Multiparty and Multi-floor dialogue structure
Lecture 1: Discourse Structure

David Traum
Institute for Creative Technologies
University of Southern California
traum@ict.usc.edu
https://people.ict.usc.edu/~traum/

Course Webpage:
https://people.ict.usc.edu/~traum/NASSLLI2022/
Outline for Today

• Introductions
• Basic Definitions: Types of Structure
• Outline of Course
• Overview of Discourse Structure
Basic Terms (1)
Participant settings

• Discourse
• Dialogue
• Multiparty Dialogue
• Multi-floor Dialogue
Basic Terms

• Discourse – coherent extended interaction (more than a single sentence)
• Dialogue
• Multiparty Dialogue
• Multi-floor Dialogue
Example Discourse

- It’s a nice day today
- Isn’t it?
- No rain in sight.
- And a pleasant temperature.
- But we are in a drought!
- I guess too many nice days is not so nice.
Basic Terms

• Discourse – coherent extended interaction (more than a single sentence)
• Dialogue – coherent interaction between multiple participants
• Multiparty Dialogue
• Multi-floor Dialogue
Example Dialogue

A It’s a nice day today
B Is it?
A No rain in sight.
A And a pleasant temperature.
B But we are in a drought!
A I guess too many nice days is not so nice.
Basic Terms

- **Discourse** – coherent extended interaction (more than a single sentence)
- **Dialogue** – coherent interaction between multiple participants
- **Multiparty Dialogue** – dialogue between more than two participants
- **Multi-floor Dialogue**
Example Multi-party Dialogue

A It’s a nice day today
B Is it?
A No rain in sight.
A And a pleasant temperature.
B But we are in a drought!
C I guess too many nice days is not so nice.
Basic Terms

• Discourse – coherent extended interaction (more than a single sentence)
• Dialogue – coherent interaction between multiple participants
• Multiparty Dialogue – dialogue between more than two participants
• Multi-floor Dialogue - interacting conversations with overlap between participants and content
Example Multi-floor Dialogue

**Floor 1: Face to Face**

A  It’s a nice day Today
B  Is it?
A  No rain in sight.
A  And a pleasant temperature.
B  But we are in a drought!
C  I guess too many nice days is not so nice.

**Floor 2: texting**

A  What’s the temperature?
D  25 degrees
A  Fahrenheit?
D  No, Celsius.

A  Thanks!
Terms

• Participant
• Participant Roles
  – Utterance (Speaker/Hearer, Reader/Writer, ICP/OCP)
  – Conversation (Active Participant, Side-participant)
  – Task (Director/Matcher, Giver/receiver, teacher/student)
• Conversation
• Floor
Basic Terms (2)

• Context – aspects outside the utterance itself that are important to interpret the meaning/function
• Dialogue State
• Discourse/Dialogue Structure
Basic Terms

• Context – aspects outside the utterance itself that are important to interpret the meaning/function

• Dialogue State – current configuration of context preserving (only) the aspects necessary for understanding subsequent utterances

• Discourse/Discourse Structure
Basic Terms

• Context – aspects outside the utterance itself that are important to interpret the meaning/function

• Dialogue State – current configuration of context preserving (only) the aspects necessary for understanding subsequent utterances

• Discourse/Dialogue Structure – structural aspects of context, how new utterances combine with old to change dialogue state
Some Uses for Discourse Structure

• Carries some of the meaning, beyond meanings of individual units

• Used for future language interpretation – filling in underspecified values from relevant context
  – Pronouns
  – Ellipsis
  – Questions under discussion

• Used for automated language generation – creating interpretable, coherent, interesting, and compelling text

• Summarization (describe most important parts)
Aspects of utterance meaning

• Truth-conditions
  – Is an assertion true or false
• Function
  – How is an utterance used to impact participants
• State Update
  – How does an utterance change the dialogue state
• Relational
  – How is meaning created by performance of an utterance in the context of others
Linguistic Structure

• How units cluster with each other, in contrast to differences from other units/clusters
• How sub-units combine to form new higher-level units
• How units are related to each other
• How units impact the Dialogue State
Linguistic Levels

• Phone Phoneme
• Morpheme
• Word
• Phrase
• Clause
• Sentence
• Discourse
Organizing Principles for Discourse Structure

