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# ERROR HANDLING IN DIALOG MANAGEMENT

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# OUTLINE

- Error Types
- Error Detection
- Error Handling
- Error Prevention
- Summary

# ERROR TYPES (I)

- Two main categories:
  - Misunderstanding: listener's interpretation not in line with the speaker's intentions
  - Non-understanding: total interpretation failure / uncertainty of interpretation
- Example:

A: I have a red building on my left

B: - How many stories does the blue building have?

- What color did you say?

- Did you say red?

**misunderstanding/  
non-understanding ?**

(Skantze, 2007)

## ERROR TYPES (2)

- Two main categories :
  - Misunderstanding
  - Non-understanding
- Example:

A: I have a red building on my left

B: - How many stories does the blue building have?

- What color did you say?

- Did you say red?

*misunderstanding*

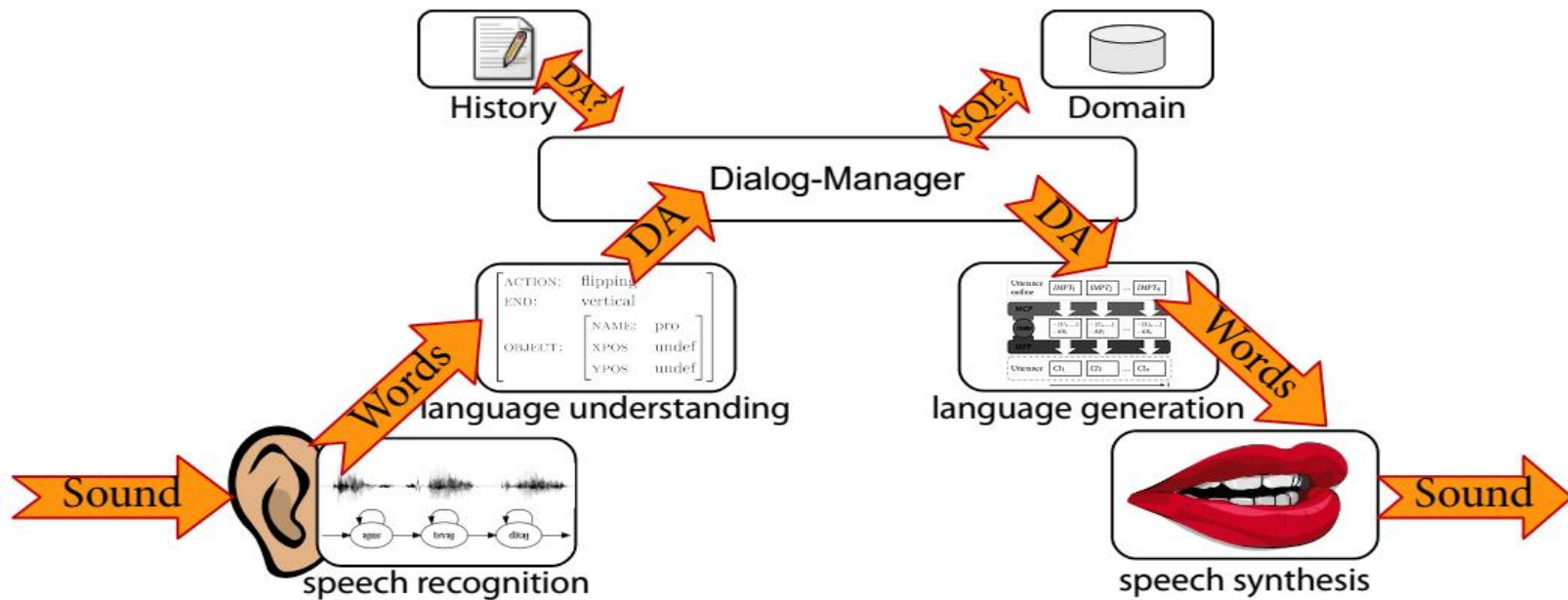
*non-understanding*

*non-understanding*

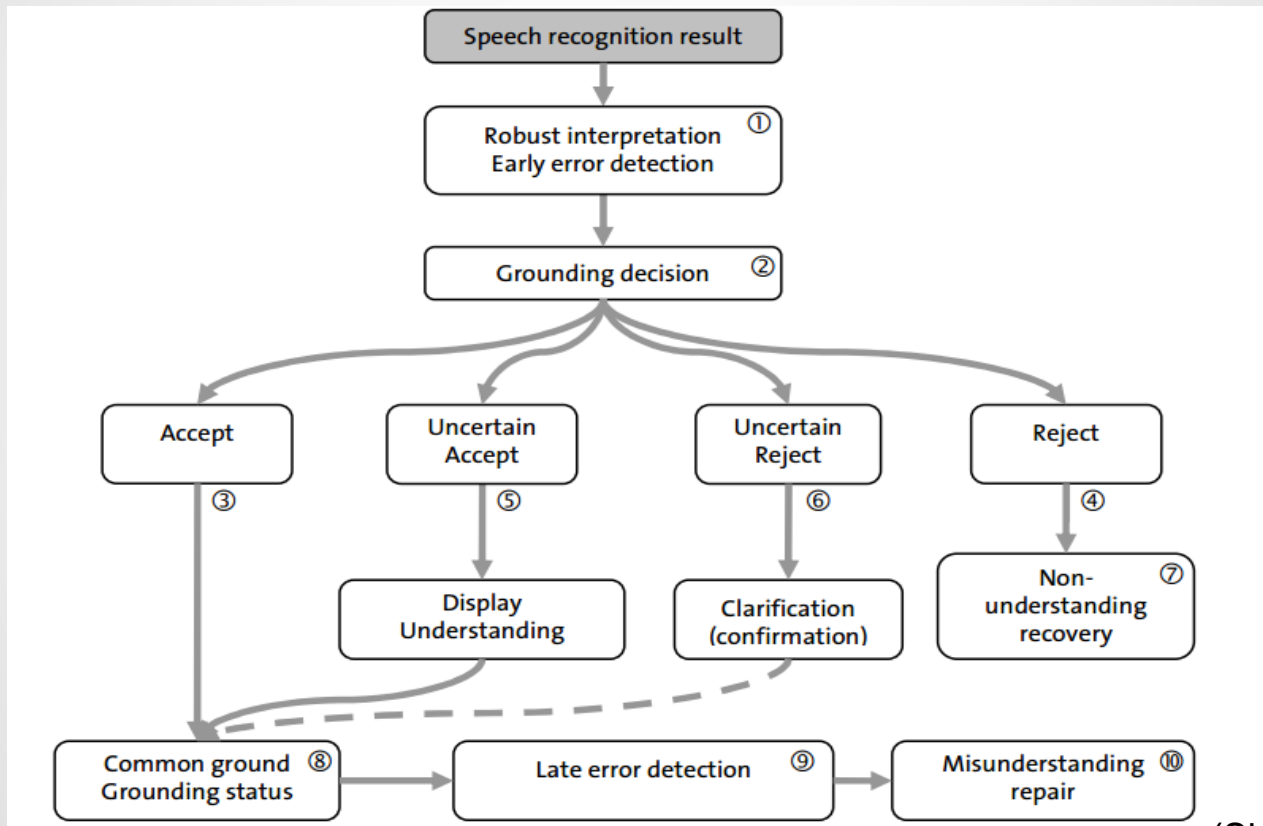
(Skantze, 2007)

# ERROR DETECTION (I)

- Which errors can happen in a dialog when A talks to B?



# OVERVIEW



(Skantze, 2007)

# ERROR DETECTION (2)

- Early Error Detection: Before accept/reject hypothesis
- Late Error Detection: After accept/reject hypothesis
- Example:
