1. Mutability of Meaning
   - Introduction
   - Language is Compositional

2. Generative Lexicon
   - Strong Compositionality
   - Type Structure
   - Mechanics of Selection

3. Selection at Work
   - Type Coercion
   - Explaining Argument Flexibility

4. Classifiers
   - Arrernte
1. Mutability of Meaning
   - Introduction
   - Language is Compositional

2. Generative Lexicon
   - Strong Compositionality
   - Type Structure
   - Mechanics of Selection

3. Selection at Work
   - Type Coercion
   - Explaining Argument Flexibility

4. Classifiers
   - Arrernte
Outline

1. Mutability of Meaning
   - Introduction
   - Language is Compositional

2. Generative Lexicon
   - Strong Compositionality
   - Type Structure
   - Mechanics of Selection

3. Selection at Work
   - Type Coercion
   - Explaining Argument Flexibility

4. Classifiers
   - Arrernte
Mutability of Meaning

Introduction

Language is Compositional

Generative Lexicon

Strong Compositionality

Type Structure

Mechanics of Selection

Selection at Work

Type Coercion

Explaining Argument Flexibility

Classifiers

Arrernte
Talk Outline

- How do verbs select their arguments?
- How do words change their meanings?
- How do we explain creative word use?
Talk Outline

- How do verbs select their arguments?
- How do words change their meanings?
- How do we explain creative word use?
Talk Outline

- How do verbs select their arguments?
- How do words change their meanings?
- How do we explain creative word use?
Talk Outline

- How do verbs select their arguments?
- How do words change their meanings?
- How do we explain creative word use?
Talk Outline

- How do verbs select their arguments?
- How do words change their meanings?
- How do we explain creative word use?
Starting Assumptions

- Language meaning is **compositional**.
- **Compositionality** is a desirable property of a semantic model.
- Many linguistic phenomena appear **non-compositional**.
- **Generative Lexicon** exploits richer representations and rules to enhance compositional mechanisms.
- Richer representations involve **Lexical Decomposition**.
- Richer rules involve **Coercion, Subselection, Co-composition**.
Starting Assumptions

- Language meaning is **compositional**.
- Compositionality is a desirable property of a semantic model.
- Many linguistic phenomena appear **non-compositional**.
- Generative Lexicon exploits richer representations and rules to enhance compositional mechanisms.
- Richer representations involve **Lexical Decomposition**.
- Richer rules involve **Coercion, Subselection, Co-composition**.
Starting Assumptions

- Language meaning is **compositional**.
- **Compositionality** is a desirable property of a semantic model.
- Many linguistic phenomena appear **non-compositional**.
- **Generative Lexicon** exploits richer representations and rules to enhance compositional mechanisms.
- Richer representations involve **Lexical Decomposition**.
- Richer rules involve **Coercion, Subselection, Co-composition**.
Starting Assumptions

- Language meaning is **compositional**.
- **Compositionality** is a desirable property of a semantic model.
- Many linguistic phenomena appear **non-compositional**.
- Generative Lexicon exploits richer representations and rules to enhance compositional mechanisms.
- Richer representations involve **Lexical Decomposition**.
- Richer rules involve **Coercion, Subselection, Co-composition**.
Starting Assumptions

- Language meaning is **compositional**.
- **Compositionality** is a desirable property of a semantic model.
- Many linguistic phenomena appear **non-compositional**.
- **Generative Lexicon** exploits richer representations and rules to enhance compositional mechanisms.
  - Richer representations involve **Lexical Decomposition**.
  - Richer rules involve **Coercion, Subselection, Co-composition**.
Starting Assumptions

- Language meaning is **compositional**.
- **Compositionality** is a desirable property of a semantic model.
- Many linguistic phenomena appear **non-compositional**.
- **Generative Lexicon** exploits richer representations and rules to enhance compositional mechanisms.
- Richer representations involve **Lexical Decomposition**.
- Richer rules involve **Coercion, Subselection, Co-composition**.
Starting Assumptions

- Language meaning is **compositional**.
- **Compositionality** is a desirable property of a semantic model.
- Many linguistic phenomena appear **non-compositional**.
- **Generative Lexicon** exploits richer representations and rules to enhance compositional mechanisms.
- Richer representations involve **Lexical Decomposition**.
- Richer rules involve **Coercion, Subselection, Co-composition**.
The Principle of Compositionality

1. The meaning of a complex expression is determined by its structure and the meanings of its constituents.

Questions . . .

2. What is the nature of the structure?
3. What is the meaning of a constituent?
4. What counts as a constituent?
The Principle of Compositionality

1. The meaning of a complex expression is determined by its structure and the meanings of its constituents.

Questions . . .

2. What is the nature of the structure?
3. What is the meaning of a constituent?
4. What counts as a constituent?
The Principle of Compositionality

1. The meaning of a complex expression is determined by its structure and the meanings of its constituents.

*Questions* 

2. What is the nature of the structure?
3. What is the meaning of a constituent?
4. What counts as a constituent?
The Principle of Compositionality

1. The meaning of a complex expression is determined by its structure and the meanings of its constituents.

Questions . . .

2. What is the nature of the structure?
3. What is the meaning of a constituent?
4. What counts as a constituent?
The meaning of a complex expression is determined by its structure and the meanings of its constituents.

Questions . . .

What is the nature of the structure?

What is the meaning of a constituent?

What counts as a constituent?
The Principle of Compositionality

1. The meaning of a complex expression is determined by its structure and the meanings of its constituents.

Questions . . .

2. What is the nature of the structure?
3. What is the meaning of a constituent?
4. What counts as a constituent?
Two Types of Ambiguity

- **Homonymy**: unrelated senses of a word
  - bank vs. bank
  - chair vs. chair

- **Polysemy**: conceptually related senses of a word
  - book vs. book
  - door vs. door
Two Types of Ambiguity

- **Homonymy**: unrelated senses of a word
  - bank vs. bank
  - chair vs. chair

- **Polysemy**: conceptually related senses of a word
  - book vs. book
  - door vs. door
Two Types of Ambiguity

- **Homonymy**: unrelated senses of a word
  - bank vs. bank
  - chair vs. chair

- **Polysemy**: conceptually related senses of a word
  - book vs. book
  - door vs. door
Two Types of Ambiguity

- **Homonymy**: unrelated senses of a word
  - bank vs. bank
  - chair vs. chair

- **Polysemy**: conceptually related senses of a word
  - book vs. book
  - door vs. door
Two Types of Ambiguity

- **Homonymy**: unrelated senses of a word
  - bank vs. bank
  - chair vs. chair

- **Polysemy**: conceptually related senses of a word
  - book vs. book
  - door vs. door
Two Types of Ambiguity

- **Homonymy**: unrelated senses of a word
  - bank vs. bank
  - chair vs. chair

- **Polysemy**: conceptually related senses of a word
  - book vs. book
  - door vs. door
Two Types of Ambiguity

- **Homonymy**: unrelated senses of a word
  - bank vs. bank
  - chair vs. chair

- **Polysemy**: conceptually related senses of a word
  - book vs. book
  - door vs. door
Lexical and Structural Ambiguity

- Iraqi Head *Seeks* Arms
- Juvenile Court to *Try* Shooting Defendant
- Teacher *Strikes* Idle Kids
- Kids *Make* Nutritious Snacks
- British Left *Waffles* on Falkland Islands
- Red Tape *Holds Up* New Bridges
- Bush Wins on Budget, but More *Lies* Ahead
- Hospitals are Sued by 7 *Foot* Doctors
- Ban on nude dancing on Governor’s desk
- Local high school dropouts *cut* in half
Lexical and Structural Ambiguity

- Iraqi Head **Seeks** Arms
- Juvenile Court to **Try** Shooting Defendant
- Teacher **Strikes** Idle Kids
- Kids **Make** Nutritious Snacks
- British Left **Waffles** on Falkland Islands
- Red Tape Holds Up New Bridges
- Bush Wins on Budget, but More **Lies** Ahead
- Hospitals are Sued by 7 **Foot** Doctors
- Ban on nude dancing on Governor’s desk
- Local high school dropouts **cut** in half
Lexical and Structural Ambiguity

