

The Effect of Emotional Linguistic Context Congruency on Mandarin Sentence Comprehension: An Eye-Tracking Study

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There is substantial empirical evidence demonstrating that language processing is shaped by a range of linguistic cues, including contextual information [1]. Emotional information has also been shown to influence language processing [2]. However, the extent to which emotional linguistic context modulates online sentence comprehension in Mandarin remains underexplored. The present pilot study therefore examines how emotional linguistic context shapes Mandarin sentence comprehension in real time.

Four native Mandarin speakers (aged 18–31) completed a Mandarin sentence-reading task while their eye movements were recorded. The materials comprised 40 critical items (20 positive, 20 negative) and 80 filler items. The 80 filler items varied in emotional valence (40 neutral, 20 positive, 20 negative) and syntactic structure, including items with the same five-region structure as the critical sentences but different conjunctions, as well as structurally varied sentences. Critical items combined positive and negative prime context sentences with positive and negative target sentences in a 2 × 2 Latin square design, yielding emotionally congruent and incongruent prime-target pairings. Lexical repetition was controlled across the materials, with each emotional adjective occurring no more than four times. Target sentences had a uniform five-region structure (NP1–Adjective–Conjunction–Verb–NP2). In each trial, participants read the prime context sentence and then the target sentence, after which they judged whether the two sentences had the same emotional valence. This judgment ensured attention to the emotional relation between context and target, while eye movements indexed online sentence processing.

The main dependent measures were comprehension accuracy, reaction times to the comprehension questions, and three eye-movement measures: first-pass reading time, regression path duration, and total reading time. Eye-movement data were analysed in R using linear mixed-effects models. We hypothesised that eye-movement patterns would differ between emotionally congruent and incongruent context–target pairings, as reflected in first-pass reading time, regression path duration, and total reading time. The adjective and verb regions were of primary interest because they carried emotionally valenced information, while analyses across all five regions allowed us to trace the emergence and possible continuation of congruency effects during sentence reading. Initial pilot analyses revealed only limited behavioural differences between conditions, but more noticeable differences in later eye-movement measures, especially regression path duration and total reading time (Figure 1 and 3). At the verb region, descriptive patterns further suggested an interaction between context and target valence in regression path duration (Figure 2), although these patterns did not align straightforwardly with the hypothesis and should be interpreted with caution given the very small pilot sample. Overall, these preliminary findings support the feasibility of the paradigm and provide an initial basis for testing prime–target congruency effects in the main experiment. Data collection for the main study is currently ongoing, with a planned sample of 52 participants.

References

- [1] Juliane Burmester, Katharina Spalek, and Isabell Wartenburger. Context updating during sentence comprehension: The effect of aboutness topic. *Brain and Language*, 137:62–76, 2014.
- [2] Maria Nella Carminati and Pia Knoeferle. Effects of speaker emotional facial expression and listener age on incremental sentence processing. *PLOS ONE*, 8(9):e72559, 2013. doi: 10.1371/journal.pone.0072559.

Figures

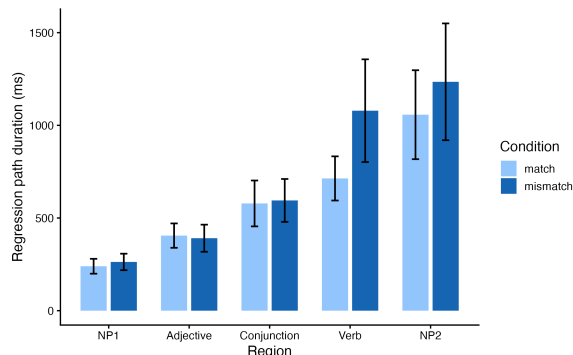


Figure 1: Mean regression path duration across the five sentence regions in the match and mismatch conditions. Error bars represent 95% confidence intervals.

