

## Aspect is distinct from time reference: An ERP study of the perfective marker *-le* in Mandarin Chinese

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In past years, the question of processing temporal information (i.e. time reference and aspect) has been raised, and several ERP studies with paradigms involving violation of time reference and/or aspect with tense-prominent languages have been conducted, with the findings suggesting different underlying processes for time reference and aspect [1-3, *inter alia*]. On the other hand, the underlying processing for time reference and aspect is less clear for aspect-prominent languages. For example, in Mandarin, where tense is not grammaticalized and past time reference can be expressed through perfective aspect, research has shown that violation of grammatical aspect (perfective aspect) elicited a P600 (need for syntactic repair) [4], but the processing of grammatical aspect and time reference has never been directly compared.

This paper thus aims to investigate the processing of both time reference and aspect in Mandarin Chinese. The main question is to determine if the Mandarin perfective verbal morpheme *-le*, which is related (but not restricted) to past time reference, is processed differently in a temporal incongruent context (see element marked with # in (1), Table 1) and an aspectual incongruent context (see element marked with # in (2), Table 1). Our hypothesis was simple: if time reference is processed based on the aspectual features of *-le*, then time and aspect would share a similar underlying process (i.e. time would be aspectually driven exclusively). In contrast, if the processing of time reference is independent from the processing of aspect in Mandarin, then different underlying processes should be observed.

Twenty-three native Mandarin speakers (9 male, mean age 23) were recruited. The ERP data revealed that while *-le* placed in an incongruent future time reference context (i.e. following *mingtian* in (1)) evoked a larger negativity at the left anterior site around 300-500ms compared to its congruent counterpart (i.e. following *zuotian* in (1);  $t(22) = 3.562, p < .01$ ), *-le* placed in an aspectual incongruent context (i.e. following *zai* in (2)) elicited a larger P600 when compared to its congruent counterpart (i.e. following *yijing* in (2);  $t(22) = -14.911, p < .001$ ) (see Figure 1).

Our results revealed different patterns for processing time reference (left anterior negativity) and aspect (P600) in Mandarin. Time reference is defined as the location of a situation temporally, while aspect is concerned with the internal temporal structure of the situation. Then, for the time incongruency, the larger negativity may be seen as a failure in locating the situation in time logically [3], while the larger P600 for the aspectual incongruency may be seen as a grammatical mismatch between contradictory accesses to the internal structure of the situation [1&3]. In sum, our findings show that in Mandarin, an aspect-prominent and tenseless language, the underlying processes for time reference and aspect are different, despite the use of the same morpheme.

## References

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**Table 1.** Sample items from the ERP experiment (total number of items: 140; 35 items per condition). The experimental materials have been controlled for their syntactic constraints (both incongruent sentences can become congruent when followed by an appropriate clause), their naturalness, the aspectual category of the verb (activity verb), and the agency of the subject.

Condition	Example			
(1) Time condition	Mama mother	zuotian / #mingtian yesterday / #tomorrow	xi-le wash-PFV	yifu. clothes
	'Yesterday/#Tomorrow, mom washed the clothes.'			
(2) Aspect condition	Mama mother	yijing / #zai already / #PROG	xi-le wash-PFV	yifu. clothes
	'Mom already/#PROG washed the clothes.'			

**Figure 1.** ERP waves of the conditions at *-le* (black = congruent, red = incongruent), and topographic maps of the difference wave (incongruent *minus* congruent; mean amplitude from  $-2.5 \mu\text{V}$  (blue) to  $+2.5 \mu\text{V}$  (red)) for different types of incongruency.