- Iraqi Head *Seeks* Arms
- Juvenile Court to *Try* Shooting Defendant
- Teacher *Strikes* Idle Kids
- Kids *Make* Nutritious Snacks
- British Left *Waffles* on Falkland Islands
- Red Tape Holds Up New Bridges
- Bush Wins on Budget, but More *Lies* Ahead
- Hospitals are Sued by 7 Foot Doctors
- Ban on nude dancing on Governor’s desk
- Local high school dropouts cut in half
Lexical and Structural Ambiguity

- Iraqi Head **Seeks** Arms
- Juvenile Court to **Try** Shooting Defendant
- Teacher **Strikes** Idle Kids
- Kids **Make** Nutritious Snacks
- British Left **Waffles** on Falkland Islands
- Red Tape Holds Up New Bridges
- Bush Wins on Budget, but More **Lies** Ahead
- Hospitals are Sued by 7 Foot Doctors
- Ban on nude dancing on Governor’s desk
- Local high school dropouts cut in half
Lexical and Structural Ambiguity

- Iraqi Head *Seeks* Arms
- Juvenile Court to *Try* Shooting Defendant
- Teacher *Strikes* Idle Kids
- Kids *Make* Nutritious Snacks
- British Left Waffles on Falkland Islands
- Red Tape *Holds Up* New Bridges
- Bush Wins on Budget, but More *Lies* Ahead
- Hospitals are Sued by 7 Foot Doctors
- Ban on nude dancing on Governor’s desk
- Local high school dropouts cut in half
Lexical and Structural Ambiguity

- Iraqi Head *Seeks* Arms
- Juvenile Court to *Try* Shooting Defendant
- Teacher * Strikes* Idle Kids
- Kids *Make* Nutritious Snacks
- British Left *Waffles* on Falkland Islands
- Red Tape *Holds Up* New Bridges
- Bush Wins on Budget, but More *Lies* Ahead
- Hospitals are Sued by 7 Foot Doctors
- Ban on nude dancing on Governor’s desk
- Local high school dropouts cut in half
Lexical and Structural Ambiguity

- Iraqi Head **Seeks** Arms
- Juvenile Court to **Try** Shooting Defendant
- Teacher **Strikes** Idle Kids
- Kids **Make** Nutritious Snacks
- British Left **Waffles** on Falkland Islands
- Red Tape **Holds Up** New Bridges
- Bush Wins on Budget, but More **Lies** Ahead
- Hospitals are Sued by 7 Foot Doctors
- Ban on nude dancing on Governor’s desk
- Local high school dropouts cut in half
Lexical and Structural Ambiguity

- Iraqi Head **Seeks** Arms
- Juvenile Court to **Try** Shooting Defendant
- Teacher **Strikes** Idle Kids
- Kids **Make** Nutritious Snacks
- British Left **Waffles** on Falkland Islands
- Red Tape **Holds Up** New Bridges
- Bush Wins on Budget, but More **Lies** Ahead
- Hospitals are Sued by 7 Foot Doctors
- Ban on nude dancing **on** Governor’s desk
- Local high school dropouts **cut in half**
Lexical and Structural Ambiguity

- Iraqi Head **Seeks** Arms
- Juvenile Court to **Try** Shooting Defendant
- Teacher **Strikes** Idle Kids
- Kids **Make** Nutritious Snacks
- British Left **Waffles** on Falkland Islands
- Red Tape **Holds Up** New Bridges
- Bush Wins on Budget, but More **Lies** Ahead
- Hospitals are Sued by 7 **Foot** Doctors
- Ban on nude dancing on Governor’s desk
- Local high school dropouts cut in half
Lexical and Structural Ambiguity

- Iraqi Head *Seeks* Arms
- Juvenile Court to *Try* Shooting Defendant
- Teacher *Strikes* Idle Kids
- Kids *Make* Nutritious Snacks
- British Left *Waffles* on Falkland Islands
- Red Tape *Holds Up* New Bridges
- Bush Wins on Budget, but More *Lies* Ahead
- Hospitals are Sued by 7 *Foot* Doctors
- Ban on nude dancing *on* Governor’s desk
- Local high school dropouts *cut in half*
Lexical and Structural Ambiguity

- Iraqi Head **Seeks** Arms
- Juvenile Court to **Try** Shooting Defendant
- Teacher **Strikes** Idle Kids
- Kids **Make** Nutritious Snacks
- British Left **Waffles** on Falkland Islands
- Red Tape **Holds Up** New Bridges
- Bush Wins on Budget, but More **Lies** Ahead
- Hospitals are Sued by 7 **Foot** Doctors
- Ban on nude dancing **on** Governor’s desk
- Local high school dropouts **cut** in half
Two Types of Polysemy

- **Inherent polysemy**: where multiple interpretations of an expression are available by virtue of the semantics inherent in the expression itself.

- **Selectional polysemy**: where any novel interpretation of an expression is available due to contextual influences, namely, the type of the selecting expression.

   b. John doesn’t agree with the new Obama book. (inherent)

2. a. Mary left after her cigarette. (selectional)
   b. Mary left after her smoking a cigarette.
Two Types of Polysemy

- **Inherent polysemy**: where multiple interpretations of an expression are available by virtue of the semantics inherent in the expression itself.

- **Selectional polysemy**: where any novel interpretation of an expression is available due to contextual influences, namely, the type of the selecting expression.

   b. John doesn’t agree with the new Obama book. (inherent)

2. a. Mary left after her cigarette. (selectional)
   b. Mary left after her smoking a cigarette.
Two Types of Polysemy

- **Inherent polysemy**: where multiple interpretations of an expression are available by virtue of the semantics inherent in the expression itself.

- **Selectional polysemy**: where any novel interpretation of an expression is available due to contextual influences, namely, the type of the selecting expression.

   b. John doesn’t agree with the new Obama book. (inherent)

2. a. Mary left after her cigarette. (selectional)
   b. Mary left after her smoking a cigarette.
Two Types of Polysemy

- **Inherent polysemy**: where multiple interpretations of an expression are available by virtue of the semantics inherent in the expression itself.
- **Selectional polysemy**: where any novel interpretation of an expression is available due to contextual influences, namely, the type of the selecting expression.

   b. John doesn’t agree with the new Obama book. (inherent)

2. a. Mary left after her cigarette. (selectional)
   b. Mary left after her smoking a cigarette.
Two Types of Polysemy

- **Inherent polysemy**: where multiple interpretations of an expression are available by virtue of the semantics inherent in the expression itself.
- **Selectional polysemy**: where any novel interpretation of an expression is available due to contextual influences, namely, the type of the selecting expression.

   b. John doesn’t agree with the new Obama book. (inherent)

2. a. Mary left after her cigarette. (selectional)
   b. Mary left after her smoking a cigarette.
Systematic (Logical) Polysemy

1. There’s **chicken** in the salad.
2. We’ll have **a** water and **two** beers.
3. Roser finished **her** thesis.
4. Mary began the novel.
5. Mary believes John’s story.
There’s **chicken** in the salad.

We’ll have **a water** and **two beers**.

Roser finished **her** thesis.

Mary began **the novel**.

Mary believes **John’s story**.

Mary believes **John**.
Systematic (Logical) Polysemy

1. There’s chicken in the salad.
2. We’ll have a water and two beers.
4. Mary began the novel.
5. Mary believes John’s story.
Systematic (Logical) Polysemy

1. There’s chicken in the salad.
2. We’ll have a water and two beers.
4. Mary began the novel.
5. Mary believes John’s story.
There’s chicken in the salad.
We’ll have a water and two beers.
Roser finished her thesis.
Mary began the novel.
Mary believes John’s story.

Mary believes John.
There’s chicken in the salad.

We’ll have a water and two beers.