- Temporal sequencing
- Surface features (syntax, morphology, phonetics, prosody)
- Meaning
- Effect
- Purpose
Interactional Levels

• Discourse
  – Single speaker/writer

• Dialogue
  – At least two participants, alternating producer/receiver roles

• Multiparty Dialogue
  – More than two participants, more roles than producer/receiver

• Multi-floor dialogue
  – Multiple conversations, sharing at least one (but not all) participants and information flowing between them.
Example Discourse

• It’s a nice day today
• Isn’t it?
• No rain in sight.
• And a pleasant temperature.
• But we are in a drought!
• I guess too many nice days is not so nice.
Example Dialogue

A It’s a nice day today
B Is it?
A No rain in sight.
A And a pleasant temperature.
B But we are in a drought!
A I guess too many nice days is not so nice.
Example Multi-party Dialogue

A It’s a nice day today
B Is it?
A No rain in sight.
A And a pleasant temperature.
B But we are in a drought!
C I guess too many nice days is not so nice.
Example Multi-floor Dialogue

Floor 1: Face to Face
A  It’s a nice day Today
B  Is it?
A  No rain in sight.

A  And a pleasant temperature.
B  But we are in a drought!
C  I guess too many nice days is not so nice.

Floor 2: texting
A  What’s the temperature?
D  25 degrees
A  Fahrenheit?
D  No, Celsius.

A  Thanks!
Types of Structure: organizing methods
Linear Structure: Segmentation

• Find boundary points between units
• E.g., Sentences, utterances. Paragraphs
• Turn:

A It’s a nice day today. (Turn 1)
B Is it? (Turn 2)
A No rain in sight. (Turn 3)
A And a pleasant temperature. (Turn 3)
Relations

• E.g. question-answer
  1. A: Where are you going?
  2. B: Probably to the Student Union. (Answer to 1)

• Symmetric or asymmetric?

• Nuclearity?
State change (for unit)

• Example: Question Answer:
  – Question introduces Obligation (Traum & Allen ‘94) or puts Question Under Discussion (Ginzburg)
  – Answer resolves obligation
Discontinuous Units

• Example Question-Answer Relation

• 2 Interruption (multiple threads)
  – E.g. answer
    1. A: Where are you going?
    2. B: It’s a nice day today.
    3. B: Probably to the Student Union.
Modelling Discontinuous Units

- Set membership
- Constraints on Accessible structures
Hierarchical Structure

• Units contain other units as constituents
  – E.g. answer
  1. A: Where are you going? (Unit 1)
  2. B: When? (Unit 2)
  3. A: For Lunch
  4. B: Oh, probably to the Student Union. (Unit 1)
Overview of Course

• Today: Introductions, terms and concepts, Intro to Discourse Structure
• Tomorrow: Dialogue structure. Additional complications from multiple language producers with separate mental states. What is new and what no longer applies?
• Wed: Multiparty dialogue. Beyond the dyad. How does this complicate aspects of dialogue state? What new phenomena are present? How to handle?
• Thursday: Multi-floor dialogue – multiple conversations, partly separate partly linked. Multi-communication,
• Friday: advanced issues with context in multi-floor dialogue
Overview of Course - Today

• Introductions,
• terms and concepts,
• Overview of Course
• Intro to Discourse Structure
  – RST
  – Grosz & Sidner’s tripartite Theory
  – Hovy & Maier 92
  – ISO Dialogue relations
Overview of Course – Tomorrow
Aspects of Dialogue structure

- Participant Roles,
- Media Considerations,
- Turn-taking,
- Adjacency Pairs/IR Units,
- Initiative,
- Feedback and Repair,
- Grounding,
- Dialogue Games,
- Transaction Units,
- Thread management.
Overview of Course – Wednesday
Multiparty dialogue

• Beyond the dyad
• How does this complicate aspects of dialogue state?
• What new phenomena are present?
• How to handle?
• How does this shed light on dialogue more generally?
Overview of Course – Thursday
Multi-floor dialogue

• Multi-communicating
• Media and accessibility concerns
• Examples from everyday life and military missions
• Botlanguage setting, system and structure annotation scheme
Overview of Course – Friday
Multi-floor dialogue (continued)

• Role of non-linguistic context
  – Situations
  – Images
  – History
  – Visual accessibility
  – Plans

