Using Verb Frames for
Text Difficulty Assessment

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Summary

• **Question:** can semantic frames help assess text difficulty?

• **Findings:** Four frame-based features appear to be correlated with text difficulty:
  – Use of non-core frame elements
  – Omission of core frame elements
  – Noun phrase vs. clause as verb argument
  – Metaphoric usage
Data

• Frame data: Mandarin VerbNet
  – http://verbnet.lt.cityu.edu.hk
  – A verbal semantic database (Liu & Chiang, 2008)

• Text data: Sentences containing ten frequent verbs in graded texts
  – Texts drawn from a corpus of Chinese textbooks for Grades 1-12

Liu, M. and Chiang, T. Y. (2008). The construction of Mandarin verbnet: A frame-based study of statement verbs. Language and Linguistics, 9(2):239–270
Non-core Frame Elements

- Difficult texts use non-core frame elements more frequently

| Verb              | Grades |
|-------------------|--------|
|                  | 1-3    | 4-6 | 7+ |
| zhùyìdào ‘notice’ | 0%     | 0%  | 0% |
| diū ‘cast away’   | 0%     | 5.9%| 8.3%|
| sīkǎo ‘reflect’   | 0%     | 7.0%| 22.0%|
| gǎndòng ‘be moved’ | 0% | 55.0% | 40.0% |
| fàng ‘put’        | 4.2%   | 7.7%| 2.0%|
| dānxīn ‘worry’    | 6.3%   | 12.5%| 10.7% |
| hòuhuǐ ‘regret’   | 11.1%  | 0%  | 5.6% |
| zhāojí ‘be anxious’ | 15.4% | 35.7% | 20.8% |
| xīyǐn ‘attract’   | 26.3%  | 18.0%| 42.9% |
| fāxiàn ‘discover’ | 40.8%  | 32.2%| 46.0% |

Percentage of sentences with non-core frame elements
Core Frame elements

• Difficult texts more often drop subjects
  – Frame elements that occupy subject position before the verb are omitted

| Verb                      | Grades |
|---------------------------|--------|
|                           | 1-3    | 4-6   | 7+    |
| gǎndòng ‘be moved’       | 100%   | 100%  | 100%  |
| xīyǐn ‘attract’           | 100%   | 100%  | 100%  |
| zhùyídào ‘notice’         | 100%   | 100%  | 85.7% |
| hòuhū ‘regret’            | 100%   | 100%  | 97.2% |
| dānxīn ‘worry’            | 100%   | 95.8% | 71.4% |
| zháojí ‘be anxious’       | 96.2%  | 78.6% | 79.2% |
| fàng ‘put’                | 91.7%  | 69.2% | 42.9% |
| fāxiàn ‘discover’         | 91.2%  | 87.3% | 76.0% |
| sīkǎo ‘reflect’           | 85.7%  | 80.0% | 67.6% |
| diū ‘cast away’           | 84.6%  | 82.4% | 66.7% |

Percentage of sentences with frame elements serving as the subject of the verb
Clause vs Noun Phrase

• Difficult texts more often choose NPs over clauses as verb argument
  – E.g., "I worry about your health" (NP) vs. "I worry that you would get sick" (clause)

| Verb     | Argument type | Grades 1-3 | Grades 4-6 | Grades 7+ |
|----------|---------------|------------|------------|-----------|
| zhùyídào ‘notice’ | clause       | 80%        | 55.6%      | 41.1%     |
|           | NP            | 20%        | 38.9%      | 53.6%     |
| fāxiàn ‘discover’ | clause     | 78.4%      | 57.6%      | 55.2%     |
|           | NP            | 21.6%      | 51.7%      | 44.1%     |
| dānxīn ‘worry’ | clause       | 75.0%      | 58.3%      | 53.6%     |
|           | NP            | 0%         | 8.3%       | 14.3%     |
| hòuhū ‘regret’ | clause     | 44.4%      | 66.7%      | 50.0%     |
|           | NP            | 0%         | 0%         | 16.7%     |

Percentage of sentences with clause or noun phrase as verb argument
Metaphorical Usage

• Difficult texts use metaphor more often
  – E.g., “put on the heart" ("remember")

| Verb          | Grades |
|---------------|--------|
|               | 1-3    | 4-6    | 7+     |
| fàng ‘put’    | 0.0%   | 19.2%  | **30.60%** |
| diū ‘cast away’| 0.0%   | 11.8%  | **33.30%** |

Percentage of sentences with metaphoric usage