Roser finished her thesis.

Mary began the novel.

Mary believes John’s story.

Mary believes John.
Underspecified Meanings: 1

How many meanings for *good*?

1. good car
2. a good meal
3. a good knife

What does *noisy* select for?

1. a noisy\textsubscript{1} car
2. a noisy\textsubscript{1} dog
3. a noisy\textsubscript{2} room
4. a noisy\textsubscript{2} cafeteria
5. a fast typist
6. a fast train
7. a fast highway
Underspecified Meanings: 1

How many meanings for good?

1. good car
2. a good meal
3. a good knife

What does noisy select for?

1. a noisy₁ car
2. a noisy₁ dog
3. a noisy₂ room
4. a noisy₂ cafeteria
5. a fast typist
6. a fast train
7. a fast highway
Underspecified Meanings: 1

How many meanings for *good*?

1. *good* car
2. a *good* meal
3. a *good* knife

What does *noisy* select for?

1. a *noisy*₁ car
2. a *noisy*₁ dog
3. a *noisy*₂ room
4. a *noisy*₂ cafeteria
5. a *fast* typist
6. a *fast* train
7. a *fast* highway
Underspecified Meanings: 1

How many meanings for **good**?

1. **good** car
2. a **good** meal
3. a **good** knife

What does **noisy** select for?

1. a **noisy**₁ car
2. a **noisy**₁ dog
3. a **noisy**₂ room
4. a **noisy**₂ cafeteria
5. a fast typist
6. a fast train
7. a fast highway
### Underspecified Meanings: 1

How many meanings for *good*?

1. **good** car
2. **a good** meal
3. **a good** knife

What does *noisy* select for?

1. **a noisy**₁ car
2. **a noisy**₁ dog
3. **a noisy**₂ room
4. **a noisy**₂ cafeteria
5. **a fast** typist
6. **a fast** train
7. **a fast** highway

---

Pustejovsky  (Brandeis University)
Underspecified Meanings: 1

How many meanings for *good*?

1. *good* car
2. a *good* meal
3. a *good* knife

What does *noisy* select for?

1. a *noisy$_1$* car
2. a *noisy$_1$* dog
3. a *noisy$_2$* room
4. a *noisy$_2$* cafeteria
5. a fast typist
6. a fast train
7. a fast highway
Underspecified Meanings: 1

How many meanings for good?
1. good car
2. a good meal
3. a good knife

What does noisy select for?
1. a noisy\textsubscript{1} car
2. a noisy\textsubscript{1} dog
3. a noisy\textsubscript{2} room
4. a noisy\textsubscript{2} cafeteria
5. a fast typist
6. a fast train
7. a fast highway
Underspecified Meanings: 1

How many meanings for good?
1. good car
2. a good meal
3. a good knife

What does noisy select for?
1. a noisy\(_1\) car
2. a noisy\(_1\) dog
3. a noisy\(_2\) room
4. a noisy\(_2\) cafeteria
5. a fast typist
6. a fast train
7. a fast highway
Underspecified Meanings: 1

How many meanings for *good*?

1. good car
2. a good meal
3. a good knife

What does *noisy* select for?

1. a noisy_1 car
2. a noisy_1 dog
3. a noisy_2 room
4. a noisy_2 cafeteria

1. a fast typist
2. a fast train
3. a fast highway
Underspecified Meanings: 1

How many meanings for good?

1. good car
2. a good meal
3. a good knife

What does noisy select for?

1. a noisy$_1$ car
2. a noisy$_1$ dog
3. a noisy$_2$ room
4. a noisy$_2$ cafeteria

1. a fast typist
2. a fast train
3. a fast highway
Underspecified Meanings: 1

How many meanings for *good*?

1. good car
2. a good meal
3. a good knife

What does *noisy* select for?

1. a noisy₁ car
2. a noisy₁ dog
3. a noisy₂ room
4. a noisy₂ cafeteria

1. a fast typist
2. a fast train
3. a fast highway
Underspecified Meanings: 1

How many meanings for *good*?

1. good car
2. a good meal
3. a good knife

What does *noisy* select for?

1. a noisy₁ car
2. a noisy₁ dog
3. a noisy₂ room
4. a noisy₂ cafeteria
5. a fast typist
6. a fast train
7. a fast highway
Underspecified Meanings: 1

How many meanings for *good*?

1. **good** car
2. a **good** meal
3. a **good** knife

What does *noisy* select for?

1. a **noisy**₁ car
2. a **noisy**₁ dog
3. a **noisy**₂ room
4. a **noisy**₂ cafeteria

1. a **fast** typist
2. a **fast** train
3. a **fast** highway
Underspecified Meanings: 1

How many meanings for *good*?

1. good car
2. a good meal
3. a good knife

What does *noisy* select for?

1. a noisy\textsubscript{1} car
2. a noisy\textsubscript{1} dog
3. a noisy\textsubscript{2} room
4. a noisy\textsubscript{2} cafeteria

1. a fast typist
2. a fast train
3. a fast highway
This ironing board is flat.
My neighborhood is flat.
My country is flat.
The water is boiling.
The pot is boiling.
This ironing board is flat.
My neighborhood is flat.
My country is flat.
The water is boiling.
The pot is boiling.
This ironing board is flat.

My neighborhood is flat.

My country is flat.

The water is boiling.

The pot is boiling.
This ironing board is flat.

My neighborhood is flat.

My country is flat.

The water is boiling.

The pot is boiling.
This ironing board is flat.
My neighborhood is flat.
My country is flat.
The water is boiling.
The pot is boiling.
Underspecified Meaning2: 2

- This ironing board is **flat**.
- My neighborhood is **flat**.
- My country is **flat**.
- The water is **boiling**.
- The pot is **boiling**.
1. Mutability of Meaning
   - Introduction
   - Language is Compositional

2. Generative Lexicon
   - Strong Compositionality
   - Type Structure
   - Mechanics of Selection

3. Selection at Work
   - Type Coercion
   - Explaining Argument Flexibility

4. Classifiers
   - Arrernte
Compositionality is usually Function Application

1. What is the nature of the function?
2. What does it apply to; i.e., what can be an argument?

1. John loves Mary.
2. love(Arg₁,Arg₂)
3. Apply love(Arg₁,Arg₂) to Mary
4. ⟷ love(Arg₁,Mary)
5. Apply love(Arg₁,Mary) to John
6. ⟷ love(John,Mary)
Compositionality is usually Function Application

1. What is the nature of the function?
2. What does it apply to; i.e., what can be an argument?

1. John loves Mary.
2. love(Arg₁,Arg₂)
3. Apply love(Arg₁,Arg₂) to Mary
4. ⇒ love(Arg₁,Mary)
5. Apply love(Arg₁,Mary) to John
6. ⇒ love(John,Mary)
Compositionality is usually Function Application

1. What is the nature of the function?
2. What does it apply to; i.e., what can be an argument?

1. John loves Mary.
2. love(Arg₁,Arg₂)
3. Apply love(Arg₁,Arg₂) to Mary
4. → love(Arg₁, Mary)
5. Apply love(Arg₁, Mary) to John
6. → love(John, Mary)
Compositionality is usually Function Application

1. What is the nature of the function?
2. What does it apply to; i.e., what can be an argument?

1. John loves Mary.

2. $\text{love}(\text{Arg}_1, \text{Arg}_2)$
3. Apply $\text{love}(\text{Arg}_1, \text{Arg}_2)$ to Mary
4. $\Rightarrow \text{love}(\text{Arg}_1, \text{Mary})$
5. Apply $\text{love}(\text{Arg}_1, \text{Mary})$ to John
6. $\Rightarrow \text{love}(\text{John}, \text{Mary})$
What is the nature of the function?

What does it apply to; i.e., what can be an argument?