• Others?
Overview of Discourse Structure
Example Discourse

• It’s a nice day today
• Isn’t it?
• No rain in sight.
• And a pleasant temperature.
• But we are in a drought!
• I guess too many nice days is not so nice.
Scrambled Discourse

• But we are in a drought!
• Isn’t it?
• And a pleasant temperature.
• It’s a nice day today
• I guess too many nice days is not so nice.
• No rain in sight.
Example Discourse – anaphora, ellipsis, & cue words

• It’s a nice day today
• Isn’t it __?
• No rain in sight.
• And a pleasant temperature.
• But we are in a drought!
• I guess too many nice days is not so nice.
Scrambled Discourse

• But we are in a drought!
• Isn’t it __?
• And a pleasant temperature.
• It’s a nice day today
• I guess too many nice days is not so nice.
• No rain in sight.
Discourse Structure

• Discourse Elements
• Text
  – Basic units (clauses, utterances)
• Participants (fixed roles)
  – Speaker/writer
  – Hearer/reader
Discourse Levels

- Described events (Fabula, Diegetic)
- Speech time
Rhetorical Structure Theory (RST)

• Predominance of Nucleus/Satellite structural patterns
• Functional Basis of Hierarchy
• Communicative role of text structure
• Describe relations of clauses
  – Relating meanings of conjunctions
  – Grammar of clause combining
1. The next music day is scheduled for July 21 (Saturday), noon-midnight.
2. I’ll post more details later,
3. but this is a good time to reserve the place on your calendar.

Figure 3: RST diagram of "Music Day" text
1. Farmington police had to help control traffic recently

2. when hundreds of people lined up to be among the first applying for jobs at the yet-to-open Marriott Hotel.

3. The hotel’s help-wanted announcement - for 300 openings - was a rare opportunity for many unemployed.

4. The people waiting in line carried a message, a refutation, of claims that the jobless could be employed if only they showed enough moxie.

5. Every rule has exceptions,

6. but the tragic and too-common tableaux of hundreds or even thousands of people snake-lining up for any task with a paycheck illustrates a lack of jobs,

7. not laziness.
Elements of RST

- Relations
- Schemas
- Schema Applications
- Structures
Relations

• Constraints on Nucleus
• Constraints on Satellite
• Constraints on combination
• Effect
Schema types

circumstance

contrast

JOINT

motivation enablement

sequence sequence
## Relations

**Table 1: Organization of the Relation Definitions**

<table>
<thead>
<tr>
<th>Each-Of</th>
<th>Antithesis and Concession</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circumstance</td>
<td>Antithesis</td>
</tr>
<tr>
<td>Solutionhood</td>
<td>Concession</td>
</tr>
<tr>
<td>Elaboration</td>
<td>Condition</td>
</tr>
<tr>
<td>Background</td>
<td>Otherwise</td>
</tr>
<tr>
<td>Enablement and Motivation</td>
<td>Interpretation and Evaluation</td>
</tr>
<tr>
<td>Enablement</td>
<td>Interpretation</td>
</tr>
<tr>
<td>Motivation</td>
<td>Evaluation</td>
</tr>
<tr>
<td>Evidence and Justify</td>
<td>Restatement and Summary</td>
</tr>
<tr>
<td>Evidence</td>
<td>Restatement</td>
</tr>
<tr>
<td>Justify</td>
<td>Summary</td>
</tr>
<tr>
<td>Relations of Cause</td>
<td>Other Relations</td>
</tr>
<tr>
<td>Volitional Cause</td>
<td>Sequence</td>
</tr>
<tr>
<td>Non-Volitional Cause</td>
<td>Contrast</td>
</tr>
<tr>
<td>Volitional Result</td>
<td></td>
</tr>
<tr>
<td>Non-Volitional Result</td>
<td></td>
</tr>
<tr>
<td>Purpose</td>
<td></td>
</tr>
</tbody>
</table>

S: (a) Come home by 5:00. (b) Then we can go to the hardware store before it closes. (c) That way we can finish the bookshelves tonight.

