Discourse Deixis: Reference to Discourse Segments

Bonnie Lynn Webber
Presented by Zhichao Hu
<zhu@ucsc.edu>
Computational Approaches to Discourse Understanding

- Two-part goal:
  1) To identify those aspects of discourse understanding that require process-based accounts
  2) To characterize the processes and data structures they involve

- **Deictic** pronoun is a pronoun whose reference must be fixed through the context of the utterance.
- **Anaphoric** pronoun refers to a pronoun which 'refers back' to another constituent in the sentence.
Two Constructs in Theories of Discourse Understanding

• **Discourse entity**
  – Discourse entities provide these theories with a uniform way of explaining what it is that noun phrases (NP) and pronouns in a discourse refer to.
  – Features:
    • It is a constant within the current discourse model
    • One can attribute to it properties and relationships with other entities
  – NPs:
    • Evoke a new discourse entity in the listener's discourse model
    • Refer to ones that are already there.
      – Correspond to outside world
      – “Refer in a model”: refer$_m$, referent$_m$
Two Constructs in Theories of Discourse Understanding

- **Discourse segment**: a chunking of a linguistic text into sequences of related clauses or sentences.

<table>
<thead>
<tr>
<th></th>
<th>To Unify a Segment</th>
<th>Minimal Segment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grosz &amp; Sidner</td>
<td>a chunk of text that expresses a common purpose (discourse segment purpose) with</td>
<td>a single sentence</td>
</tr>
<tr>
<td></td>
<td>respect to the speaker's plans</td>
<td></td>
</tr>
<tr>
<td>Hobbs</td>
<td>a chunk of text that has a common meaning</td>
<td>a sentence</td>
</tr>
<tr>
<td>Nakhimovsky</td>
<td>a chunk of text that describes a single event from a single perspective (considering only narrative)</td>
<td></td>
</tr>
<tr>
<td>Polanyi</td>
<td></td>
<td>a clause</td>
</tr>
</tbody>
</table>
Two Constructs in Theories of Discourse Understanding

- **Discourse segment**: defined recursively – tree structure

![Diagram of discourse segmentation](image)

* indicates “complete”
The Problem

• Different associations:
  – Discourse entities go with NPs (to explain anaphoric and definite reference\textsubscript{m})
  – Discourse segments go with sentences or clauses (to explain textual coherence and discourse structure).

• This leaves a gap in the case of reference\textsubscript{m} to what can only be taken to be some aspect of a sequence of clauses, sentences or utterances (e.g., its content, form, modality, etc.)
The Problem

Example 2
The tools come from the development of new types of computing devices. Just as we thought of intelligence in terms of servomechanism in the 1950s, and in terms of sequential computers in the sixties and seventies, we are now beginning to think in terms of parallel computers, in which tens of thousands of processors work together. *This* is not a deep, philosophical shift, but it is of great practical importance, since it is now possible to study large emergent systems experimentally.

1. Such reference\textsubscript{m} involves the same processes used to explain how a pronoun or NP evokes and/or refers\textsubscript{m} to a discourse entity
2. Some other sort of process is involved

This paper argues for the latter, giving evidence for a separate reference\textsubscript{m} process, by which a linguistic expression is:

1. First interpreted as a pointer to the representation of a discourse segment
2. And then further constrained to specify either
   (a) a particular aspect of the discourse segment (e.g., its form, interpretation, speech act, etc.) or
   (b) a particular entity within its interpretation
Justifying a Second Referring PROCESS

- Subsequent reference can be made to some aspect of a sequence of clauses in text
- Such subsequent reference is most often done via deictic pronouns (“this” or “that”)

<table>
<thead>
<tr>
<th></th>
<th>Using pronoun “it”</th>
<th>Using “this” or “that”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clausal material</td>
<td>14/79 (~18%)</td>
<td>65/79 (82%)</td>
</tr>
<tr>
<td>Discourse entities</td>
<td>39/41 (~95%)</td>
<td>2/41 (~5%)</td>
</tr>
</tbody>
</table>
Justifying a Second Referring Process

• The referent_\textsubscript{m} is often distinct from the things described in the sequence.

