

A Linguistic Annotation Scheme of Chinese Discourse Structures and Study of Prosodic Interactions



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Outline

I. Introduction

II. Hierarchical Scheme and Annotation Convention – HiSAC

III. Construction of Annotation Corpus

IV. Case Studies of Prosodic Interactions

V. Conclusions

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The definition of discourse

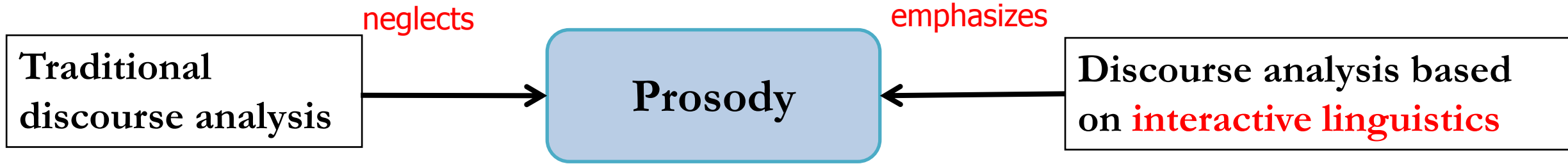
Van Dijk

- Discourse refers to both spoken language and written text
- Three major features or categories of discourse :
 - anything beyond sentence;
 - language use;
 - research on language applications, including non-linguistic contents and those not restricted to a specific language.

Saussure

- Language VS speech
 - Language is a common symbolic system of a group of people, while speech is language-based individual behavior to express or comprehend intentions;
 - language is a stable social phenomenon, while speech is the representation of intentions, hence of individual variations;
 - language is the method of communication and reflection, while speech is the process of communication or the process of utilizing language.
- Spoken discourse comprehension belongs to speech comprehension.

Discourse analysis



- **Speech discourse should be combined with prosodic studies:**
- prosody is systematically organized in a speech discourse
- prosody is fundamental to achieve context-dependent social function.

Typical methods of discourse analysis

- **Intonation-as-grammar approach**
Described the intonation of English with six pitch accents, two phrase tones and two boundary tones.
- **Intonation-and-information flow approach**
Accent units express new/given information in speech communication, while intonation units transmit the focus of speakers.
- **Intonation-as-contextualization approach**
Intonation is regarded as a prime contextualization cue without referential, gradient, and evocative features.
- **Contextual prosody and prosodic contextualization cues approach**
Takes into account duration and intensity as important features, prosodic features could be regarded as a contextualization cue.

Syntactic Features of spoken Chinese

The minor sentence structure (零句)(Chao 1968, Shen 2012). :

- essential , full sentences(整句) are composed of minor sentences.
- could exist dependently and intonationally
- Without subject-predicate forms, usually found in dialogues and other occasions involving acts, mainly in the forms of verb phrases and noun phrases