Intentional Analysis

Information

<table>
<thead>
<tr>
<th>motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>c</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>a</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>b</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>c</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>a</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>b</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>c</th>
</tr>
</thead>
</table>
Grosz & Sidner (1986)

- 3 Kinds of Structure
  - Linguistic structure
    - Discourse Segments
  - Intentional structure
    - Discourse Segment Purposes
  - Attentional state
    - Focus spaces
G&S: Linguistic Structure

• Utterances as basic units
• Discourse Segments
• Hierarchical structure: segments can contain other segments and/or utterances
  – Surface reflection of relationships of intentional structure
Intentional Structure

• Discourse Purpose
• Discourse Segment Purpose
• Relations:
  – Dominance
  – Satisfaction Precedence
G&S: Attentional State

- Set of Focus Spaces
- Stack data structure for accessibility
  - Relevant parts of intentional structure
G&S: Movie Essay Example

1. The "movies" are so attractive to the great American public, especially to young people, that it is time to take careful thought about their effect on mind and morals.

2. Ought any parent to permit his children to attend a moving picture show often or without being quite certain of the show he permits them to see?

3. No one can deny, of course, that great educational and ethical gains may be made through the movies because of their astonishing vividness.

4. But the important fact to be determined is the total result of continuous and indiscriminate attendance on shows of this kind. Can it be other than harmful?

5. In the first place the character of the plays is seldom of the best.

6. One has only to read the ever-present "movie" billboard to see how cheap, melodramatic and vulgar most of the photoplays are.

7. Even the best plays, moreover, are bound to be exciting and over-emotional.

8. Without spoken words, facial expression and gesture must carry the meaning.

9. But only strong emotion, or buffoonery can be represented through facial expression and gesture.

10. The more reasonable and quiet aspects of life are necessarily neglected.

11. How can our young people drink in through their eyes a continuous spectacle of intense and strained activity and feeling without harmful effects?

12. Parents and teachers will do well to guard the young against overindulgence in the taste for the "movie".

13. (Intend ICP (Believe OCP PO))
   where PO = the proposition that parents and teachers should guard the young from overindulgence in the movies.

14. (Intend ICP (Believe OCP P1))
   where P1 = the proposition that it is time to consider the effect of movies on mind and morals.

15. (Intend ICP (Believe OCP P2))
   where P2 = the proposition that young people cannot drink in through their eyes a continuous spectacle of intense and strained activity without harmful effects.

16. (Intend ICP (Believe OCP P3))
   where P3 = the proposition that it is undeniable that great educational and ethical gains may be made through the movies.

17. (Intend ICP (Believe OCP P4))
   where P4 = the proposition that although there are gains, the total result of continuous and indiscriminate attendance at movies is harmful.

18. (Intend ICP (Believe OCP P5))
   where P5 = the proposition that the content of movies (i.e., the character of the plays) is not the best.

19. (Intend ICP (Believe OCP P6))
   where P6 = the proposition that the stories (i.e., the plays) in movies are exciting and over-emotional.

20. (Intend ICP (Believe OCP P7))
   where P7 = the proposition that movies portray strong emotion and buffoonery neglecting the quiet and reasonable aspects of life.
Hovy & Maier (94)

