

Move or not Move: An ERP Study on the Processing of Fictive and Actual Motion Events

Yu Deng¹ Juanjuan Chen²

Sichuan International Studies University, Chongqing, China 400031

(1. dengyu@sisu.edu.cn 2. 609057225@qq.com)

Keywords: Fictive Motion; Actual Motion; Cognitive Processing; N400; P600

This study used ERP method to investigate the processing of Fictive Motion (FM) and Actual Motion (AM) during natural language comprehension. In our hypothesis, the motion component of a verb is preserved in both AM and FM constructions (“The army/The bridge crossed the river”). However, the incorporation of a motion-event sense into FM requires reanalysis or reconstruction both syntactically and semantically.

In the experiment, all the FM and AM sentences were selected using the framework of Talmy (2000). Originally, 180 (3 conditions *60 groups =180 trials) sentences were used as the stimuli, and each sentence was divided into three segments: the noun phrase, the verb and the final part of the sentence. Notably, the only difference between the FM and AM sentence lies in the Figure, while the motion verb and the Ground are the same. FM sentences (i.e. emanation path, pattern path, frame-relative path, advent path, access path and coextension path) were matched as closely as possible in length and content to AM sentences. For example:

- (1) a. FM sentence: 影子落在地面上(The shadow falls onto the floor)
- b. AM sentence: 苹果落在地面上(The apple falls onto the floor)
- c. Filler sentence: 地面是湿的(The floor is wet)

The paradigm of rapid serial visual presentation (RSVP) was used in the experiment (see Figure 1). 16 Chinese participants attended the experiment.

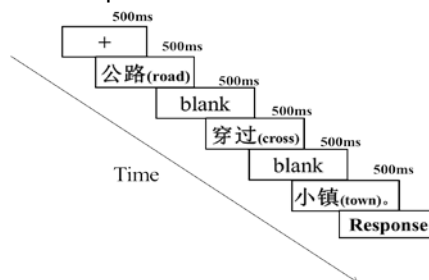


Figure 1: Example trial in the ERP experiment

The ANOVAs in the 300–500 ms time-window yielded a significant main effect of condition and an interaction between condition and Anterior-Central-Posterior distribution at midline electrodes: $F(2, 30) = 4.519, p = 0.046$. Pairwise comparisons revealed that the FM evoked a larger N400 than the AM condition. Specifically, for CZ N400: $F(1, 15) = 8.462, p = 0.011$; for PZ N400: $F(1, 15) = 5.900, p = 0.028$. ANOVAs between 500 and 800 ms also detected a significant main effect of condition and an interaction between condition and Anterior-Central-Posterior distribution at midline electrodes: $F(2, 30) = 4.262, p = 0.042$. Pairwise comparisons showed that the FM elicited a larger P600 at the electrode site of PZ than the AM condition: $F(1, 15) = 4.959, p = 0.042$.

Overall, the ERP results reveal that larger N400 and P600 were elicited by FM constructions, indicating that the processing of FM requires increased cognitive efforts than AM condition. The neurocognitive mechanism underlying the N400 and P600 effects reflects the higher cognitive load in both syntactic and semantic integration process for FM constructions, such that motion verbs with static entities can be difficultly integrated into the motion-event frame context involve additional mental simulation of motion (Matlock, 2004).

References

- Matlock, T. (2004). Fictive motion as cognitive simulation. *Memory & Cognition*, 32, 1389-1400.
- Talmy, L. (2000). *Toward a Cognitive Semantics (Volume I): Concept Structuring Systems*. Cambridge, MA: MIT Press.