 1   Parameter estimates of the main effects from the mixed-effects logistic regression model

Figure 5 shows the mean rejection of incomplete situations by Determiner-Type and LE-Type. Table 2 presents pairwise contrasts between pairwise contrasts between different conditions, specifically comparing Numeral vs. Demonstrative for both the No LE condition and the Verbal LE condition, as well as comparing the presence and absence of verbal *le* for both Numeral and Demonstrative conditions. The contrasts between Numeral and Demonstrative in both the No LE and Verbal LE conditions show no significant differences. However, the contrast between the No LE and Verbal LE conditions reveals significant differences for both Numeral and Demonstrative conditions, indicating that the presence of verbal *le* increased the rejection rates.
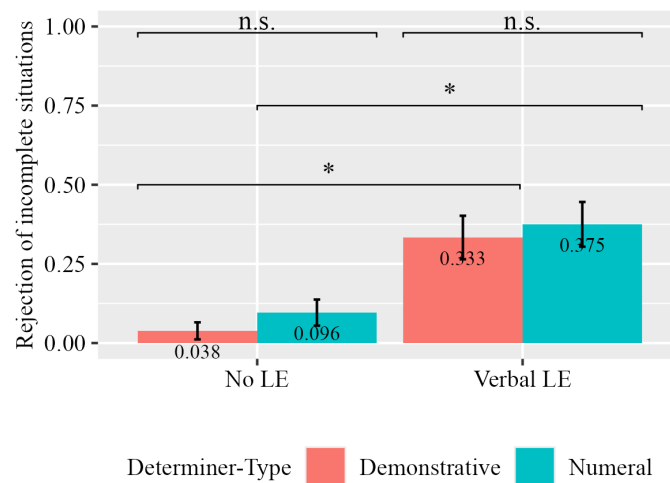

Figure 5   Mean rejection rates of incomplete situations by Determiner-Type and LE-Type

Condition	Contrast	Est.	SE	z-value	p-value
No LE	Numeral vs. Demonstrative	0.505	0.455	1.110	1.0000
Verbal LE	Numeral vs. Demonstrative	0.505	0.455	1.110	1.0000
Numeral	No LE. vs. Verbal LE	-2.609	0.908	-2.872	0.0245*
Demonstrative	No LE. vs. Verbal LE	-2.609	0.908	-2.872	0.0245*
Note:			*p<0.05; **p<0.01; ***p<0.001		

Table 2   Results of key contrasts (*p*-values adjusted by the Bonferroni correction)

To further investigate whether the higher rejection rates in the Verbal LE condition were influenced by specific individuals, we counted the number of rejections each participant made for the four sentences with demonstratives (x-axes of Fig. 6) and the four sentences with numerals (y-axes of Fig. 6) in the No LE condition (left panel) and the Verbal LE condition respectively (right panel). Quadrants *a*, *b*, *c*, and *d* help interpret participants' rejection patterns. Quadrant *a* includes participants who frequently rejected both demonstratives and numerals; Quadrant *b* contains participants who frequently rejected demonstratives but were more lenient on numerals, while Quadrant *d* reflects the opposite pattern, namely frequent rejections of numerals but leniency with demonstratives. Quadrant *c* includes participants who rarely rejected either category, showing overall leniency in accepting incomplete situations. In the No LE condition, most individuals fall in Quadrant *c*, suggesting a tendency to accept sentences with both demonstratives and numerals. Conversely, the Verbal LE condition shows more variability. Although the majority of participants still fall within Quadrant *c*, three participants are on the border, and four participants fall outside of Quadrant *c*. This suggests that the higher rejection rates in the Verbal LE condition were not driven by specific individuals; rather, there is greater individual variability in responses in this condition.
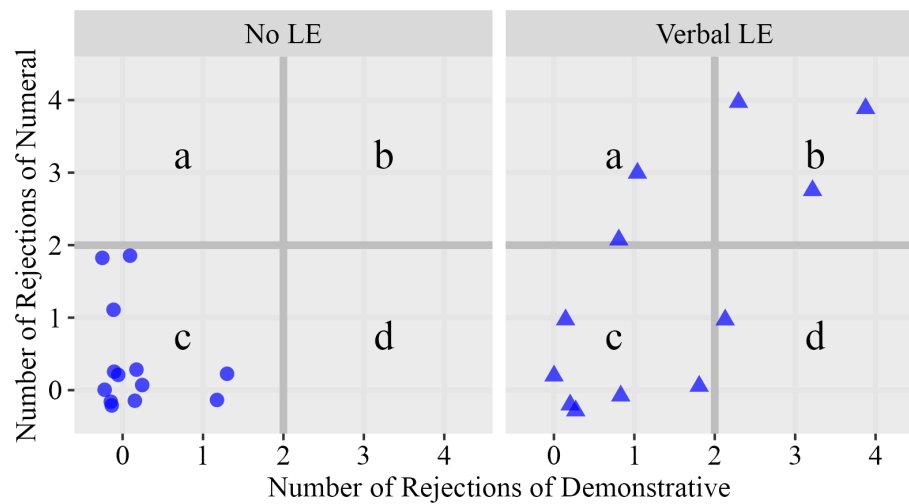
Figure 6 Individual participants' rejection counts of demonstrative (x-axes) and numeral sentences (y-axes) in incomplete situations in the No LE condition (left panel) and the Verbal LE condition (right panel)

