

## Chapter 5 Discourse analysis.

### 1. Explain coreference and anaphoric reference with the help of an example?

The **anaphoric** reference occurs when a word or phrase refers back to another word or phrase that has already been mentioned in the text. For example, consider the following sentence: "Mary went to the store to buy some milk. She forgot her wallet."

In this sentence, "She" is an example of an anaphoric reference, as it refers back to "Mary", the subject of the previous sentence. The use of "she" helps to avoid repetition and maintain cohesion in the text.

**Coreference**, on the other hand, occurs when two or more words or phrases refer to the same entity or concept. For example, consider the following sentence: "John loves his dog. He takes care of it every day."

In this sentence, "John" and "he" are coreferential, as they both refer to the same person. Similarly, "his dog" and "it" are coreferential, as they both refer to the same pet. Coreference is an important aspect of language comprehension and production, as it helps to disambiguate references and maintain coherence in discourse.

### 2. Explain the working of Hobbs Algorithm to build the reference resolution system

### Hobb's Algorithm

- Simple syntax-based algorithm that on syntactic parser .
- Searches syntactic trees of current and preceding sentences in breadth-first, left-to-right manner.
- Stops when it finds matching NP.

```
graph TD
    S1[S1] --- NP1[NP1]
    S1 --- VP1[VP]
    NP1 --- Det1[Det]
    NP1 --- N1[N]
    Det1 --- NP2[NP2]
    Det1 --- s['s']
    NP2 --- Lyn[Lyn]
    N1 --- mom[mom]
    VP1 --- V1[V]
    V1 --- is[is]
    VP1 --- NP[NP]
    NP --- Det[Det]
    NP --- N3[N3]
    Det --- a[a]
    N3 --- N[N]
    N --- gardener[gardener]

    S2[S2] --- NP4[NP4]
    S2 --- VP2[VP]
    NP4 --- Craig[Craig]
    VP2 --- V2[V]
    V2 --- likes[likes]
    VP2 --- NP5[NP5]
    NP5 --- her[her]
```

- Start search at NP5 in S2.
- Reject NP4 as no NP node between it and X (S2).
- What would have happened if the subject was Craig's mom?
- Move to S1. NP1 is first NP we encounter, so finish.
- Result: Lyn's mom

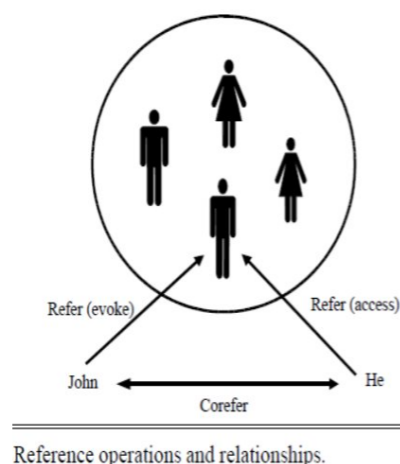
### 3. Write a short note on the Terminology Used in Reference Resolution.

## Terminology Used in Reference Resolution

- **Referring expression** – The natural language expression that is used to perform reference is called a referring expression.  
e.g, Ram, the manager of ABC bank, saw his friend Shyam at a shop. He went to meet him.  
is a referring expression.
- **Referent** – It is the entity that is referred.  
e.g., in the last given example Ram is a referent.
- **Corefer** – When two expressions are used to refer to the same entity, they are called corefers.  
For example, Ram and he are corefers.
- **Antecedent** – The term has the license to use another term.  
For example, Ram is the antecedent of the reference he.
- **Anaphora & Anaphoric** – It may be defined as the reference to an entity that has been previously introduced into the sentence. And, the referring expression is called anaphoric.  
e.g. Ram is officer, He(anaphora) went to bank. → Anaphoric
- **Discourse model** – The model that contains the entities that have been referred to in the discourse and the relationship they are engaged in.