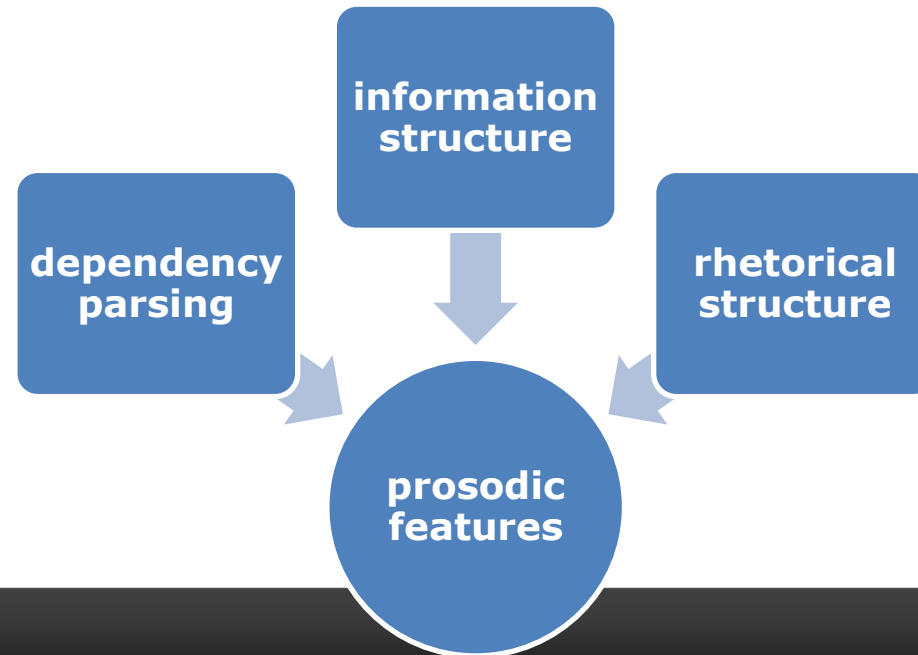
Shen(2012) pointed out that “The advantageous state of minor sentences causes the large amount of flowing sentences (流水句) in Chinese.”

The function of speech discourse

- Key function: transmit information---a flow of information.
- Apart from linguistic meanings, the speakers' emotions, attitudes, and speech acts are also transmitted in discourse.
- Recent studies have focused on the syntactic and prosodic features, but there is a lack of study on how prosodic features in Chinese (especially intonation) encode emotional utterances and speech acts.

HiSAC (Hierarchical Scheme and Annotation Convention for Chinese Discourse)

- ⊙ HiSAC : a hierarchical structure representation system and annotation convention of speech discourse.
- ⊙ Based on HiSAC, an annotation corpus is constructed.
- ⊙ Several on-going case studies are then introduced to provide theoretical and data support to discourse comprehension.



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Representation system of different categories:

Form & Meaning

Form :

- **phonetic & phonological**
- phonemic
- distinctive features

- **syntactic features**
- structure of words,
- syntactic rules,
- structural types of phrases and sentences