6   Discussion

The present study offers novel insights into how visual context affects judgments regarding event culmination by testing incomplete situations in which all three object items were partially affected. Our current experiments showed two major differences compared with our previous results from Xu & Schmitt (to appear a, to appear b). **First**, in our earlier experiments, when only the 3rd object was partially consumed or created (the "3rd Object Incomplete" situation), both English and Mandarin speakers showed a strong determiner-type effect, rejecting sentences with numeral direct objects more frequently than those with demonstrative direct objects. In contrast, in the current experiment, when all three object items were partially affected (the "Each Object Incomplete" situation), the determiner-type effect disappeared: our Mandarin participants accepted sentences with numeral direct objects at the same rate as those with demonstrative direct objects. **Second**, in Xu & Schmitt (to appear b), verbal *le* did not have any effect in the context of the "3rd Object Incomplete" situation in our previous experiments. However, in the current study, it led to more rejections in the context of the "Each Object Incomplete" situation. In this section, we will discuss these two findings.

In the experiments where two and a half of the objects were created/consumed we found a determiner effect. While the predicates with numerals were largely rejected when only two of the 3 objects were completely affected, there was a large

acceptance of the definite, suggesting that participants found a way to accept the sentences by restricting the set associated with the definite noun phrase. This was impossible to do when all the three objects were equally partially affected. Reducing the size of the set would not help. In this case, participants had two options: to reject a set of partially affected objects as indicating culmination or to accept the statements as true enough.

The low rejection rates under both determiner-types in our current experiment shows that most participants were willing to accept the statements as true enough, despite the events not being fully completed. For example, when participants saw three constructions with recognizable house features, such as pillars and roofs, they might have considered that three "houses" had been built, judging the sentence to be true even with one missing pillar per house. In contrast, when judging the sentences with numeral DPs in the "3rd Object Incomplete" situations, after seeing two fully built houses, participants expected the third house to be completed to meet the standard of a "fully built house." Consequently, they were less likely to tolerate a missing pillar, leading to higher rejection rates of the sentence as not matching the video. Unlike creation events, consumption events such as "eating three cookies" and "drinking three lemonades" do not rely on whether the extension of the direct object can be considered the created object. Instead, the existence of the objects is presupposed. Thus, they may permit a higher degree of pragmatic slack. In contexts where a girl took a bite of each cookie, participants might consider the sentence accurate as long as each cookie was touched. Conversely, in the "3rd Object Incomplete" situation, upon seeing two fully eaten cookies, they likely expected the third to be fully eaten, leading them to judge the sentence with a numeral direct object as false.

Our findings that verbal *le* elicited more rejections in the "Each Object Incomplete" situations provide further evidence against verbal *le* as a terminative marker (Smith 1991, 1997) or a partitive operator (Martin 2019). Following Zhao (2023), it is possible that participants who rejected the test sentences interpreted verbal *le* as a resultative particle, similar to *diao* 'drop' or *wan* 'finish', as shown in (18). As previously mentioned, in our biclausal test sentences, the matrix clauses provided tense anchoring for the embedded clause, allowing it to be aspectually unmarked (Tang & Lee 2000; Tsai 2008; Zhao 2023). As a result, verbal *le* in the embedded clause is ambiguous between a perfective marker and a resultative particle. This ambiguity may explain why some participants were more likely to reject sentences with verbal *le* in the "Each Object Incomplete" context: they might have interpreted verbal *le* as requiring a full result to be achieved for each individual object, e.g., each cookie must be fully eaten; each house must be fully built. In contrast, in our previous experiments, we did not find an effect of verbal *le* in the "3rd Object Incomplete" context. For the sentences with numeral DPs, this is probably because the sentences

were already rejected at near-ceiling levels. For the sentences with demonstrative DPs, the resultative interpretation of verbal *le* could not further increase rejection rates either, as participants could interpret the sentence as referring only to the two objects that were fully consumed/created. We leave the resultative interpretation of verbal *le* for future research.

(18) a. *Ta   chi-diao na-ji-kuai   binggan hou*, *jiu   qu gan bie-de shi*
3SG eat-drop that-how.many-CL cookie   after then go do other thing
le.
LE

'After she ate up those cookies, she went to do something else.'

b. *Ta   zao-wan   san-zuo fangzi hou jiu   qu gan bie-de   shi   le*.
3SG build-finish three-CL house after then go do   other-DE thing LE

'After he finish building three houses, he went to do something else.'

To conclude, the present study provides further insight into the pragmatic account for the "non-culmination" phenomenon associated with Mandarin incremental-theme predicates. Our findings show that subtle changes in the visual context significantly impact participants judgments on event culmination. These findings support a pragmatic account over the idea of a general mechanism of accommodation.

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Jingying Xu
B320 Wells Hall
619 Red Cedar Rd
East Lansing, MI 48824
xujing21@msu.edu

Cristina Schmitt
B405 Wells Hall
619 Red Cedar Rd
East Lansing, MI 48824
schmit12@msu.edu