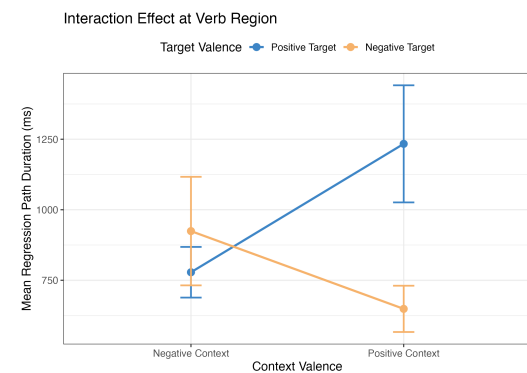


Figure 2: Interaction effect at the Verb region in regression path duration. Error bars represent standard errors.

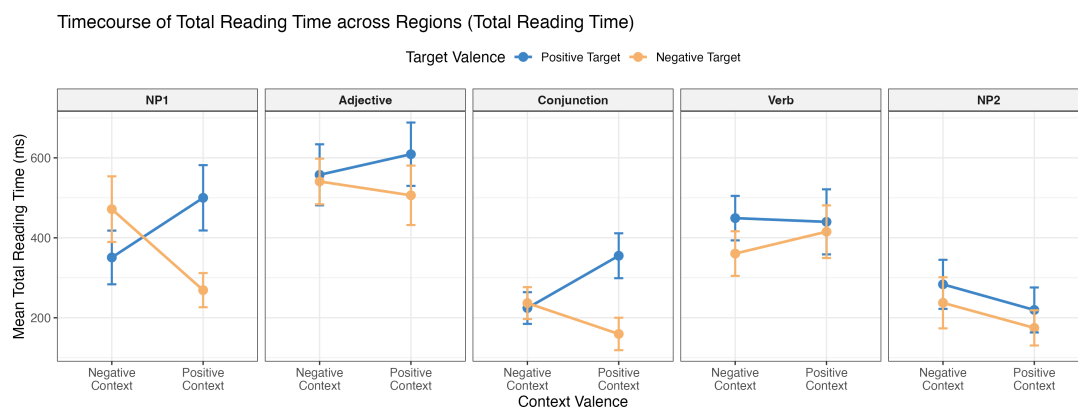


Figure 3: Context valence by target valence patterns in total reading time across sentence regions. Error bars represent standard errors.

Supplementary Information for the Language of Study

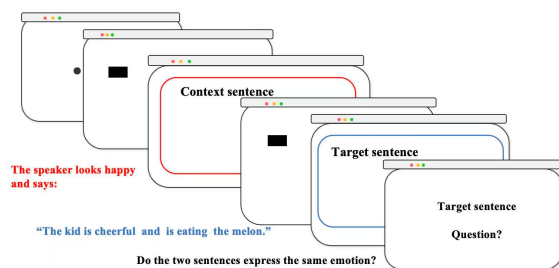


Figure 4: Trial sequence of the experimental procedure.

	Linguistics Context valence	Target valence	Condition
a	positive	positive	Match (congruent)
b	negative	positive	Mismatch (incongruent)
c	positive	negative	Mismatch (incongruent)
d	negative	negative	Match (congruent)

Figure 5: Experimental conditions crossing linguistic context valence and target valence.

Example Stimulus Item and Region Segmentation

The target sentence format was chosen to keep the sentence structure parallel across languages (NP1–Adjective–Conjunction–Verb–NP2).

Region segmentation:

Region 1 = NP1

Region 2 = Adjective

Region 3 = Conjunction

Region 4 = Verb

Region 5 = NP2

Example of context–target pairings

Congruent example: positive context + positive target

Context:

说话者 看起来 很开心 并且说:

speaker looks very happy and says

'The speaker looks very happy and says:'

Target:

这个小家伙 很开心 并且 吃着 瓜。

this little one very happy and eat-PROG melon

'The little one is happy and is eating the melon.'

Incongruent example: negative context + positive target

Context:

说话者 看起来 很难过 并且说:

speaker looks very sad and says

'The speaker looks very sad and says:'

Target:

这个小家伙 很开心 并且 吃着 瓜。

this little one very happy and eat-PROG melon

'The little one is happy and is eating the melon.'

Judgment question after each trial: Do the two sentences express the same emotion?