- Composite set of relations
ISO Discourse Relation Scheme

- A discourse relation is a relation expressed in discourse (written, spoken, or multimodal) between abstract objects, such as events, states, conditions, and dialogue acts.
- Discourse relations can be expressed explicitly in text/speech or can be implicit. The annotation of implicit relations may optionally include the specification of a connective that could express the inferred relation.
- A discourse relation takes two and only two arguments. Arguments can be shared by different relations.
- The meaning of discourse relations is described in informational terms.
- Pragmatic aspects of meaning involving beliefs and dialogue acts as arguments are represented as a property of arguments, rather than of discourse relations.
- Discourse relations are categorized as a flat set of relations.
- Annotations are at a low level; ISO DR-Core is agnostic towards the nature of the global structure of a text or dialogue.
- Asymmetrical relations are represented with relation-specific argument role labels.
- The relative importance of a relation’s arguments with respect to the text as a whole is not represented as such.
- No apriori assumptions are made concerning constraints on syntactic form, syntactic complexity, or textual adjacency of expressions that may realize the arguments of a discourse relation.
<table>
<thead>
<tr>
<th>ISO DRel</th>
<th>Symmetry</th>
<th>Relation and Argument-Role Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cause</td>
<td>Asymmetric</td>
<td>Arg1 provides a reason for Arg2 to come about or occur.</td>
</tr>
<tr>
<td>2. Condition</td>
<td>Asymmetric</td>
<td>Arg1 is an unrealized situation which, when realized, would lead to Arg2.</td>
</tr>
<tr>
<td>3. Negative Condition</td>
<td>Asymmetric</td>
<td>Arg1 is an unrealized situation which, when not realized, would lead to Arg2.</td>
</tr>
<tr>
<td>4. Purpose</td>
<td>Asymmetric</td>
<td>Arg1 enables Arg2.</td>
</tr>
<tr>
<td>5. Manner</td>
<td>Asymmetric</td>
<td>Arg1 is a way in which Arg2 comes about or occurs.</td>
</tr>
<tr>
<td>6. Concession</td>
<td>Asymmetric</td>
<td>An expected causal relation between Arg1 and Arg2, where Arg1 is expected to cause Arg2, is cancelled or denied by Arg2.</td>
</tr>
<tr>
<td>7. Contrast</td>
<td>Symmetric</td>
<td>One or more differences between Arg1 and Arg2 are highlighted with respect to what each predicates as a whole or to some entities they mention.</td>
</tr>
<tr>
<td>8. Exception</td>
<td>Asymmetric</td>
<td>Arg1 evokes a set of circumstances in which the described situation holds, while Arg2 indicates one or more instances where it doesn’t.</td>
</tr>
<tr>
<td>9. Similarity</td>
<td>Symmetric</td>
<td>One or more similarities between Arg1 and Arg2 are highlighted with respect to what each predicates as a whole or to some entities they mention.</td>
</tr>
<tr>
<td>10. Substitution</td>
<td>Asymmetric</td>
<td>Arg1 and Arg2 are alternatives, with Arg2 being the favored or chosen alternative.</td>
</tr>
<tr>
<td>11. Conjunction</td>
<td>Symmetric</td>
<td>Arg1 and Arg2 bear the same relation to some other situation evoked in the discourse. Their conjunction indicates that they are doing the same thing with respect to that situation, or are doing it together.</td>
</tr>
<tr>
<td>12. Disjunction</td>
<td>Symmetric</td>
<td>Arg1 and Arg2 are alternatives, with either one or both holding.</td>
</tr>
<tr>
<td>13. Exemplification</td>
<td>Asymmetric</td>
<td>Arg1 describes a set of situations; Arg2 is an element of that set.</td>
</tr>
<tr>
<td>14. Elaboration</td>
<td>Asymmetric</td>
<td>Arg1 and Arg2 are the same situation, but Arg2 contains more detail.</td>
</tr>
<tr>
<td>15. Restatement</td>
<td>Symmetric</td>
<td>Arg1 and Arg2 are the same situation, but described from different perspectives.</td>
</tr>
<tr>
<td>16. Synchrony</td>
<td>Symmetric</td>
<td>Some degree of temporal overlap exists between Arg1 and Arg2. All forms of overlap are included.</td>
</tr>
<tr>
<td>17. Asynchrony</td>
<td>Asymmetric</td>
<td>Arg1 temporally precedes Arg2.</td>
</tr>
<tr>
<td>18. Expansion</td>
<td>Asymmetric</td>
<td>Arg2 provides further description about some entity or entities in Arg1, expanding the narrative forward of which Arg1 is a part, or expanding on the setting relevant for interpreting Arg1. The Arg1 and Arg2 situations are distinct.</td>
</tr>
<tr>
<td>19. Functional dependence</td>
<td>Asymmetric</td>
<td>Arg2 is a dialogue act with a responsive communicative function; Arg1 is the dialogue act(s) that Arg2 responds to.</td>
</tr>
<tr>
<td>20. Feedback dependence</td>
<td>Asymmetric</td>
<td>Arg2 is a feedback act that provides or elicits information about the understanding or evaluation by one of the dialogue participants of Arg1, a communicative event that occurred earlier in the discourse.</td>
</tr>
<tr>
<td>Discourse relation</td>
<td>Argument role labels</td>
<td></td>
</tr>
<tr>
<td>------------------------------</td>
<td>-----------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>1   Cause</td>
<td>Reason, Result</td>
<td></td>
</tr>
<tr>
<td>2   Concession</td>
<td>Expectation-raiser, Expectation-denier</td>
<td></td>
</tr>
<tr>
<td>3   Elaboration</td>
<td>Broad, Specific</td>
<td></td>
</tr>
<tr>
<td>4   Restatement</td>
<td>n.a.</td>
<td></td>
</tr>
<tr>
<td>5   Condition</td>
<td>Antecedent, Consequent</td>
<td></td>
</tr>
<tr>
<td>6   Negative Condition</td>
<td>Negated-Antecedent, Consequent</td>
<td></td>
</tr>
<tr>
<td>7   Contrast</td>
<td>n.a.</td>
<td></td>
</tr>
<tr>
<td>8   Similarity</td>
<td>n.a.</td>
<td></td>
</tr>
<tr>
<td>9   Expansion</td>
<td>Foreground, Entity-description</td>
<td></td>
</tr>
<tr>
<td>10  Purpose</td>
<td>Goal, Enablement</td>
<td></td>
</tr>
<tr>
<td>11  Manner</td>
<td>Means, Achievement</td>
<td></td>
</tr>
<tr>
<td>12  Exception</td>
<td>Regular, Exclusion</td>
<td></td>
</tr>
<tr>
<td>13  Substitution</td>
<td>Disfavoured-alternative, Favoured-alternative</td>
<td></td>
</tr>
<tr>
<td>14  Conjunction</td>
<td>n.a.</td>
<td></td>
</tr>
<tr>
<td>15  Disjunction</td>
<td>n.a.</td>
<td></td>
</tr>
<tr>
<td>16  Exemplification</td>
<td>Set, Instance</td>
<td></td>
</tr>
<tr>
<td>17  Synchrony</td>
<td>n.a.</td>
<td></td>
</tr>
<tr>
<td>18  Asynchrony</td>
<td>Before, After</td>
<td></td>
</tr>
<tr>
<td>19  Functional dependence</td>
<td>Antecedent-act, Dependent-act</td>
<td></td>
</tr>
<tr>
<td>20  Feedback dependence</td>
<td>Feedback-scope, Feedback-act</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Role labels for arguments of ISO DR-Core discourse relations
# ISO Relations to other schemes (1)

