

Constraints of lexical and grammatical aspect on event representations in Mandarin Chinese

Shaohua Fang¹, Fei Yuan²

¹Department of Linguistics, University of Pittsburgh, USA

²Faculty of Asian and Middle Eastern Studies, University of Cambridge, UK

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Abstract

The current study addresses whether differential facilitation effects (dependent on lexical aspects) from perfectives and imperfectives observed in English and Cantonese would generalize to Mandarin Chinese by conducting a battery of offline and online experiments. The results indicated an across-the-board processing advantage of perfectives. Crucially, we found that the grammatical and lexical aspect interactively constrained the representation and processing of sentence processing in Mandarin. However, a robust facilitation emerged only for the perfective aspect when it co-occurred with accomplishment verbs but not for the imperfective aspect when it co-occurred with activity verbs.

Keywords: constraints, lexical aspect, grammatical aspect, facilitation, Mandarin

Introduction

In Mandarin Chinese, aspect can be grammatically encoded. For example, the perfective aspect with *-le* and the imperfective aspect with *-zhe*. It can also be lexically encoded. For example, *du* ‘(to read)’ and *gu* ‘(to hire)’ are examples of activity verbs and accomplishment verbs. According to Peck, Lin and Sun (2013), accomplishment verbs can be mono-morphemic and resultative compounds. Verbs of both lexical aspects can be distinguished by the [\pm scalar] and the [\pm telic] features: Activity verbs are non-scalar and atelic; Accomplishment verbs are scalar and telic.

Language users use aspectual information to construct event representations during sentence comprehension. In a sentence-picture selection task, Madden and Zwaan (2003) found that the perfective aspect rather than the imperfective aspect facilitated English sentence comprehension. This effect is called *perfective facilitation* in Yap et al. (2009) where it was attested with Cantonese, and such an effect was shown to be modulated by lexical aspect in that perfective facilitation was evident with accomplishment verbs and imperfective facilitation culminated in activity verbs.

The present study adopts a cross-linguistic perspective examining whether the effects of grammatical and lexical aspects on the construction of event representations observed in English and Cantonese would generalize to Mandarin Chinese.

Experiments

Materials

A 2*2 factorial design was adopted for the experiments, yielding a total of four conditions. The first independent variable was grammatical aspect (GA) which varied between perfective aspect (*-le*) and imperfective aspect (*-zhe*), and the second independent variable was lexical aspect (LA) with two levels, activity, accomplishment. Experimental items were sentences containing each of the four conditions in Table 1. Each participant read 36 sentences, consisting of 12 experimental sentences and 24 fillers, of which 10 sentences were catch trials. The experimental sentences were identical across each experiment.

Table 1. Lexical and grammatical aspect in Mandarin.

Grammatical Aspect	Lexical Aspect	
	Accomplishment	Activity
Perfective <i>-le</i>	mai- <i>le</i> (to have bought)	chi- <i>le</i> (to have eaten)
Imperfective <i>-zhe</i>	mai- <i>zhe</i> (buying)	chi- <i>zhe</i> (eating)

Participants and procedure

Eighty-two native Mandarin speakers participated in a self-paced reading (SPR) task, and an untimed acceptability judgment task (AJT). Another group of 65 participants completed a speeded acceptability judgment task (SAJT). Experiments were distributed via Ixweb Farm (Drummond, 2013). In the SPR, each sentence was presented word-by-word in a non-cumulative fashion, followed by a comprehension question. In the AJT, participants rated each sentence using a 7-point Likert Scale. In the SAJT, sentences were presented one word at a time at a rate of 300 ms for participants to respond with yes/no within 3s.

Data treatment and analysis

For AJT, no participant was rejected for statistical analysis since each of them consistently rated the unambiguously acceptable catch trials above the unacceptable ones. Raw ratings were then converted into z-scores. For SPR, before statistical modelling, data were cleaned and trimmed such that two participants who scored below 80% on the comprehension questions were removed, and the RTs above 2000 ms were further discarded. RTs were subsequently log transformed. Linear mixed-effects models and logistic mixed-effects models were used for the SPR/AJT data and the SAJT data respectively. Independent variables were sum coded; participant and experimental items were treated as the random effects.