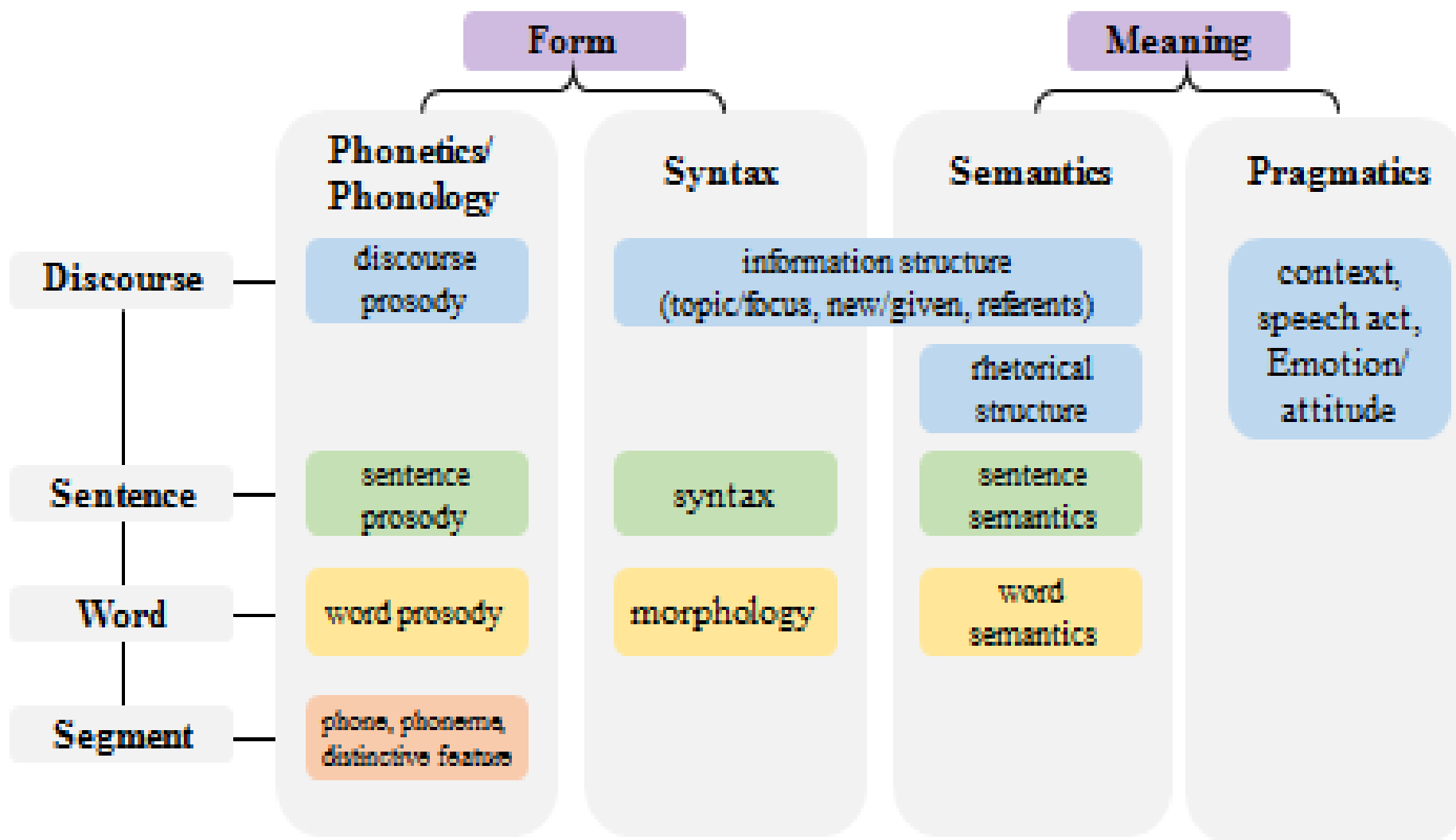
Representation system of different categories:

Form & Meaning

Meaning :

- **semantic :**
the meaning of different levels of linguistic units--words, phrases, sentence and text
- **pragmatic features :**
 - context
 - speech act
 - emotion and attitude

A hierarchical representation system of speech discourse



A hierarchical representation system of speech discourse

(i) Phonetics & Phonology layer :

- the phonemic features of each syllable
- prosodic features from the word level to the discourse level

(ii) Syntax layer :

- Morphology layer : the descriptions of word category and denotation,
- Syntax layer : the dominance relationship among the constituents
based on dependency grammars

A hierarchical representation system of speech discourse

(iii) Semantic layer :

- word & sentence semantics
- information structure : reveals different types of information on the text level based on the division of new-old information and it belongs to both syntax and semantic layer.
- rhetorical relations : describe the coherence between sentences with respect to relation sets.

(iv) Pragmatic layer :

- expressiveness layer
- speech act layer
- context layers

An annotation convention

1. Annotation specifications for *Phonetics & Phonology layer*.

(i) *Phonemic layer*:

annotations of the start and the end of segments are based on both spectrogram and auditory impression.

- syllable-tone tier : annotates the boundary of syllables and the tone pattern.
- onset-rhyme tier :annotates the boundary of vowels and consonants.

(ii) *Word Prosody layer* :

describes the placement of word stress

(iii) *Sentence Prosody layer* :

annotates the perceived prosodic boundary or hierarchical structure. Stresses are hierarchical in sentence level, and this research mainly covers stresses in prosodic phrases and intonation phrases;

(iv) *Discourse prosody layer*:

contains the prosodic boundaries and stress information form the whole discourse.