<table>
<thead>
<tr>
<th>ISO DR-Core</th>
<th>RST</th>
<th>RST Treebank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause</td>
<td>Vol. cause, Non-vol. cause, Vol. result, Non-vol. result, Evidence, Justify</td>
<td>Cause, Consequence, Result, Evidence, Explanation-argumentation, Reason</td>
</tr>
<tr>
<td>Condition</td>
<td>Condition</td>
<td>Condition, Contingency, Hypothetical</td>
</tr>
<tr>
<td>Negative Condition</td>
<td>Otherwise</td>
<td>Otherwise</td>
</tr>
<tr>
<td>Purpose</td>
<td>Purpose</td>
<td>Purpose</td>
</tr>
<tr>
<td>Manner</td>
<td>–</td>
<td>Manner, Means</td>
</tr>
<tr>
<td>Concession</td>
<td>Concession</td>
<td>Concession, Antithesis, Preference</td>
</tr>
<tr>
<td>Contrast</td>
<td>Contrast</td>
<td>Comparison</td>
</tr>
<tr>
<td>Exception</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Similarity</td>
<td>–</td>
<td>Analogy, Proportion</td>
</tr>
<tr>
<td>Substitution</td>
<td>Antithesis</td>
<td>–</td>
</tr>
<tr>
<td>Conjunction</td>
<td>Joint</td>
<td>List</td>
</tr>
<tr>
<td>Disjunction</td>
<td>Joint</td>
<td>Disjunction</td>
</tr>
<tr>
<td>Exemplification</td>
<td>Elaboration (set-member)</td>
<td>Elaboration set-member, Example</td>
</tr>
<tr>
<td>Restatement</td>
<td>Restatement</td>
<td>–</td>
</tr>
<tr>
<td>Synchrony</td>
<td>–</td>
<td>Temporal-same-time</td>
</tr>
<tr>
<td>Asynchrony</td>
<td>Sequence</td>
<td>Temporal-before, Temporal-after, Sequence, Inverted-sequence</td>
</tr>
<tr>
<td>Expansion</td>
<td>Elaboration (object-attribute)</td>
<td>Elaboration object-attribute, Elaboration additional</td>
</tr>
</tbody>
</table>

Table 3: Mapping between discourse relations in ISO DR-Core, RST, and RST Treebank
## ISO Relations to other schemes (2)