  - U: I can see a brown building.*
  - S: A blue building, ok, can you see something else?*
  - U: No, a brown building.*
- Online Detection (Meena et al., 2015)

(Skantze, 2007)

# ERROR DETECTION (3)

- Detection Techniques:
  - Confidence level:
    - Accept
    - Displaying understanding
    - Clarification request
    - Reject
  - Speaker's uncertainty (Krammer et al., 2001):
    - Prosody: delay, high intonation, filled pause
    - Visual cues: eyebrow movements, smile, low gaze, high gaze, diverted gaze, funny face.
  - Dialog history (Meena 2015)
  - Grammar
  - Spelling



# ERROR HANDLING (I)

- Early Error Detected:
  - Repetition Request
  - Clarification Request

*U: I have a red building on my left.  
S: Red or blue?*
  - Referent Ambiguity (Marge, 2015):
    - Intrinsic properties
    - History
    - Egocentric Proximity
    - Object Proximity
    - Example:
      - *Do you mean the table in front of me?*
      - *Should I go to the small or big table?*

# ERROR HANDLING (2)

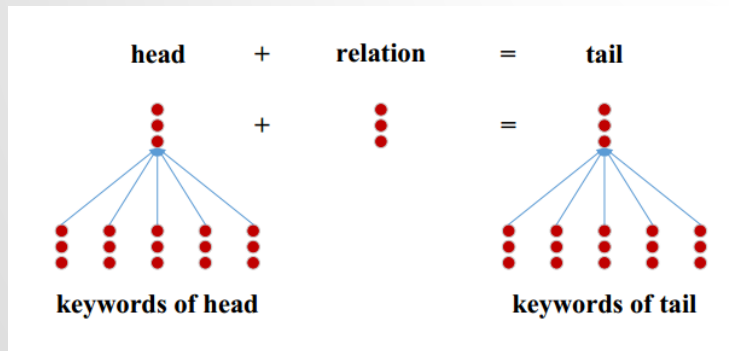
- Late Error Detected:
  - Remove erroneous hypothesis:
    - Late clarification request (Skantze, 2007), e.g.:
      - A: I am on Blackberry Street.*
      - B: Take to the left.*
      - A: Ok, now I am on Cranberry Street.*
      - B: Weren't you on Blueberry Street before you turned?*