Example 3

There's two houses you might be interested in:

House A is in Palo Alto. It's got 3 bedrooms and 2 baths, and was built in 1950. It's on a quarter acre, with a lovely garden, and the owner is asking $425K. But that's all I know about it.

House B is in Portola Vally. It's got 3 bedrooms, 4 baths and a kidney-shaped pool, and was also built in 1950. It's on 4 acres of steep wooded slope, with a view of the mountains. The owner is asking $600K. I heard all this from a friend, who saw the house yesterday.

Is that enough information for you to decide which to look at?

Example 4

There's two houses you might be interested in:

House A is in Palo Alto, House B in Portola Vally. Both were built in 1950, and both have 3 bedrooms. House A has 2 baths, and B, 4. House B also has a kidney-shaped pool. House A is on a quarter acre, with a lovely garden, while House B is on 4 acres of steep wooded slope, with a view of the mountains. The owner of House A is asking $425K. The owner of House B is asking $600K. That's all I know about House A. This I heard from a friend, who saw House B before it came on the market.

Is that enough information for you to decide which to look at?
Justifying a Second Referring\textsubscript{m} Process

• The only sequences of utterances that appear to allow such pronominal reference\textsubscript{m} are ones that intuitively constitute a discourse segment.

Example 1

It’s always been presumed that \[1\text{ when the glaciers receded, the area got very hot. The Folsom men couldn’t adapt, and they died out.}\] \[1\text{(That’s what is supposed to have happened. It’s the textbook dogma. But it’s wrong. They were human and smart. They adapted their weapons and culture, and they survived.)}\]

Example 5

...it should be possible to identify certain functions as being unnecessary for thought by studying patients whose cognitive abilities are unaffected by locally confined damage to the brain. For example, \[1\text{ binocular stereo fusion is known to take place in a specific area of the cortex near the back of the head.}\] \[2\text{ Patients with damage to this area of the cortex have visual handicaps but show no obvious impairment in their ability to think.}\] \[2\text{(This suggests that stereo fusion is not necessary for thought.}\] \[1\text{(This is a simple example, and the conclusion is not surprising....)}\]
Justifying a Second Referring$_m$ Process

• Summary: in the process of discourse understanding, a referent$_m$ must be associated with each discourse segment, independent of the things it describes.

• Three properties of this referent$_m$:
  – the speech act import of the segment
  – the form of the segment
  – its interpretation (e.g., as a situation, event, object description, etc.)

• There is not enough evidence that these discourse segment referents$_m$ should be considered discourse entities like their NP-evoked counterparts.

• However, if every discourse segment evokes a discourse entity, an account will be needed of
  – When in the course of processing a segment such a thing happens
  – What the 'focus' status of each of these entities is
Features of Deictic Reference

• The process of resolving discourse segment reference:
  1. An input pronoun is first interpreted as a pointer to a representation of a discourse segment on the right frontier.
  2. As the rest of the clause containing the pronoun is interpreted, pronoun interpretation may be either:
     • Further constrained to some property of the discourse segment representation
     • Extended to one of the discourse entities within the interpretation of the segment
  3. As a consequence of whether *this* or *that* was used, the listener characterizes the speakers "psychological distance" to its referent as either "close" or "far away". That is, this well-known deictic feature of *this/that* is not used in the referent-finding process but rather afterwards in attributing the speakers' relationship to that referent.
Features of Deictic Reference

Step 1 (pointing)

• The only discourse segments available are ones on the right frontier. Evidence:
  – It being true of the 69 clausally-referring instances of this and that found in the five texts
  – The oddity of examples like the following variation of Example 3 (counter-example)

Example 3'

There's two houses you might be interested in:

House A is in Palo Alto. It's got 3 bedrooms and 2 baths, and was built in 1950. It's on a quarter acre, with a lovely garden, and the owner is asking $425K.