An annotation convention

2. Annotation specifications for *Syntax layer*:

(i) *Morphology layer* :

- word categories : syntax-oriented, intended to provide syntax-related categorized information.
- Grammatical functions : annotate the lexical meaning and grammatical function of each morpheme. FIR-SIG -- “first person singular”

(ii) *Syntax layer*:

- annotates the dominance relationship and ownership among different syntactic constituents based on dependency grammar.
- eg: (A←B, Label)
dominators (B), dominatees (A) and dependency type (Label)

An annotation convention

3. Annotation specifications for *Semantic layer*:

(i) *Rhetorical structure layer*:

- It analyses discourse by describing the structural relationship among different parts, and focuses on the integrity and coherence of the discourse.
- “Nucleus” “Satellite”
- On defining the relations, we adopt the set of semantic relations proposed by Mann & Thompson, such as Concession.

(ii) *Information structure layer*:

Basis : Riester& Baumann’s representation system

- Lexical category (L-category):
information structures of content words
non-referential phrases
- Referential category (R-category):
referential determiner phrases (DP)
prepositional phrases (PP)

An annotation convention

4. Annotation specifications for *Pragmatics layer*:

- (i) ***Social context layer***: it describes the speaker's gender and the topics of the on-going dialogue.

- (ii) ***Speech acts layer***: it's a multi-level annotation for dialogue including Turns, Dialog-act and Adjacency Pairs and Ill-formedness.

- (iii) ***Expressiveness layer***.
 - Emotion as well as attitude of the speakers are categorically annotated with more than 70 representations, such as happy, appreciate.
 - Each expressive emotion has two grades to further measure the degree of expressiveness.

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DISCOURSE-CASS

An annotation corpus of Chinese discourse, which can be used to study the interactions among grammar, semantics and prosody.

- reading texts & conversation texts
- standard Mandarin
- Genres : narration, argumentation, new report and essay
- read by more than 100 subjects of equal gender ratio

Annotation

annotated by professional transcribers, double checked manually

Basic segmental information:

- syllables, initials and finals
- sound change and variation

The prosodic boundary and stress information :

- C-ToBI system was used for prosodic annotation: prosodic boundaries, stress degrees

The grammatical and semantic information

- Dependency parsing

- The annotation of information structure :
- RefLex scheme

lexical levels	referential levels
given information (l-given)	given information (r-given)
accessible information (l-accessible)	bridging information (r-bridging)
new information (l-new)	unused information (r-unused)
	new information (r-new)
	generic information (r-generic)



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4.1 Dependency Parsing

- In Natural Language Processing, dependency parsing is known as a syntactic or a shallow semantic analysis.
- Pang et al.(2016) elucidate the relationship between prosodic variation and syntactic structure within the framework of dependency parsing in Chinese reading texts corpus and Chinese spoken dialogue corpus respectively.
 1. There is an intrinsic association between duration variation and dependency relation.
 2. The duration variation made a contribution to correctly predict stress distribution: the longer duration accounted for, the more possibly a stress is obtained.

4.2 Information Structure

- Information Structure (IS): deals with characterizing properties of utterances that relate to the information transfer between interlocutors.
- **Liu et al.(2016)**
 1. The information status on each level seems to have an incremental effect on the degree of stress assigned to it.
 2. The new information cannot be treated as a uniform category at the referential level.
 3. The relevance of both referential and lexical levels to the information status in Chinese reading texts.

4.3 Rhetorical Structure

- The Rhetorical Structure Theory (RST) is a theory of text organization that has been further applied to beyond discourse analysis and text generation.
- **Zhang et al.(2014)**
 1. Different types of discourse present different distributions of rhetorical relations.
 2. stress degree in both pre- and post-pausal positions seems to have a significant influence on pause duration.
 3. Nuclearity in both positions separately showed a remarkable effect on pause duration.

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Conclusion

We have proposed :

- A representation system
- An annotation scheme for Chinese discourse
- DISCOURSE-CASS corpus.

We briefly introduced:

- Recent case studies

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Thank You!