# ERROR HANDLING (3)

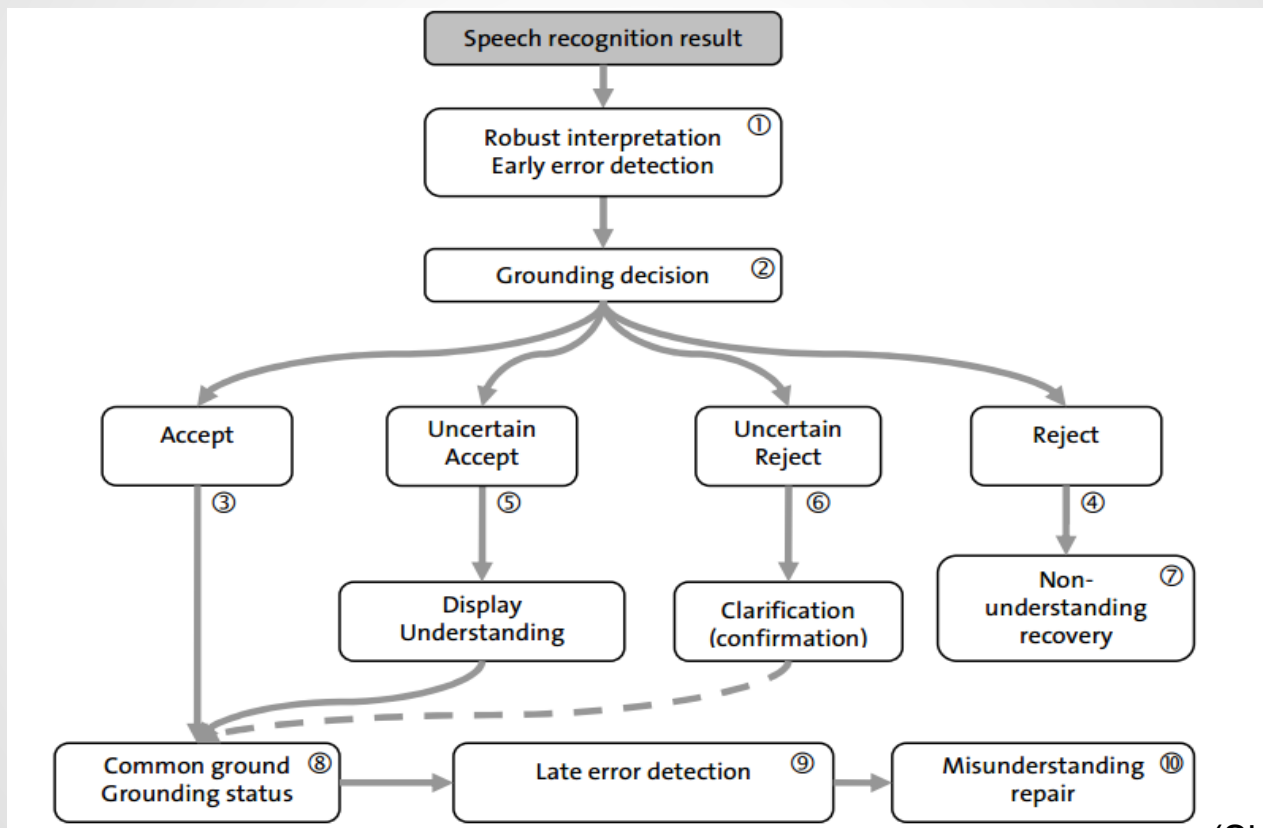
- Late Error Detected:
  - Restore information state (Larsson 2002)
    - S: How may I help you?*
    - U: Can you recommend a Turkish restaurant in downtown area?*
    - S: Could you please rephrase that?*
    - U: A Turkish restaurant in downtown.*
    - S: Clowns, which serves Italian food, is a great restaurant in downtown.*
    - U: I am looking for a Turkish restaurant.*
  - Online Error detection: (Meena et al., 2015)
  - Difficult to implement sophisticated model to detect the error

# ERROR PREVENTION

- Repetition
- Referent Identification (him, her...)
- Collect more data to improve language model
- Facts to increase confidence score
- Semantics: using (CBOW) continuous bag-of-words encoder (Xie, 2016)



# SUMMARY



(Skantze, 2007)

# THE END

Thank you for your attention.

Any question?

## Literature:

- Skantze, G. (2007). Error Handling in Spoken Dialogue Systems-Managing Uncertainty, Grounding and Miscommunication. Gabriel Skantze.
- Marge, M., & Rudnicky, A. I. (2015, September). Miscommunication Recovery in Physically Situated Dialogue. In *16th Annual Meeting of the Special Interest Group on Discourse and Dialogue* (p. 22).
- Meena, R., Skantze, J. L. G., & Gustafson, J. (2015, September). Automatic Detection of Miscommunication in Spoken Dialogue Systems. In *16th Annual Meeting of the Special Interest Group on Discourse and Dialogue* (p. 354).