An Aspectual Account of Spatial Modification in Mandarin

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Outline

• Introduction
• Research questions
• An aspectual analysis
• Experiment
• Discussion and conclusions

Introduction

• Aims of the study
  – Look into syntax and semantics of Mandarin spatial phrases with zai ‘(be) at’
  – Examine the development of the zai-phrase in child Mandarin through a preliminary pilot experiment

Word order contrast

<table>
<thead>
<tr>
<th>Language</th>
<th>Location</th>
<th>Direction</th>
<th>Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mandarin</td>
<td>(2) a. Ta zai mabei shang tiao. he at horseback top jump ‘He was jumping on the horse’s back.’ b. To tiao zai mabei shang he jump at horseback top ‘He jumped onto the horse.’</td>
<td>Tai (1973, 1975, 1985), Mulder and Sybesma (1992), Huang (1994)</td>
<td></td>
</tr>
</tbody>
</table>

Syntax-semantics mismatch

• Mappings of direction and location to the PP-V and V-PP word orders are inconsistent (cf. Li and Thompson 1981, Fan 1982, Fong 1997).
  – Posture verb
  – Placement verb
  – Displacement verb
  – (Dis)appearance verb
  – Verb with posterior/anterior entailment

Motivation

• Non-target post-verbal zai-PPs in a monolingual child’s naturalistic speech (Hsieh 2010)

(3) Wo shi na zai ni fangjian li, wo queding. (Sean, 5;8)
  I be take at your room inside I sure
  ‘I took it to your room, I’m sure.’

• 11.8% of the V-hoi(‘at’)-PP utterances produced by six Cantonese-English bilingual children are non-target (Yip and Matthews 2007).

• Ambiguous input: both PP-V and V-PP orders are productive and certain verbs allow both orders in Cantonese → language transfer
Motivation

• Virtually no non-target child use despite ambiguous input based on 782 adult utterances from Beijing corpus (Deng and Yip 2012)

<table>
<thead>
<tr>
<th>Zai-PP type</th>
<th>Location</th>
<th>Direction</th>
<th>Ambiguous</th>
<th>No. of utterances</th>
</tr>
</thead>
<tbody>
<tr>
<td>before placement V</td>
<td></td>
<td>10 (23%)</td>
<td>28 (64%)</td>
<td>6 (14%)</td>
</tr>
<tr>
<td>after placement V</td>
<td></td>
<td>37</td>
<td></td>
<td>37</td>
</tr>
<tr>
<td>before posture V</td>
<td>22</td>
<td></td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>after posture V</td>
<td>21 (44%)</td>
<td>16 (36%)</td>
<td>10 (20%)</td>
<td>47</td>
</tr>
</tbody>
</table>

Research questions

• How to account for the syntax-semantics mismatch with regard to zai-PPs in Mandarin Chinese?
• What are the interpretations of pre- and post-verbal zai-PPs for native speakers?
• How is the syntax and semantics of zai-PPs acquired by children?

Hypotheses

• The syntax-semantics mismatch of zai-PPs in spoken Mandarin is not arbitrary but systematic.
• Ample evidence of the mismatch in adult input
  – facilitate grasping their interpretations for children
  – confuse children with regard to their word order

Aspect shift

• Aktionsarts/ event types (Vendler 1957, Dowty 1979, Pustejovsky 1995)
  – Activity
  – State
  – Accomplishment: E=e1* [activity] + e2* [state]
  – Achievement: E=e1 [activity] + e2* [state]
• A verb with complex event structure can shift between two event types (Dowty 1979, Fong 1997, Nam 2000).
  (4) He crouched behind the bush. (State/Achievement)

Spatial modification and subevents

• E= e1 + e2 spatial modifier (cf. Dowty 1979, Parsons 1990)
  (5) Mary flew her kite behind the museum.
    i. Mary did something behind the museum.
    ii. The kite flew behind the museum.
• (3 e) [Agent(e, Mary)] & (3 e’)[Flying (e’) & Theme (e’, kite) & Behind (_ , museum) & CAUSE (e, e’)] (the blank may be filled by either e or e’)

Phase change

• In Finnish, verbs with posterior/ anterior entailment take directional locative Cases.
  (7) a. Tuovi unoht-i kirja-n auto-on.
      ‘Tuovi forgot-PAST book-ACC car-ILLATIVE’
  b. Tuovi löys-i kirja-n laatiko-sta.
     ‘Tuovi found a/the book in (lit. ‘into’) a/the box.’
Phase change

a. Pat forgot the book car-ILLATIVE

b. \( \exists e \) (Forget (Pat, book, e)) and

(i) \( I \) is an interval, which is an ordering of the range of \( t(A) \), contains one phase change \((\sim < \sim p)\) with respect to the potential change of location of the book;

(ii) \( \exists t \in I \) (LOC-IN (car, book, \( t \)) \( \land \forall t' \in I \) (\( t < t' \) \( \rightarrow \) LOC-IN (car, book, \( t' \)))))

→ The direction expression is licensed by phase transition (Fong 1997).