John loves Mary.

love(\text{Arg}_1, \text{Arg}_2)

Apply love(\text{Arg}_1, \text{Arg}_2) to Mary

⇒ love(\text{Arg}_1, \text{Mary})

Apply love(\text{Arg}_1, \text{Mary}) to John

⇒ love(\text{John}, \text{Mary})
Compositionality is usually Function Application

1. What is the nature of the function?
2. What does it apply to; i.e., what can be an argument?

1. John loves Mary.
2. love(Arg₁,Arg₂)
3. Apply love(Arg₁,Arg₂) to Mary
4. ⇒ love(Arg₁,Mary)
5. Apply love(Arg₁,Mary) to John
6. ⇒ love(John,Mary)
Compositionality is usually Function Application

1. What is the nature of the function?
2. What does it apply to; i.e., what can be an argument?

1. John loves Mary.
2. love(\text{Arg}_1, \text{Arg}_2)
3. Apply \text{love}(\text{Arg}_1, \text{Arg}_2) to Mary
4. \implies \text{love}(\text{Arg}_1, \text{Mary})
5. Apply \text{love}(\text{Arg}_1, \text{Mary}) to John
6. \implies \text{love}(\text{John}, \text{Mary})
Compositionality is usually Function Application

1. What is the nature of the function?
2. What does it apply to; i.e., what can be an argument?

1. John loves Mary.
2. love(\text{Arg}_1, \text{Arg}_2)
3. Apply love(\text{Arg}_1, \text{Arg}_2) to Mary
4. $\Rightarrow$ love(\text{Arg}_1, \text{Mary})
5. Apply love(\text{Arg}_1, \text{Mary}) to John
6. $\Rightarrow$ love(\text{John}, \text{Mary})
Compositionality is usually Function Application

1. What is the nature of the function?
2. What does it apply to; i.e., what can be an argument?

1. John loves Mary.
2. love(Arg₁,Arg₂)
3. Apply love(Arg₁,Arg₂) to Mary
4. ⇒ love(Arg₁,Mary)
5. Apply love(Arg₁,Mary) to John
6. ⇒ love(John,Mary)
Challenges to Simple Compositionality

- Flexibility of Subject Interpretation
- Flexibility of Object Interpretation
- Flexibility of Experiencing
- Flexibility of Perceiving
- Flexibility of Aspectuals
Challenges to Simple Compositionality

- Flexibility of Subject Interpretation
- Flexibility of Object Interpretation
- Flexibility of Experiencing
- Flexibility of Perceiving
- Flexibility of Aspectuals
Challenges to Simple Compositionality

- Flexibility of Subject Interpretation
- Flexibility of Object Interpretation
- Flexibility of Experiencing
- Flexibility of Perceiving
- Flexibility of Aspectuals
Challenges to Simple Compositionality

- Flexibility of Subject Interpretation
- Flexibility of Object Interpretation
- Flexibility of Experiencing
  - Flexibility of Perceiving
  - Flexibility of Aspectuals
Challenges to Simple Compositionality

- Flexibility of Subject Interpretation
- Flexibility of Object Interpretation
- Flexibility of Experiencing
- Flexibility of Perceiving
- Flexibility of Aspectuals
Challenges to Simple Compositionality

- Flexibility of Subject Interpretation
- Flexibility of Object Interpretation
- Flexibility of Experiencing
- Flexibility of Perceiving
- Flexibility of Aspectuals
Flexibility of Subject Interpretation

Subject of **kill**:

- John killed Mary.
- The gun killed Mary.
- The shot killed Mary.
- The bullet killed Mary.
- John’s pulling the trigger killed Mary.
- *The trigger killed Mary.
Flexibility of Subject Interpretation

Subject of **kill**:

- **John** killed Mary.
- The gun killed Mary.
- The shot killed Mary.
- The bullet killed Mary.
- John’s pulling the trigger killed Mary.
- *The trigger killed Mary.*
Flexibility of Subject Interpretation

Subject of kill:

- John killed Mary.
- The gun killed Mary.
- The shot killed Mary.
- The bullet killed Mary.
- John’s pulling the trigger killed Mary.
- *The trigger killed Mary.
Flexibility of Subject Interpretation

Subject of **kill**:

- John killed Mary.
- The gun killed Mary.
- The shot killed Mary.
- The bullet killed Mary.
- John’s pulling the trigger killed Mary.
- *The trigger killed Mary.
Flexibility of Subject Interpretation

Subject of *kill*:

- John killed Mary.
- The gun killed Mary.
- The shot killed Mary.
- The bullet killed Mary.
- John’s pulling the trigger killed Mary.
- *The trigger killed Mary.*
Flexibility of Subject Interpretation

Subject of *kill*:

- John killed Mary.
- The gun killed Mary.
- The shot killed Mary.
- The bullet killed Mary.
- John’s pulling the trigger killed Mary.
- *The trigger killed Mary.*
Subject of *kill*:

- John killed Mary.
- The gun killed Mary.
- The shot killed Mary.
- The bullet killed Mary.
- John’s pulling the trigger killed Mary.
- *The trigger killed Mary.
Causation and Intention

- John rolled down the hill as fast as he could.
- John cooled off with an iced latte.

Subject Rule (Wechsler, 2005): Optionally interpret subject as AGENTIVE.

kill vs murder:
- John killed the flowers accidentally / intentionally.
- John murdered Mary.
- *John murdered Mary intentionally / accidentally.
Causation and Intention

- John **rolled** down the hill as fast as he could.
- John **cooled off** with an iced latte.

**Subject Rule** (Wechsler, 2005): Optionally interpret subject as AGENTIVE.

- kill vs murder:
  - John killed the flowers accidently / intentionally.
  - John murdered Mary.
  - *John murdered Mary intentionally / accidentally.*
Causation and Intention

- John **rolled** down the hill as fast as he could.
- John **cooled off** with an iced latte.

**Subject Rule** (Wechsler, 2005): Optionally interpret subject as AGENTIVE.

**kill vs murder:**
- John killed the flowers accidently / intentionally.
- John murdered Mary.
- *John murdered Mary intentionally / accidentally.*
Causation and Intention

- John **rolled** down the hill as fast as he could.
- John **cooled off** with an iced latte.

**Subject Rule** (Wechsler, 2005): Optionally interpret subject as AGENTIVE.

- kill vs murder:
  - John killed the flowers accidentally / intentionally.
  - John murdered Mary.
  - *John murdered Mary intentionally / accidentally.
Causation and Intention

- John **rolled** down the hill as fast as he could.
- John **cooled off** with an iced latte.

**Subject Rule** (Wechsler, 2005): Optionally interpret subject as AGENTIVE.

- **kill** vs **murder**:
  - John killed the flowers accidently / intentionally.
  - John murdered Mary.
  - *John murdered Mary intentionally / accidentally.
Causation and Intention

- John rolled down the hill as fast as he could.
- John cooled off with an iced latte.

**Subject Rule** (Wechsler, 2005): Optionally interpret subject as AGENTIVE.

**kill vs murder:**
- John killed the flowers accidently / intentionally.
- John murdered Mary.
- *John murdered Mary intentionally / accidentally.
Causation and Intention

- John rolled down the hill as fast as he could.
- John cooled off with an iced latte.

**Subject Rule** (Wechsler, 2005): Optionally interpret subject as AGENTIVE.

- kill vs murder:
  - John killed the flowers accidently / intentionally.
  - John murdered Mary.
  - *John murdered Mary intentionally / accidentally.
Causation and Intention

- John **rolled** down the hill as fast as he could.
- John **cooled off** with an iced latte.

