

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

Non-core Frame Elements

- Difficult texts use non-core frame elements more frequently

| Verb | Grades | | |
|----------------------------|--------------|--------------|--------------|
| | 1-3 | 4-6 | 7+ |
| <i>zhùyìdào</i> 'notice' | 0% | 0% | 0% |
| <i>diū</i> 'cast away' | 0% | 5.9% | 8.3% |
| <i>sīkǎo</i> 'reflect' | 0% | 7.0% | 22.0% |
| <i>gǎndòng</i> 'be moved' | 0% | 55.0% | 40.0% |
| <i>fàng</i> 'put' | 4.2% | 7.7% | 2.0% |
| <i>dānxīn</i> 'worry' | 6.3% | 12.5% | 10.7% |
| <i>hòuhuǐ</i> 'regret' | 11.1% | 0% | 5.6% |
| <i>zhāojí</i> 'be anxious' | 15.4% | 35.7% | 20.8% |
| <i>xīyǐn</i> 'attract' | 26.3% | 18.0% | 42.9% |
| <i>fāxiàn</i> '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+ |
| <i>gǎndòng</i> 'be moved' | 100% | 100% | 100% |
| <i>xīyǐn</i> 'attract' | 100% | 100% | 100% |
| <i>zhùyìdào</i> 'notice' | 100% | 100% | 85.7% |
| <i>hòuhuǐ</i> 'regret' | 100% | 100% | 97.2% |
| <i>dānxīn</i> 'worry' | 100% | 95.8% | 71.4% |
| <i>zhāojī</i> 'be anxious' | 96.2% | 78.6% | 79.2% |
| <i>fàng</i> 'put' | 91.7% | 69.2% | 42.9% |
| <i>fāxiàn</i> 'discover' | 91.2% | 87.3% | 76.0% |
| <i>sīkǎo</i> 'reflect' | 85.7% | 80.0% | 67.6% |
| <i>diū</i> '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 | 4-6 | 7+ |
| <i>zhùyìdào</i> 'notice' | clause | 80% | 55.6% | 41.1% |
| | NP | 20% | 38.9% | 53.6% |
| <i>fāxiàn</i> 'discover' | clause | 78.4% | 57.6% | 55.2% |
| | NP | 21.6% | 51.7% | 44.1% |
| <i>dānxīn</i> 'worry' | clause | 75.0% | 58.3% | 53.6% |
| | NP | 0% | 8.3% | 14.3% |
| <i>hòuhuī</i> '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+ |
| <i>fàng</i> ‘put’ | 0.0% | 19.2% | 30.60% |
| <i>diū</i> ‘cast away’ | 0.0% | 11.8% | 33.30% |

Percentage of sentences with metaphoric usage