An aspectual analysis: posture verbs

• Aspect shift of the posture verb from State to Achievement

\( \exists t \in I \) (LOC-IN (car, book, \( t \)) \( \land \forall t' \in I \) (\( t < t' \) \( \rightarrow \) LOC-IN (car, book, \( t' \)))))

→ The direction expression is licensed by phase transition (Fong 1997).

An aspectual analysis: placement verbs

• Accomplishment: the preverbal zai-PP modifying the causing event \( \rightarrow \) Location; it modifying the result state \( \rightarrow \) Direction

\( \exists t \in I \) (LOC-IN (car, book, \( t \)) \( \land \forall t' \in I \) (\( t < t' \) \( \rightarrow \) LOC-IN (car, book, \( t' \)))))

→ The direction expression is licensed by phase transition (Fong 1997).

An aspectual analysis: verbs of (dis)appearance

• Achievement

\( \exists t \in I \) (LOC-IN (car, book, \( t \)) \( \land \forall t' \in I \) (\( t < t' \) \( \rightarrow \) LOC-IN (car, book, \( t' \)))))

→ The direction expression is licensed by phase transition (Fong 1997).

An aspectual analysis: displacement verbs

• Achievements like dao ‘fall’ readily take postverbal zai-PPs.

• Activities with potential end point can shift to Accomplishments and take postverbal zai-PPs.

• Tiao ‘jump’ shifts into Accomplishment if the direction of jumping is downwards.

• Otherwise it cannot shift into Accomplishment.

An aspectual analysis: displacement verbs

• In formal written language, Activities without potential end point combine with post-verbal zai PPs to express location.

• In formal written language, Activities without potential end point combine with post-verbal zai PPs to express location.
Verbs with posterior/anterior entailment
• Verbs with posterior entailment encode a change in the potential to move something. 🆔 compatible with post-verbal zai-PPs to express phase change.
  (15) Ta ba yaoshi wang zai jia li le. he BA key forget at home inside LE ‘He forgot the key at home.’
• Verbs with anterior entailment take ambiguous preverbal zai-PPs, modifying either of the subevents.
  (16) Ta zai shujia shang zao-dao-le na-feng xin. he at shelf top find-Perf that-CL letter
    i. ‘He found that letter when he was on the shelf!’ (location)
    ii. ‘He found that letter when it was on the shelf.’ (direction)

Summary: syntax-semantics mismatch
<table>
<thead>
<tr>
<th>Verbs classes</th>
<th>Event type</th>
<th>Example</th>
<th>Preverbal zai</th>
<th>Postverbal zai</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displacement verbs</td>
<td>Achievement</td>
<td>ding ‘jump’</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Activity</td>
<td>with inherent point</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Activity</td>
<td>without inherent point</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Picture verbs</td>
<td>Achievement</td>
<td>sheng ‘park’</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Placement verbs</td>
<td>Accomplishment</td>
<td>fang ‘put’</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Appearing verbs</td>
<td>Achievement</td>
<td>sheng ‘park’</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Verbs with posterior entailment</td>
<td>Achievement</td>
<td>wan ‘forget’</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Verbs with anterior entailment</td>
<td>Accomplishment</td>
<td>yan-shao ‘buy’</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Diachronic perspective
• Since Early Archaic Chinese the preverbal and postverbal zai have been around with little meaning difference (S. Huang 1978).
• Some constraints on post-verbal zai-PPs can be explained by historical changes (Liu 2009).
• Formal, written language represents different layers of grammars diachronically. We are only concerned with zai-PPs in spoken language.

Experiment: subjects
• Comprehension and production data from Mandarin speakers
  – 16 Mandarin-speaking children aged 2;11 – 6;3 from kindergartens in Shenzhen, matched for sex
  – 8 adult Mandarin native speakers from Shenzhen and HK

An aspectual analysis: summary
• Aspect shift
  – Accomplishment 🆔 Activity / State
  – Achievement 🆔 State
• The directional reading of zai-PPs is caused by the phase change in an event.
• The state verbs can have a locational zai-PP before or after it. Other postverbal zai-PPs exclusively follow verbs with complex event structure and denote phase change.
• Spatial modifier + subevents 🆔 ambiguity

Experiment: procedure
1. **Warm-up**
   • Instruct the subject and train them to say ‘no’
2. **Judgement**
   • View a video on the computer screen and then listen to a prerecorded sentence
   • Acceptability judgment
   • ‘Yes’ 🆔 repeat the sentence (elicited imitation, only for children)
   • ‘No’ 🆔 say a better sentence (elicited production)
Experiment: materials