**Subject Rule** (Wechsler, 2005): Optionally interpret subject as AGENTIVE.

**kill** vs **murder**:
- John killed the flowers accidently / intentionally.
- John murdered Mary.
- *John murdered Mary intentionally / accidentally.*

- John swept \( \text{the dirt} \) \(_{\text{material}} \).
- John swept \( \text{the room} \) \(_{\text{region}} \).
- The man shoveled \( \text{the snow} \) \(_{\text{material}} \).
- The man shoveled \( \text{the driveway} \) \(_{\text{region}} \).
Flexibility of Object Interpretation


- John swept [the dirt]_{material}.
- John swept [the room]_{region}.
- The man shoveled [the snow]_{material}.
- The man shoveled [the driveway]_{region}.
Flexibility of Object Interpretation


- John swept [the dirt]_{material}.
- John swept [the room]_{region}.
- The man shoveled [the snow]_{material}.
- The man shoveled [the driveway]_{region}.
Flexibility of Object Interpretation


- John swept [the dirt]_{material}.
- John swept [the room]_{region}.
- The man shoveled [the snow]_{material}.
- The man shoveled [the driveway]_{region}.
Flexibility of Object Interpretation


- John swept [the dirt]_{material}.
- John swept [the room]_{region}.
- The man shoveled [the snow]_{material}.
- The man shoveled [the driveway]_{region}.
Flexibility of Arguments: Experiencers

1. That book bored me terribly.
2. The movie frightened Mary.
3. The newspaper article angered the Republicans.
4. Listening to Mary irritates Alice.
Flexibility of Arguments: Experiencers

1. That book bored me terribly.
2. The movie frightened Mary.
3. The newspaper article angered the Republicans.
4. Listening to Mary irritates Alice.
Flexibility of Arguments: Experiencers

1. That book bored me terribly.
2. The movie frightened Mary.
3. The newspaper article angered the Republicans.
4. Listening to Mary irritates Alice.
Flexibility of Arguments: Experiencers

1. That book bored me terribly.
2. The movie frightened Mary.
3. The newspaper article angered the Republicans.
4. Listening to Mary irritates Alice.
Flexibility of Arguments: Experiencers

1. That book bored me terribly.
2. The movie frightened Mary.
3. The newspaper article angered the Republicans.
4. Listening to Mary irritates Alice.
Flexibility of Arguments: Perception

- The boy heard a cat / a dog.
- They heard a bang / cry / rumor / shout / rain.
- !John heard the cloud/star/light.
- The crowd listened to the poem/speaker/speech.
Flexibility of Arguments: Perception

- The boy heard a cat / a dog.
- They heard a bang / cry / rumor / shout / rain.
- !John heard the cloud/star/light.
- The crowd listened to the poem/speaker/speech.
The boy heard a cat / a dog.

They heard a bang / cry / rumor / shout / rain.

!John heard the cloud/star/light.

The crowd listened to the poem/speaker/speech.
Mutability of Meaning

Language is Compositional

Flexibility of Arguments: Perception

- The boy heard a cat / a dog.
- They heard a bang / cry / rumor / shout / rain.
- !John heard the cloud/star/light.
- The crowd listened to the poem/speaker/speech.
The boy **heard** a cat / a dog.
They **heard** a bang / cry / rumor / shout / rain.
!John **heard** the cloud/star/light.
The crowd **listened** to the poem/speaker/speech.
Mary believes the rumor.
No one believes the newspaper.
She found the book hard to believe.
They denied the actual conditions of the prisons.
The graduate student regrets his last homework assignment.
The hacker acknowledged the spam.
Flexibility of Arguments: Attitudes, Factives

- Mary believes the rumor.
- No one believes the newspaper.
- She found the book hard to believe.
- They denied the actual conditions of the prisons.
- The graduate student regrets his last homework assignment.
- The hacker acknowledged the spam.
Mary **believes** the rumor.

No one **believes** the newspaper.

She found the book hard to **believe**.

They **denied** the actual conditions of the prisons.

The graduate student **regrets** his last homework assignment.

The hacker **acknowledged** the spam.
Flexibility of Arguments: Attitudes, Factivs

- Mary believes the rumor.
- No one believes the newspaper.
- She found the book hard to believe.
- They denied the actual conditions of the prisons.
- The graduate student regrets his last homework assignment.
- The hacker acknowledged the spam.
Flexibility of Arguments: Attitudes, Factivs

- Mary believes the rumor.
- No one believes the newspaper.
- She found the book hard to believe.
- They denied the actual conditions of the prisons.
- The graduate student regrets his last homework assignment.
- The hacker acknowledged the spam.
Flexibility of Arguments: Attitudes, Factivs

- Mary believes the rumor.
- No one believes the newspaper.
- She found the book hard to believe.
- They denied the actual conditions of the prisons.
- The graduate student regrets his last homework assignment.
- The hacker acknowledged the spam.
Flexibility of Arguments: Attitudes, Factives

- Mary \textit{believes} the rumor.
- No one \textit{believes} the newspaper.
- She found the book hard to \textit{believe}.
- They \textit{denied} the actual conditions of the prisons.
- The graduate student \textit{regrets} his last homework assignment.
- The hacker \textit{acknowledged} the spam.
The verb *begin* is syntactically *polymorphic*:

- Mary began [to eat her breakfast].
- Mary began [eating her breakfast].
- Mary began [her breakfast].

but semantically *underspecified*:

- Mary began her beer/thesis/dinner/class/homework/bath
- John enjoyed his coffee/movie/cigar/discussion/appointment
The verb *begin* is syntactically *polymorphic*:
- Mary *began* [to eat her breakfast].
- Mary *began* [eating her breakfast].
- Mary *began* [her breakfast].

but semantically *underspecified*:
- Mary *began* her beer/thesis/dinner/class/homework/bath
- John *enjoyed* his coffee/movie/cigar/discussion/appointment
The verb \textit{begin} is syntactically \textit{polymorphic}:

- Mary began [to eat her breakfast].
- Mary began [eating her breakfast].
- Mary began [her breakfast].

but semantically \textit{underspecified}:

- Mary began her beer/thesis/dinner/class/homework/bath
- John enjoyed his coffee/movie/cigar/discussion/appointment
The verb *begin* is syntactically *polymorphic*:

- Mary *began* [to eat her breakfast].
- Mary *began* [eating her breakfast].
- Mary *began* [her breakfast].

but semantically *underspecified*:

- Mary *began* her beer/thesis/dinner/class/homework/bath
- John *enjoyed* his coffee/movie/cigar/discussion/appointment
1. Mutability of Meaning
   - Introduction
   - Language is Compositional

2. Generative Lexicon
   - Strong Compositionality
   - Type Structure
   - Mechanics of Selection

3. Selection at Work
   - Type Coercion
   - Explaining Argument Flexibility

4. Classifiers
   - Arrernte
A Flexible Strategy of Selection

Arguments can be viewed as encoding pretests for performing the action in the predicate.

If the argument condition (i.e., its type) is not satisfied, the predicate either:
- fails to be interpreted (strong selection);
- coerces its argument according to a given set of strategies.
A Flexible Strategy of Selection

Arguments can be viewed as encoding pretests for performing the action in the predicate.

If the argument condition (i.e., its type) is not satisfied, the predicate either:

- fails to be interpreted (strong selection);
- coerces its argument according to a given set of strategies.
A Flexible Strategy of Selection

Arguments can be viewed as encoding pretests for performing the action in the predicate.

If the argument condition (i.e., its type) is not satisfied, the predicate either:

- **fails** to be interpreted (strong selection);
- coerces its argument according to a given set of strategies.
A Flexible Strategy of Selection

Arguments can be viewed as encoding pretests for performing the action in the predicate.