## Terminology Used in Reference Resolution

- **Discourse context:** Natural languages provide speakers with a variety of ways to refer to entities.  
E.g. *my friend's car, it, this, that, this car, that car, the car.*
- **Situational context:** We cannot use 'it' or 'this' if friend's car has not been mentioned before, and it is not in the immediate surroundings of the discourse participants
- **Evoked:** When a referent is first time mentioned in a discourse
- **Accessed:** In subsequent mention, this entity is **accessed** from the model.



4. Explain Discourse Model with help of a suitable example.

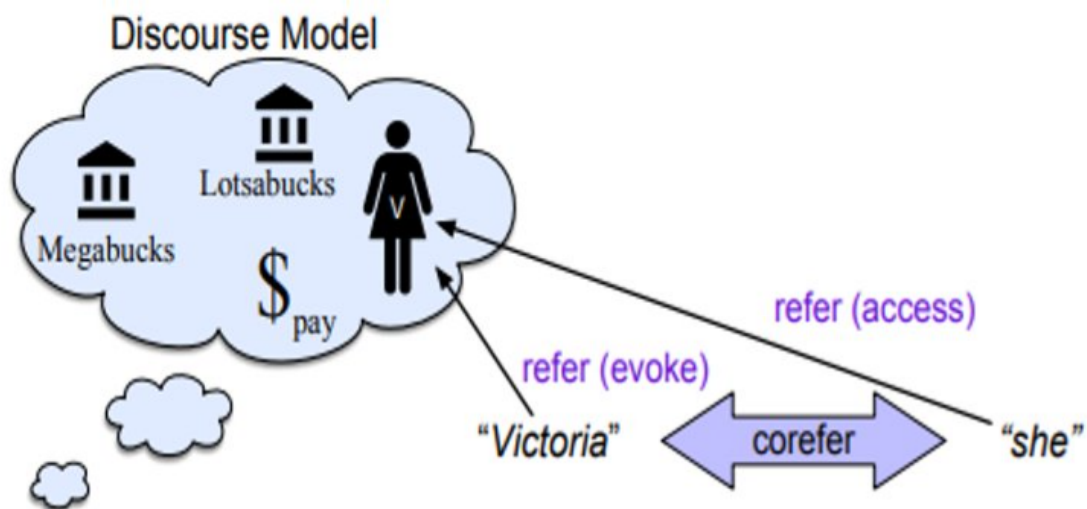
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## Discourse Model

- Natural language processing systems (and humans) interpret linguistic expressions with respect to a discourse model
- It is a mental model that the understander builds incrementally when interpreting a text,
- containing representations of the entities referred to in the text, as well as properties of the entities and relations among them.
- When a referent is evoked first mentioned in a discourse, then a representation for it is evoked into the accessed model.
- Upon subsequent mention, this representation is accessed from the model.

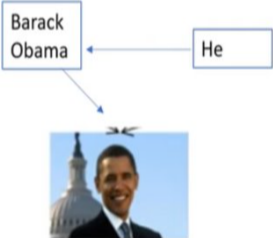
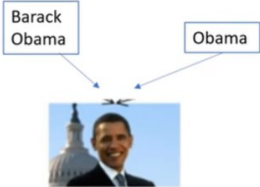
## Discourse Model

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- **Reference** in a text **to an entity** that has been **previously introduced** into the discourse is called **anaphora**,
- the **referring expression** used is said to be an **anaphor, or anaphoric**.
- In the above example the pronouns she and her and the definite NP the 38-year-old are therefore anaphoric.
- The anaphor corefers with a prior antecedent mention (in this case Victoria Chen) that is called the antecedent.
- Not every referring expression is an antecedent.
- An entity that has only a single mention in a text singleton (like Lotsabucks )is called a singleton.