<table>
<thead>
<tr>
<th>ISO DR-Core</th>
<th>PDTB</th>
<th>Sanders et al/DiscAn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause</td>
<td>Reason, Result, Justification</td>
<td>Causal-Semantic-Basic-Positive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Causal-Semantic-NonBasic-Positive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Causal-Pragmatic-Basic-Positive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Causal-Pragmatic-NonBasic-Positive</td>
</tr>
<tr>
<td>Condition</td>
<td>Hypothetical, General, UnrealPast, UnrealPresent, FactualPast, FactualPresent</td>
<td>Causal-Semantic-Basic-Positive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Causal-Semantic-NonBasic-Positive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Causal-Pragmatic-Basic-Positive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Causal-Pragmatic-NonBasic-Positive</td>
</tr>
<tr>
<td>Negative Condition</td>
<td>Condition</td>
<td></td>
</tr>
<tr>
<td>Purpose</td>
<td>Result</td>
<td>Causal-Pragmatic-Basic-Positive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Causal-Pragmatic-NonBasic-Positive</td>
</tr>
<tr>
<td>Manner</td>
<td>–</td>
<td>AdditiveSemantic-Basic-Positive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AdditiveSemantic-NonBasic-Positive</td>
</tr>
<tr>
<td>Concession</td>
<td>Expectation, Contra-Expectation</td>
<td>Causal-Semantic-Basic-Positive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Additive-Semantic-Negative</td>
</tr>
<tr>
<td>Contrast</td>
<td>Juxtaposition, Opposition</td>
<td>Additive-Semantic-Negative</td>
</tr>
<tr>
<td>Exception</td>
<td>Exception</td>
<td>Additive-Semantic-Negative</td>
</tr>
<tr>
<td>Similarity</td>
<td>Conjunction</td>
<td>Additive-Semantic-Positive</td>
</tr>
<tr>
<td>Substitution</td>
<td>Chosen Alternative</td>
<td>Additive-Semantic-Negative</td>
</tr>
<tr>
<td>Conjunction</td>
<td>Conjunction, List</td>
<td>Additive-Semantic-Positive</td>
</tr>
<tr>
<td>Disjunction</td>
<td>Disjunctive, Conjunctive</td>
<td>Additive-Semantic-Negative</td>
</tr>
<tr>
<td>Exemplification</td>
<td>Instantiation</td>
<td>Additive-Semantic-Positive</td>
</tr>
<tr>
<td>Elaboration</td>
<td>Generalization, Specification</td>
<td>Additive-Semantic-Positive</td>
</tr>
<tr>
<td>Restatement</td>
<td>Equivalence</td>
<td>–</td>
</tr>
<tr>
<td>Synchrony</td>
<td>Synchronous</td>
<td>–</td>
</tr>
<tr>
<td>Asynchrony</td>
<td>Precedence, Succession</td>
<td>–</td>
</tr>
<tr>
<td>Expansion</td>
<td>EntRel</td>
<td>Additive-Semantic-Positive</td>
</tr>
</tbody>
</table>
Some Other Important Approaches to Discourse Structure

- Hobbs ‘78, ’79, ‘90
- Polanyi ‘88 Linguistic Discourse Model
- Discourse Representation Theory (DRT)
- Segmented Discourse Representation Theory (SDRT)
- Penn Discourse Treebank (PDTB)
Issues

• One (primary) structure or many?
  – If many, independent or mutually constraining?
• How many and which relations?
• Nuclearity?
• Focus on hierarchical structure or relational structure?
• Text (Semantics), or participants/situation (pragmatics)
• Focus on semantic/pragmatic relation or explicit discourse marker
• How to evaluate?
Evaluation

• Inter-annotator reliability
• How to account for impact of other structures?
• Partial matches
  – Ratio of content grouped together
  – Boundaries matching
  – Hierarchical structure
• (Passonneau & Litman, 1997)
1. Listen, lad. I built this kingdom up from nothing.
2. When I started here, all there was was swamp.
3. Other kings said I was daft to build a castle on a swamp,
4. but I built it all the same,
5. just to show 'em.
6. It sank into the swamp.
7. So, I built a second one.
8. That sank into the swamp.
9. So, I built a third one.
10. That burned down, fell over, then sank into the swamp,
11. but the fourth one... stayed up!
12. And that's what you're gonna get, lad: the strongest castle in these islands.
Next time

• Dialogue Structure
  – Multiple participants can change roles
  – Intentions of multiple participants
  – Interactional factors