Computational Linguistics

2D

CSC 485/2501
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2d. Syntax and Interpretation

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Reading: Jurafsky & Martin: 12.3.4–6, 15.0–3*;
[Allen: *4.1–5]; Bird et al: 9.

Goal of parsing

- A representation of properties relevant to meaning and interpretation:

  - Things
  - Predicates (events)

    Entities (e.g., in a knowledge base)

  - Roles

    Relations between things and predicates.

- Syntactic structure helps in:

  - Determining **things** and **predicates**.
  - Determining mapping of **things** to **roles** of **predicates**.

Example

The goalie kicked the ball.

Event: *kicked*

Role: Agent
(doer)

Role: Theme
(thing affected)

Thing: *The goalie*   Thing: *the ball*

```
kick (agent=goalie, theme=ball)
```

Syntax ↔ interpretation

- Mapping from structure to *objects of interpretation*
  - Things: NPs, Ss
  - Predicates: verbs, preps, APs
  - Roles: ??

- What are the roles in these examples?

  Sara left.
  Joan found the treasure in the garage.
  Ken put the ball in the garage.
  Tim cut the wire with a pair of scissors.
  Melissa visited Ottawa with Nadia.
  Andrew felt like a failure.

Syntax ↔ interpretation

- Mapping from structure to *objects of interpretation*
  - Things: NPs, Ss
  - Predicates: verbs, preps, APs
  - Roles: ?? **(thematic roles)**
- What are the roles in these examples?

Ken put the ball in the garage.
Joan found the treasure in the garage.
Tim cut the wire with a pair of scissors.
Melissa visited Ottawa with Nadia.
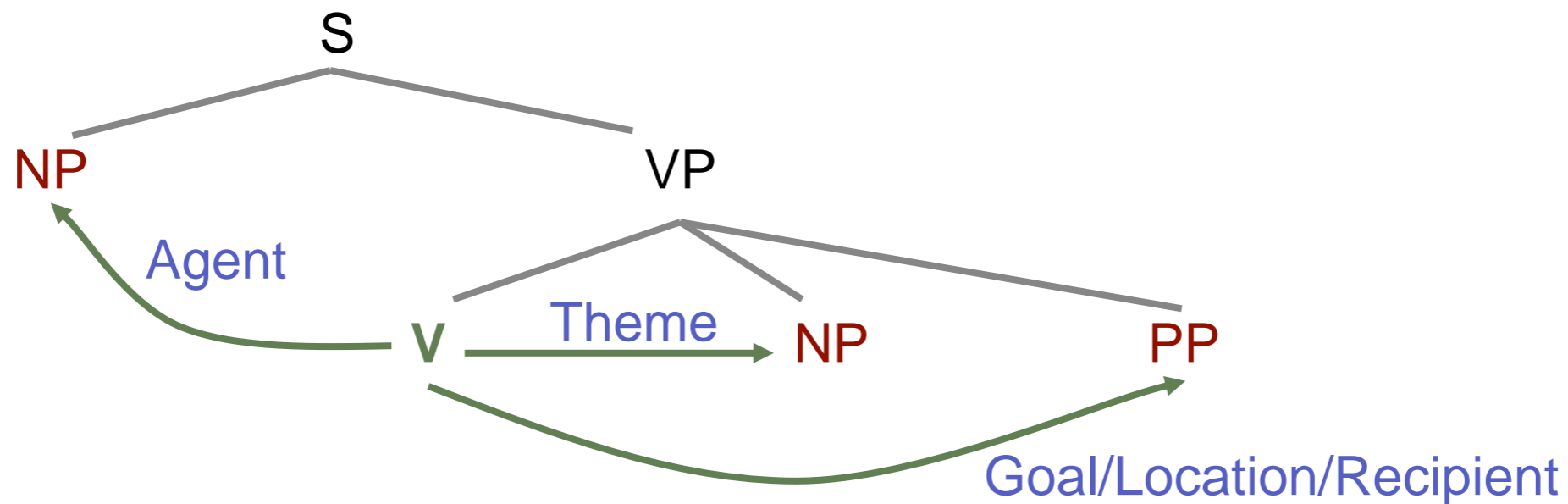*Sara left.*
Andrew felt like a failure.

Syntax ↔ thematic roles

- Parse trees more or less indicate grammatical function:

  Subject ≈ Agent
  Object ≈ Theme
  Object of preposition ≈ Goal/Location/Recipient

- This mapping is used to determine appropriate semantic representation.