If the argument condition (i.e., its type) is not satisfied, the predicate either:

- fails to be interpreted (strong selection);
- coerces its argument according to a given set of strategies.
Co-compositionality

- Bilateral functional application:
  Both predicate and argument act functionally to build the resulting meaning

Three Kinds of Co-composition

- Predicate Coercion:
  Subject acts functionally over its own predicate

- Predicate Cospecification:
  Verb and object create a new meaning

- Argument Cospecification:
  Two arguments of the verb are related independently of the selecting predicate
Co-compositionality

- **Bilateral functional application:**
  Both predicate and argument act functionally to build the resulting meaning

Three Kinds of Co-composition

- **Predicate Coercion:**
  Subject acts functionally over its own predicate

- **Predicate Cospecification:**
  Verb and object create a new meaning

- **Argument Cospecification**
  Two arguments of the verb are related independently of the selecting predicate
Co-compositionality

- Bilateral functional application:
- Both predicate and argument act functionally to build the resulting meaning

Three Kinds of Co-composition

- Predicate Coercion:
  Subject acts functionally over its own predicate

- Predicate Cospecification:
  Verb and object create a new meaning

- Argument Cospecification
  Two arguments of the verb are related independently of the selecting predicate
Co-compositionality

- Bilateral functional application:
  - Both predicate and argument act functionally to build the resulting meaning

Three Kinds of Co-composition

- Predicate Coercion:
  - Subject acts functionally over its own predicate

- Predicate Cospecification:
  - Verb and object create a new meaning

- Argument Cospecification
  - Two arguments of the verb are related independently of the selecting predicate
Co-compositionality

- Bilateral functional application:
  Both predicate and argument act functionally to build the resulting meaning

Three Kinds of Co-composition

- **Predicate Coercion:**
  Subject acts functionally over its own predicate

- **Predicate Cospecification:**
  Verb and object create a new meaning

- **Argument Cospecification**
  Two arguments of the verb are related independently of the selecting predicate
Co-compositionality

- Bilateral functional application:
  - Both predicate and argument act functionally to build the resulting meaning

Three Kinds of Co-composition

- Predicate Coercion:
  - Subject acts functionally over its own predicate

- Predicate Cospecification:
  - Verb and object create a new meaning

- Argument Cospecification
  - Two arguments of the verb are related independently of the selecting predicate
Co-compositionality

Bilateral functional application:
Both predicate and argument act functionally to build the resulting meaning

Three Kinds of Co-composition

Predicate Coercion:
Subject acts functionally over its own predicate

Predicate Cospecification:
Verb and object create a new meaning

Argument Cospecification
Two arguments of the verb are related independently of the selecting predicate
Co-compositionality

- Bilateral functional application:
  Both predicate and argument act functionally to build the resulting meaning

Three Kinds of Co-composition

- **Predicate Coercion:**
  Subject acts functionally over its own predicate

- **Predicate Cospecification:**
  Verb and object create a new meaning

- **Argument Cospecification**
  Two arguments of the verb are related independently of the selecting predicate
1. Mutability of Meaning
   - Introduction
   - Language is Compositional

2. Generative Lexicon
   - Strong Compositionality
   - Type Structure
   - Mechanics of Selection

3. Selection at Work
   - Type Coercion
   - Explaining Argument Flexibility

4. Classifiers
   - Arrernte
Lexical Data Structures

(1) a. **Lexical Typing Structure**: giving an explicit type for a word positioned within a type system for the language;
b. **Argument Structure**: specifying the number and nature of the arguments to a predicate;
c. **Event Structure**: defining the event type of the expression and any subeventual structure it may have;
d. **Qualia Structure**: a structural differentiation of the predicative force for a lexical item.
(2) a. **Lexical Typing Structure**: giving an explicit type for a word positioned within a type system for the language;
b. **Argument Structure**: specifying the number and nature of the arguments to a predicate;
c. **Event Structure**: defining the event type of the expression and any subeventual structure it may have;
d. **Qualia Structure**: a structural differentiation of the predicative force for a lexical item.
Lexical Data Structures

(3) a. **Lexical Typing Structure**: giving an explicit type for a word positioned within a type system for the language;
b. **Argument Structure**: specifying the number and nature of the arguments to a predicate;
c. **Event Structure**: defining the event type of the expression and any subeventual structure it may have;
d. **Qualia Structure**: a structural differentiation of the predicative force for a lexical item.
Lexical Data Structures

(4) a. **Lexical Typing Structure**: giving an explicit type for a word positioned within a type system for the language;
b. **Argument Structure**: specifying the number and nature of the arguments to a predicate;
c. **Event Structure**: defining the event type of the expression and any subeventual structure it may have;
d. **Qualia Structure**: a structural differentiation of the predicative force for a lexical item.
Qualia

(5)  a. **FORMAL**: the basic category of which distinguishes the meaning of a word within a larger domain;
    b. **CONSTITUTIVE**: the relation between an object and its constituent parts;
    c. **TELIC**: the purpose or function of the object, if there is one;
    d. **AGENTIVE**: the factors involved in the object’s origins or “coming into being”.

Pustejovsky (Brandeis University)
Qualia

(6) a. **FORMAL**: the basic category of which distinguishes the meaning of a word within a larger domain;
b. **CONSTITUTIVE**: the relation between an object and its constituent parts;
c. **TELIC**: the purpose or function of the object, if there is one;
d. **AGENTIVE**: the factors involved in the object’s origins or “coming into being”.

Pustejovsky  (Brandeis University)  GL and Semantic Theory  April 27, 2010  28 / 72
Qualia

(7)  

a. **FORMAL**: the basic category of which distinguishes the meaning of a word within a larger domain;  

b. **CONSTITUTIVE**: the relation between an object and its constituent parts;  

c. **TELIC**: the purpose or function of the object, if there is one;  

d. **AGENTIVE**: the factors involved in the object’s origins or “coming into being”.
Qualia

(8) a. **FORMAL**: the basic category of which distinguishes the meaning of a word within a larger domain;
b. **CONSTITUTIVE**: the relation between an object and its constituent parts;
c. **TELIC**: the purpose or function of the object, if there is one;
d. **AGENTIVE**: the factors involved in the object’s origins or “coming into being”.
GL Feature Structure

\[ \begin{align*}
\alpha & \\
\text{ARGSTR} & = \begin{bmatrix}
\text{ARG1} = x \\
\ldots
\end{bmatrix} \\
\text{EVENTSTR} & = \begin{bmatrix}
\text{EVENT1} = e_1 \\
\text{EVENT2} = e_2
\end{bmatrix} \\
\text{QUALIA} & = \begin{bmatrix}
\text{CONST} = \text{what } x \text{ is made of} \\
\text{FORMAL} = \text{what } x \text{ is} \\
\text{TELIC} = e_2: \text{function of } x \\
\text{AGENTIVE} = e_1: \text{how } x \text{ came into being}
\end{bmatrix}
\end{align*} \]
Type Composition Logic (Asher and Pustejovský, 2006)

1. $e$ the general type of entities; $t$ the type of truth values. ($\sigma, \tau$ range over all simple types, and subtypes of $e$.)

2. If $\sigma$ and $\tau$ are types, then so is $\sigma \rightarrow \tau$.

3. If $\sigma$ and $\tau$ are types, then so is $\sigma \otimes_R \tau$; $R$ ranges over $A$ or $T$.

4. If $\sigma$ and $\tau$ are types, then so is $\sigma \cdot \tau$. 
1. $e$ the general type of entities; $t$ the type of truth values. 
   ($\sigma$, $\tau$ range over all simple types, and subtypes of $e$.)

2. If $\sigma$ and $\tau$ are types, then so is $\sigma \rightarrow \tau$.

3. If $\sigma$ and $\tau$ are types, then so is $\sigma \otimes_R \tau$; $R$ ranges over $A$ or $T$.

4. If $\sigma$ and $\tau$ are types, then so is $\sigma \cdot \tau$. 
Type Composition Logic (Asher and Pustejovksy, 2006)

1. The general type of entities; \( t \) the type of truth values. 
   (\( \sigma, \tau \) range over all simple types, and subtypes of \( e \).)

2. If \( \sigma \) and \( \tau \) are types, then so is \( \sigma \rightarrow \tau \).

3. If \( \sigma \) and \( \tau \) are types, then so is \( \sigma \otimes_R \tau \); \( R \) ranges over \( A \) or \( T \).

4. If \( \sigma \) and \( \tau \) are types, then so is \( \sigma \bullet \tau \).
Type Composition Logic  (Asher and Pustejovsky, 2006)

1. $e$ the general type of entities; $t$ the type of truth values.  
   ($\sigma, \tau$ range over all simple types, and subtypes of $e$.)