## 5. Differentiate between anaphora and coreference.

Anaphora	Coreference
Anaphora is a type of reference that involves a word or phrase referring back to a previously mentioned word or phrase in the same discourse.	Coreference, on the other hand, refers to two or more expressions in a discourse that refer to the same entity.
The function of anaphora is to create cohesion and coherence in a text by referring back to previously mentioned ideas or concepts. Anaphora helps the reader to understand how ideas or concepts are related to each other.	On the other hand, the function of coreference is to reduce redundancy in a text by using different expressions to refer to the same entity.
<p>Text :</p> <p>World :</p> 	<p>Text :</p> <p>World :</p> 

6. What are the types of Referring Expressions and types of referents ? Explain with a suitable example.

## Types of Referring Expressions

- The Six types of referring expressions are described below –
- **Indefinite Noun Phrases**
- Such kind of reference represents the entities that are new to the hearer into the discourse context.  
e.g. Ram had gone to bring him some food → some is an indefinite reference.
- **Definite Noun Phrases**
- Opposite to above, such kind of reference represents the entities that are not new or identifiable to the hearer into the discourse context.  
e.g. I used to read The Times of India – The Times of India is a definite reference.
- **Pronouns**
- It is a form of definite reference.  
e.g. Ram laughed as loud as he could. The word 'he' represents pronoun referring expression.

## Types of Referring Expressions

- **Demonstratives**
- These demonstrate and behave differently than simple definite pronouns.  
e.g. this and that are demonstrative pronouns.
- **Names**
- It is the simplest type of referring expression. It can be the name of a person, organization and location also.  
e.g. in the above examples, Ram is the name-referring expression.
- **One Anaphora:** This use of **one** can be roughly paraphrased by *one of them*.  
e.g. John has two girlfriends, but I only have 'one'.

## Types of referents

A few interesting types of referents that complicate the reference resolution problem.

Ram(**referent**) is a manager. He (**reference**) goes to office everyday

- **Inferables:** A referring expression does not refer to an entity that has been explicitly evoked in the text, but instead one that is inferentially related to an evoked entity. Such referents are called *inferables*.

e.g. I almost bought an Acura Integra today, but a **'door'** had a dent and **the 'engine'** seemed noisy.

Infer: it is not just any door, but one of the doors of the Integra

## Types of referents

- **Discontinuous Sets:** references using plural referring expressions like *they* and *them* refer to sets of entities that are evoked together,

e.g. John and Mary love their Acuras. **'They'** drive **'them'** all the time.

**e.g.** John has an Acura, and Mary has a Mazda. **They** drive **them** all the time.

- **Generics:** Below example *they does not* refers to the 6 Integras mentioned in the first sentence, but instead to the class of Integras in general.

e.g. I saw no less than 6 Acura Integras today. **'They'** are the coolest cars.

### 7. Explain the constraints and preferences in reference Resolution.

#### • Reference Resolution

##### • 1. Constraints and Preferences

- Constraints that rule out certain referents can be checked
- Constraints of number, gender, case
- Semantic constraints can also be used to identify a preferred referent

##### a) Person agreement

Referent and referring expressions must agree in person

Eg: Zuha and I bought a camera. We like capturing nature scenes

(We = I and Zuha)

Zuha and Prabha bought a camera. We like capturing nature scenes

Resolving We into Zuha and Prabha incorrect

- Gender agreement
  - Zuha bought a printer. She is printing now (She = Zuha, not printer)
  - Zuha bought a printer. It is printing now (It = printer, not Zuha)
- Case agreement
  - The position where a pronoun is used constraints its form. Eg: In the object position we use him, her, them and in subject position we use he, she etc
- Selectional Restrictions
  - Selectional restrictions placed by verbs on their arguments can be used to resolve references
    - Eg: Zuha put an apple on the table. Suha is eating it.
      - It refers to apple and not table since eat can take only an edible object

#### PREFERENCES:

- Recently introduced references
  - While resolving references, the entities introduced recently are considered more important than ones introduced further back
- Parallelism
  - Zuha went with Suha to the computer shop. Danish went with her to the computer institute.
    - Her refers to Suha and not Zuha, due to structural parallelism
- Repeated Mention
  - Refers to the idea that entities that are focused on in prior discourses are more likely to continue to be focused on subsequent discourses
    - Eg: Lucid was the first among the six women to join the astronaut program. A veteran of 5 space flights, logging 223 days in spaces, **she** hold the international record.....  
In 1998 **she** wrote in The Scientific American that **she** viewed the Mir mission.....