- 13 sentences including 3 control items

<table>
<thead>
<tr>
<th>Verb type</th>
<th>Word order</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posture V</td>
<td>zuo ‘sit’-PP</td>
<td>direction; location</td>
</tr>
<tr>
<td>Placement V</td>
<td>PP-gua ‘hang’ PP-tie ‘stick’</td>
<td>direction; location</td>
</tr>
<tr>
<td>V with anterior entailment</td>
<td>*zhao-dao ‘find’-PP PP-zhao-dao ‘find’</td>
<td>phase change location</td>
</tr>
<tr>
<td>V with posterior entailment</td>
<td>PP-wang ‘forget’</td>
<td>location</td>
</tr>
<tr>
<td>Activity V</td>
<td>*wan ‘play’-PP</td>
<td>location</td>
</tr>
</tbody>
</table>

Findings: acceptance rates for control items

<table>
<thead>
<tr>
<th>Test sentences</th>
<th>Children # %</th>
<th>Adults # %</th>
</tr>
</thead>
<tbody>
<tr>
<td>*阿姨滑下来从滑梯上了</td>
<td>4 (27%)</td>
<td>0</td>
</tr>
<tr>
<td>*叔叔跳下来从楼梯上了</td>
<td>3 (20%)</td>
<td>0</td>
</tr>
<tr>
<td>*爬上来阿姨了</td>
<td>4/10 (40%)</td>
<td>0</td>
</tr>
</tbody>
</table>

Findings: posture verb

<table>
<thead>
<tr>
<th>Test sentences</th>
<th>Children # %</th>
<th>Adults # %</th>
</tr>
</thead>
<tbody>
<tr>
<td>阿姨坐在长椅上(location)</td>
<td>15 (100%)</td>
<td>8 (100%)</td>
</tr>
<tr>
<td>阿姨坐在椅子上(direction)</td>
<td>15 (100%)</td>
<td>8 (100%)</td>
</tr>
</tbody>
</table>

Findings: placement verbs

<table>
<thead>
<tr>
<th>No.</th>
<th>Test sentences</th>
<th>Children # %</th>
<th>Adults # %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>阿姨在床上挂了一件衣服(location)</td>
<td>14 (93%) 2 (25%)</td>
<td>8 (100%)</td>
</tr>
<tr>
<td>2</td>
<td>阿姨在床上挂了一件衣服(direction)</td>
<td>14 (93%) 8 (100%)</td>
<td>8 (100%)</td>
</tr>
<tr>
<td>3</td>
<td>阿姨在沙发上贴了一张相片(location)</td>
<td>10 (67%) 5 (63%)</td>
<td>8 (100%)</td>
</tr>
<tr>
<td>4</td>
<td>阿姨在沙发上贴了一张相片(direction)</td>
<td>15 (100%)</td>
<td>8 (100%)</td>
</tr>
</tbody>
</table>

Findings: verbs with posterior/anterior entailment

<table>
<thead>
<tr>
<th>Test sentences</th>
<th>Children # %</th>
<th>Adults # %</th>
</tr>
</thead>
<tbody>
<tr>
<td>*阿姨找到了一本书在椅子上(phrase change)</td>
<td>3/9 (33%) 1/7 (14%)</td>
<td></td>
</tr>
<tr>
<td>阿姨在椅子上找到一本书(location)</td>
<td>5/9 (56%) 1/7 (14%)</td>
<td></td>
</tr>
<tr>
<td>阿姨在家里忘了一本书(location/phase change)</td>
<td>8/9 (89%) 2/7 (29%)</td>
<td></td>
</tr>
</tbody>
</table>
Findings: activity verb

<table>
<thead>
<tr>
<th>Test sentences</th>
<th>Children</th>
<th>Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>他放一本书在桌子上</td>
<td>10 (67%)</td>
<td>0</td>
</tr>
</tbody>
</table>

Findings: summary

- All adults and children had the two readings for postverbal *zai*-PPs with posture verb.
- The locational reading for pre-verbal *zai*-PPs is suppressed or encouraged depending on contexts and the hearer’s knowledge of the world. The directional reading was preferred.

Findings: summary

- Children accepted non-target word orders of *zai*-PPs with the Activity verb.
- Children were more inclined to accept the location reading of the preverbal *zai*-PPs than adults.
- Children older than 4;2 are more adultlike in rejecting *wan*-PP; children older than 5;3 are more adultlike with PP-tie (location); such tendency is not found for other test items.

Discussion and conclusions

- Pre- and post-verbal *zai*-PPs are all modifiers even though the latter occupy the complement position of the main verb (cf. Larson 2004, Lin 2008).
- Post-verbal *zai*-PPs modifying the result state of a complex event give rise to the directional reading.
- The interpretation of the *zai*-PP depends on its syntactic position and the aspectual properties of the verb it co-occurs with.

Why are pre-verbal *zai*-PPs ambiguous?

![Diagram](cf. Huang 1994, Lin 2001)

Discussion and conclusions

- Knowledge of event structure and aspect shift is accessible to children, as they have both readings for ambiguous *zai*-PPs.
- Children have a greater tendency than adults to accept nontarget word orders of *zai*-PPs and the locational reading for pre-verbal *zai*-PPs.
- Children may unlearn the nontarget forms through accumulation of lexical semantics of verbs and real world knowledge.
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Selected references