Results

Figure 1 visualizes the descriptive results for AJT. There was a main effect of grammatical aspect, indicating that perfective sentences were rated reliably higher than imperfective sentences ($b=-0.325$, $p<.0001$). GA significantly interacted with LA. Noticeably, sentences containing accomplishment verbs were more acceptable with perfective aspect than with imperfective aspect ($b=-0.921$, $p<.0001$). Imperfective sentences were less acceptable when they contained accomplishment verbs than when they contained activity verbs ($b=-0.724$, $p<.0001$). Figure 2 visualizes the descriptive results for SAJT. A main effect of grammatical aspect revealed that perfective sentences were more likely to be accepted than imperfective sentences ($b=-1.170$, $p=.0069$). GA and LA significantly interacted such that imperfective sentences with activity verbs ($b=-3.380$, $p<.0001$) were more likely to be accepted than those with accomplishment verbs. Moreover, perfective sentences were more likely to be accepted than imperfective sentences when they contained accomplishment verbs ($b=-3.407$, $p<.0001$). For the SPR, RTs of two regions were analysed – the critical region where GA locates, and the spillover region where numeral-classifier locates. A reliable interaction between both aspects was observed at the critical region, indicating that this region was read faster for perfective sentences with accomplishment verbs than for sentences with activity verbs ($b=-0.064$, $p=.0392$). A main effect of GA was obtained at the spillover region, reflecting an overall slowdown for the imperfective sentences relative to the perfective sentences ($b=0.030$, $p=.0916$). Moreover, we obtained a reliable interaction between both aspects at the spillover region, which was driven by the reduced RTs on the perfective sentences relative to the imperfective sentences when they contained accomplishment verbs ($b=0.074$, $p=.0174$).

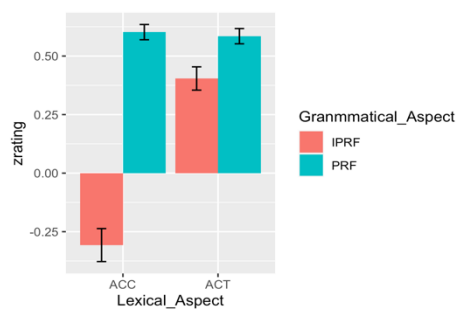


Figure 1. Mean z-ratings.

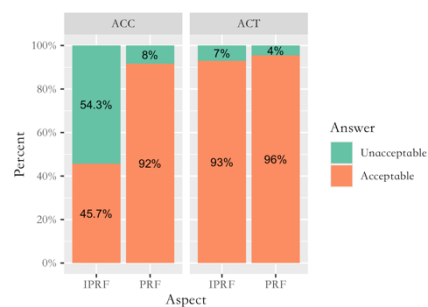


Figure 2. Speeded acceptability judgments.

Discussion and conclusion

The results show an advantage of perfective aspect over imperfective aspect across each measure, suggesting that the perfective aspect relative to imperfective aspect could facilitate processing to a larger extent in Mandarin. This could be interpreted by the fact that the imperfective aspect with a focus on the internal structure of an event usually yields a longer retention rate relative to the perfective aspect, thus leading to a slower cognitive processing. (Madden & Zwaan, 2003; Yap et al., 2009).

Crucially, it was clear from the results that GA and LA interacted to facilitate sentence processing across the board. However, different from Yap et al. (2009), we only observed the perfective facilitation with accomplishment verbs, but not the imperfective facilitation with activity verbs in Mandarin. Specifically, in the AJT, the fact that sentences with Accomplishments + *le* were rated higher than those with Accomplishments + *zhe* demonstrated a facilitation of Accomplishments + *le*. In the SAJT, the facilitation of Accomplishments + *le* was also robust, as reflected in a higher likelihood of accepting sentences with Accomplishments + *le* relative to those with Accomplishment + *zhe*. Similar facilitative patterns emerged during moment-by-moment processing in that the spillover region was processed faster in the condition of Accomplishments + *le* relative to Accomplishments + *zhe*.

We argued that the interaction between LA and GA was driven by semantic compatibility: Accomplishment verbs being telic are semantically compatible with the perfective aspect (*-le*) which usually denotes a completed event, whereas Activity verbs being atelic are semantically compatible with the imperfective aspect (*-zhe*) which usually denotes an ongoing event.

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