2. If $\sigma$ and $\tau$ are types, then so is $\sigma \rightarrow \tau$.  

3. If $\sigma$ and $\tau$ are types, then so is $\sigma \otimes_{R} \tau$; $R$ ranges over $A$ or $T$. 

4. If $\sigma$ and $\tau$ are types, then so is $\sigma \bullet \tau$. 
Type Composition Logic  (Asher and Pustejovsky, 2006)

1. \(e\) the general type of entities; \(t\) the type of truth values.
   (\(\sigma, \tau\) range over all simple types, and subtypes of \(e\).)
2. If \(\sigma\) and \(\tau\) are types, then so is \(\sigma \rightarrow \tau\).
3. If \(\sigma\) and \(\tau\) are types, then so is \(\sigma \otimes_R \tau\); \(R\) ranges over \(A\) or \(T\).
4. If \(\sigma\) and \(\tau\) are types, then so is \(\sigma \cdot \tau\).
Qualia Types

\[
\chi : \alpha \\
\otimes_c \beta \\
\otimes_t \tau \\
\otimes_a \sigma
\]
Qualia Types

\[
\chi : \alpha \\
\otimes_c \beta \\
\otimes_t \tau \\
\otimes_a \sigma
\]
Qualia Types

\[
\begin{align*}
\chi : & \quad \alpha \\
\otimes_c & \quad \beta \\
\otimes_t & \quad \tau \\
\otimes_a & \quad \sigma
\end{align*}
\]
Entities formed from the application of the FORMAL and/or CONST qualia roles:

1. For the predicates below, $e_N$ is structured as a join semi-lattice, $\langle e_N, \sqsubseteq \rangle$;

2. physical, human, stick, lion, pebble

3. water, sky, rock
Natural Types

Entities formed from the application of the FORMAL and/or CONST qualia roles:

1. For the predicates below, $e_N$ is structured as a join semi-lattice, $\langle e_N, \sqsubseteq \rangle$;
2. physical, human, stick, lion, pebble
3. water, sky, rock
Natural Types

Entities formed from the application of the FORMAL and/or CONST qualia roles:

1. For the predicates below, $e_N$ is structured as a join semi-lattice, $\langle e_N, \sqsubseteq \rangle$;
2. physical, human, stick, lion, pebble
3. water, sky, rock
Natural Predicate Types

Predicates formed with Natural Entities as arguments:

1. *fall*: $e_N \rightarrow t$
2. *touch*: $e_N \rightarrow (e_N \rightarrow t)$
3. *be under*: $e_N \rightarrow (e_N \rightarrow t)$

a. $\lambda x : e_N[fall(x)]$

b. $\lambda y : e_N \lambda x : e_N[touch(x,y)]$

c. $\lambda y : e_N \lambda x : e_N[be-under(x,y)]$
Natural Predicate Types

Predicates formed with **Natural Entities** as arguments:

1. **fall**: \( e_N \rightarrow t \)
2. **touch**: \( e_N \rightarrow (e_N \rightarrow t) \)
3. **be under**: \( e_N \rightarrow (e_N \rightarrow t) \)

a. \( \lambda x : e_N[fall(x)] \)
b. \( \lambda y : e_N \lambda x : e_N[touch(x,y)] \)
c. \( \lambda y : e_N \lambda x : e_N[be-under(x,y)] \)
Natural Predicate Types

Predicates formed with Natural Entities as arguments:

1. **fall**: $e_N \rightarrow t$
2. **touch**: $e_N \rightarrow (e_N \rightarrow t)$
3. **be under**: $e_N \rightarrow (e_N \rightarrow t)$

a. $\lambda x : e_N[fall(x)]$

b. $\lambda y : e_N \lambda x : e_N(touch(x,y))$

c. $\lambda y : e_N \lambda x : e_N(be-under(x,y))$
Natural Predicate Types

Predicates formed with Natural Entities as arguments:

1. *fall*: $e_N \rightarrow t$
2. *touch*: $e_N \rightarrow (e_N \rightarrow t)$
3. *be under*: $e_N \rightarrow (e_N \rightarrow t)$

a. $\lambda x : e_N[fall(x)]$
b. $\lambda y : e_N \lambda x : e_N[touch(x,y)]$
c. $\lambda y : e_N \lambda x : e_N[be-under(x,y)]$
Natural Predicate Types

Predicates formed with **Natural Entities** as arguments:

1. **fall**: $e_N \rightarrow t$
2. **touch**: $e_N \rightarrow (e_N \rightarrow t)$
3. **be under**: $e_N \rightarrow (e_N \rightarrow t)$

   a. $\lambda x : e_N[fall(x)]$
   b. $\lambda y : e_N \lambda x : e_N[touch(x,y)]$
   c. $\lambda y : e_N \lambda x : e_N[be-under(x,y)]$
Natural Predicate Types

Predicates formed with Natural Entities as arguments:

1. *fall*: $e_N \rightarrow t$
2. *touch*: $e_N \rightarrow (e_N \rightarrow t)$
3. *be under*: $e_N \rightarrow (e_N \rightarrow t)$

a. $\lambda x : e_N[\textit{fall}(x)]$

b. $\lambda y : e_N \lambda x : e_N[\textit{touch}(x,y)]$

c. $\lambda y : e_N \lambda x : e_N[\textit{be-under}(x,y)]$
Natural Predicate Types

Predicates formed with Natural Entities as arguments:

1. \textit{fall}: \( e_N \rightarrow t \)
2. \textit{touch}: \( e_N \rightarrow (e_N \rightarrow t) \)
3. \textit{be under}: \( e_N \rightarrow (e_N \rightarrow t) \)

a. \( \lambda x : e_N[\textit{fall}(x)] \)
b. \( \lambda y : e_N \lambda x : e_N[\textit{touch}(x,y)] \)
c. \( \lambda y : e_N \lambda x : e_N[\textit{be-under}(x,y)] \)
Artifactual Entity Types

Entities formed from the Naturals by adding the AGENTIVE or TELIC qualia roles:

1. **Artifact Entity**: \( x : e_N \otimes_a \sigma \)
   - \( x \) exists because of event \( \sigma \)

2. **Functional Entity**: \( x : e_N \otimes_t \tau \)
   - the purpose of \( x \) is \( \tau \)

3. **Functional Artifactual Entity**: \( x : (e_N \otimes_a \sigma) \otimes_t \tau \)
   - \( x \) exists because of event \( \sigma \) for the purpose \( \tau \)

   a. **beer**: \( (\text{liquid} \otimes_a \text{brew}) \otimes_t \text{drink} \)
   b. **knife**: \( (\text{phys} \otimes_a \text{make}) \otimes_t \text{cut} \)
   c. **house**: \( (\text{phys} \otimes_a \text{build}) \otimes_t \text{live\_in} \)
Artifactual Predicate Types

Predicates formed with Artifactual Entities as arguments:

1. \( \text{spoil} : e_N \otimes_t \tau \rightarrow t \)
2. \( \text{fix} : e_N \otimes_t \tau \rightarrow (e_N \rightarrow t) \)

a. \( \lambda x : e_A[\text{spoil}(x)] \)

b. \( \lambda y : e_A \lambda x : e_N[\text{fix}(x,y)] \)

- The beer spoiled.
- Mary fixed the watch.
Artifactual Predicate Types

Predicates formed with Artifactual Entities as arguments:

1. **spoil**: $e_N \otimes_t \tau \rightarrow t$
2. **fix**: $e_N \otimes_t \tau \rightarrow (e_N \rightarrow t)$

a. $\lambda x : e_A[spoil(x)]$

b. $\lambda y : e_A \lambda x : e_N[fix(x,y)]$

- The beer spoiled.
- Mary fixed the watch.
Artifactual Predicate Types

Predicates formed with Artifactual Entities as arguments:

1. \textit{spoil}: \(e_N \otimes_t \tau \rightarrow t\)