Case **vs.**Grammatical function **vs.**Thematic role

- Mapping from case to grammatical function is entirely regular (in English, but not 1-to-1):
Subject: nominative/subjective
Object: accusative/objective
Object of preposition: accusative/objective

- Mapping from grammatical function to thematic role is more or less regular:

  Subject ≈ Agent / Experiencer
  Object ≈ Theme
  Object of preposition ≈ Goal/Location/
  Recipient / Instrument

- The latter mapping is used to determine appropriate semantic representation.

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Verb subcategorization

- **Problem:** Constraints on individual verbs and their complements not at all regular.

  *Nadia told / instructed / *said / *informed Ross to sit down.*
  *Nadia *told / *instructed / said / *informed to sit down.*
  *Nadia told / *instructed / *said / informed Ross of the requirement to sit down.*

  Nadia gave / donated her painting to the museum.
  *Nadia gave / *donated the museum her painting.*

  Nadia put / ate the cake in the kitchen.
  *Nadia *put / ate the cake.*

- We will return to this later…

Diathesis 1

The goalie kicked the ball.

Event: *kicked*

Role: Agent
(doer)

Role: Theme
(thing affected)

Thing: *the goalie*   Thing: *the ball*

```
kick (agent=goalie, theme=ball)
```

Diathesis 2

The ball was kicked.

Event: *kicked*

Role: Theme
(thing affected)

Thing: *the ball*

```
kick (agent=?, theme=ball)
```

The ball was kicked by the goalie.

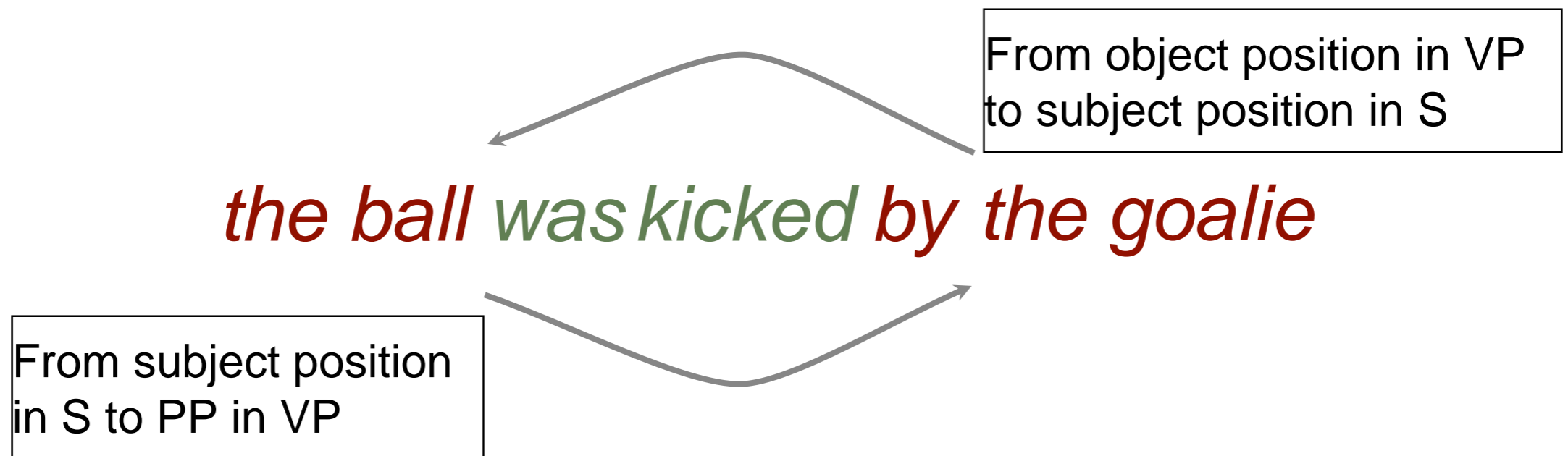Event: *kicked*

Role: Theme
(thing affected)

Role: Agent
(doer)

Thing: *the ball*   Thing: *the goalie*

```
kick (agent=goalie, theme=ball)
```

Diathetic alternation

the goalie *kicked* *the ball*

Diathetic alternation

From object position in VP
to subject position in S

the ball was kicked by the goalie

From subject position
in S to PP in VP

But the semantic representation doesn't change