House B is in Portola Valley. It's got 3 bedrooms, 4 baths and a kidney-shaped pool, and was also built in 1950. It's on 4 acres of steep wooded slope, with a view of the mountains. The owner is asking $600K. I heard all this from a friend, who saw the house yesterday. #But that's all I know about House A.4

Is that enough information for you to decide which to look at?
Features of Deictic Reference

Step 1 (pointing)

• There may be more than one discourse segment on the right frontier, part of the reference resolution process involves identifying which one is intended.

• The listener's choice depends on what is compatible with the meaning of the rest of the sentence.

Example 5

...it should be possible to identify certain functions as being unnecessary for thought by studying patients whose cognitive abilities are unaffected by locally confined damage to the brain. For example, binocular stereo fusion is known to take place in a specific area of the cortex near the back of the head. Patients with damage to this area of the cortex have visual handicaps but show no obvious impairment in their ability to think. This ....

This suggests that stereo fusion is not necessary for thought.

This is only a simple example, and the conclusion is not surprising...
Features of Deictic Reference

Step 1 (pointing)

Example 7

[A and A_Junior are standing in A’s art gallery]
A: Someday this will all be yours.

The business

The physical gallery

The pictures
Features of Deictic Reference

Step 2 (interpretation)

- The process must then be able to further coerce the interpretation to be some property of the discourse segment representation or to some entity within it.

Example 6

A: Hey, they've promoted Fred to second vice president.  
B1: That's a lie.  
B2: That's a funny way to describe the situation.  
B3: When did that happen?  
B4: That's a weird thing for them to do.

(* that speech act *)

(* that expression *)

(* that event *)

(* that action *)

Example 8

A: In the Antarctic autumn, Emperor penguins migrate to Tasmania.  
B1: That's where they wait out the long Antarctic winter.  
B2: So that's what you're likely to see there in May.  
B3: That's when it begins to get too cold even for a penguin.

(* that place *)

(* that time *)

(* that species of birds *)
Features of Deictic Reference

Step 2 (interpretation)

• Why two-stage?
  – Most instances of this and that are as the first NP in a clause
  – the listener cannot say for sure what they refer to until more evidence comes in from the rest of the sentence

Example 9

Gladys told Sam last night that Fred was a complete jerk.

a. Anyway, that's what Fred believes that Gladys said.

b. Anyway, that's what Fred believes that Gladys did.
Features of Deictic Reference

Step 2 (interpretation)

• When a deictic pronoun specifies an NP-evoked discourse entity, it must actually be part of its corresponding discourse segment interpretation.

• Anaphoric NPs can easily refer to things associated in some way with an existing entity.

Example 10

John and Mary decided to go on a picnic. While they remembered most things, they forgot to put the picnic supplies in the cooler. So when they got to the park, the beer was warm.

Example 11

John and Mary decided to go on a picnic. While they remembered most things, they forgot to put the picnic supplies in the cooler. So when they got to the park, that beer was warm.
Features of Deictic Reference

Step 2 (interpretation)

• The anaphoric NP may refer to something associated with the current focus
• The deictic NP must point to something already explicitly included there

Example 12

a. Some files are superfiles.
b. To screw up some one's directory, look at the files.
c. If one of them is a superfile, ....

Example 13

a. Some files are superfiles.
b. To screw up some one's directory, look at those files.
c. They will tell you which of his files is absolutely vital to him.
Features of Deictic Reference

Step 3 (distance)

• Distinguish "this" and "that"
  – "Psychological distance" feature of the deictic only comes into play after the referent is found
  – Distinguished by their effect on the discourse focus

Example 1

It's always been presumed that when the glaciers receded, the area got very hot. The Folsom men couldn’t adapt, and they died out. That’s what is supposed to have happened. It’s the textbook dogma. But it’s wrong. They were human and smart. They adapted their weapons and culture, and they survived.

Example 16

They wouldn’t hear to my giving up my career in New York. That was where I belonged. That was where I had to be to do my work. [Peter Taylor, A Summons to Memphis, p.68]
Thank you!