2. \textit{fix}: \(e_N \otimes_t \tau \rightarrow (e_N \rightarrow t)\)

a. \(\lambda x : e_A[spoil(x)]\)

b. \(\lambda y : e_A \lambda x : e_N[fix(x,y)]\)

- The beer spoiled.
- Mary fixed the watch.
Artifactual Predicate Types

Predicates formed with Artifactual Entities as arguments:

1. **spoil**: $e_N \otimes_t \tau \rightarrow t$

2. **fix**: $e_N \otimes_t \tau \rightarrow (e_N \rightarrow t)$

a. $\lambda x : e_A[spoil(x)]$

b. $\lambda y : e_A \lambda x : e_N[fix(x,y)]$

- The beer spoiled.
- Mary fixed the watch.
Artifactual Predicate Types

Predicates formed with Artifactual Entities as arguments:

1. **spoil**: \( e_N \otimes t \tau \rightarrow t \)
2. **fix**: \( e_N \otimes t \tau \rightarrow (e_N \rightarrow t) \)

a. \( \lambda x : e_A[spoil(x)] \)

b. \( \lambda y : e_A \lambda x : e_N[fix(x,y)] \)

- The beer spoiled.
- Mary fixed the watch.
Artifactual Predicate Types

Predicates formed with Artifactual Entities as arguments:

1. spoil: $e_N \otimes_t \tau \rightarrow t$
2. fix: $e_N \otimes_t \tau \rightarrow (e_N \rightarrow t)$

   a. $\lambda x: e_A[\text{spoil}(x)]$
   b. $\lambda y: e_A \lambda x: e_N[\text{fix}(x,y)]$

- The beer spoiled.
- Mary fixed the watch.
Artifactual Predicate Types

Predicates formed with Artifactual Entities as arguments:

1. **spoil**: $e_N \otimes_t \tau \rightarrow t$
2. **fix**: $e_N \otimes_t \tau \rightarrow (e_N \rightarrow t)$

a. $\lambda x : e_A[spoil(x)]$

b. $\lambda y : e_A \lambda x : e_N[fix(x,y)]$

- The beer spoiled.
- Mary fixed the watch.
Complex Entity Types

Entities formed from the **Naturals** and **Artifactuals** by a *product type* between the entities, i.e., the dot, ●.

1. a. Mary doesn’t believe the book.

2. a. The exam started at noon.
   b. The students could not understand the exam.
Complex Entity Types

Entities formed from the **Naturals** and **Artifactuals** by a **product type** between the entities, i.e., the dot, ⋅.

1. a. Mary doesn’t believe the book.

2. a. The exam started at noon.
   b. The students could not understand the exam.
Complex Entity Types

Entities formed from the **Naturals** and **Artifactuals** by a **product type** between the entities, i.e., the dot, •.

1. a. Mary doesn’t believe the book.

2. a. The exam started at noon.
   b. The students could not understand the exam.
Today’s lunch$_2$ was longer than yesterday’s lunch$_1$.
Today’s lunch₂ was longer than yesterday’s [___]₁.
Today’s lunch$_2$ was longer than yesterday’s [___]$_1$. 

![Diagram showing two lunch objects, Lunch-1 and Lunch-2, with Lunch-1 being longer than Lunch-2.]
Today’s lunch₂ was longer than yesterday’s [___]₁.
Today’s lunch$_2$ was longer than yesterday’s [__]$_1$. 
Today’s lunch\textsubscript{2} was longer than yesterday’s \textit{[__]}\textsubscript{1}. 
Today’s lunch was longer than yesterday’s [___].
Today’s lunch\textsubscript{2} was longer than yesterday’s [___]\textsubscript{1}.
Today’s lunch₂ was longer than yesterday’s [___]₁.

Today’s Lunch

Yesterday’s Lunch
Complex Predicate Types

Predicates formed with a Complex Entity Type as an argument:

1. \( \text{read} : \text{phys} \bullet \text{info} \rightarrow (\text{e}_N \rightarrow \text{t}) \)

2. Expressed as typed arguments in a \( \lambda \)-expression:
   \( \lambda y : \text{phys} \bullet \text{info} \ \lambda x : \text{e}_N [\text{read}(x,y)] \)

3. Mary read the book.
Predicates formed with a Complex Entity Type as an argument:

1. $\textit{read}: \textit{phys} \bullet \textit{info} \rightarrow (\textit{e}_N \rightarrow \textit{t})$

2. Expressed as typed arguments in a $\lambda$-expression:
   $$\lambda y : \textit{phys} \bullet \textit{info} \; \lambda x : \textit{e}_N [\textit{read}(x, y)]$$

3. Mary read the book.
Strong Compositionality

If all you have for composition is function application, then you need to create as many lexical entries for an expression as there are environments it appears in. (Weak Compositionality)

Two ways to overcome this:


Strong Compositionality

If all you have for composition is function application, then you need to create as many lexical entries for an expression as there are environments it appears in. (Weak Compositionality)

Two ways to overcome this:


Strong Compositionality

If all you have for composition is function application, then you need to create as many lexical entries for an expression as there are environments it appears in. (Weak Compositionality)

Two ways to overcome this:


Strong Compositionality

If all you have for composition is function application, then you need to create as many lexical entries for an expression as there are environments it appears in. (Weak Compositionality)

Two ways to overcome this:


1. Mutability of Meaning
   - Introduction
   - Language is Compositional

2. Generative Lexicon
   - Strong Compositionality
   - Type Structure
   - Mechanics of Selection

3. Selection at Work
   - Type Coercion
   - Explaining Argument Flexibility

4. Classifiers
   - Arrernte
Modes of Composition

9) a. **PURE SELECTION** (Type Matching): the type a function requires is directly satisfied by the argument;
b. **ACCOMMODATION**: the type a function requires is inherited by the argument;
c. **TYPE COERCION**: the type a function requires is imposed on the argument type. This is accomplished by either:
   i. *Exploitation*: taking a part of the argument’s type to satisfy the function;
   ii. *Introduction*: wrapping the argument with the type required by the function.
(10) a. **PURE SELECTION** (Type Matching): the type a function requires is directly satisfied by the argument;
b. **ACCOMMODATION**: the type a function requires is inherited by the argument;
c. **TYPE COERCION**: the type a function requires is imposed on the argument type. This is accomplished by either:
   i. *Exploitation*: taking a part of the argument’s type to satisfy the function;
   ii. *Introduction*: wrapping the argument with the type required by the function.
Modes of Composition

(11) a. **PURE SELECTION** (Type Matching): the type a function requires is directly satisfied by the argument;

b. **ACCOMMODATION**: the type a function requires is inherited by the argument;

c. **TYPE COERCION**: the type a function requires is imposed on the argument type. This is accomplished by either:
   i. **Exploitation**: taking a part of the argument’s type to satisfy the function;
   ii. **Introduction**: wrapping the argument with the type required by the function.
Modes of Composition

(12) a. **PURE SELECTION** (Type Matching): the type a function requires is directly satisfied by the argument;
b. **ACCOMMODATION**: the type a function requires is inherited by the argument;
c. **TYPE COERCION**: the type a function requires is imposed on the argument type. This is accomplished by either:
   i. **Exploitation**: taking a part of the argument’s type to satisfy the function;
   ii. **Introduction**: wrapping the argument with the type required by the function.
(13) a. **PURE SELECTION** (Type Matching): the type a function requires is directly satisfied by the argument;
b. **ACCOMMODATION**: the type a function requires is inherited by the argument;
c. **TYPE COERCION**: the type a function requires is imposed on the argument type. This is accomplished by either:
   i. **Exploitation**: taking a part of the argument’s type to satisfy the function;
   ii. **Introduction**: wrapping the argument with the type required by the function.
Modes of Composition

(14) a. **PURE SELECTION** (Type Matching): the type a function requires is directly satisfied by the argument;
b. **ACCOMMODATION**: the type a function requires is inherited by the argument;
c. **TYPE COERCION**: the type a function requires is imposed on the argument type. This is accomplished by either:
   i. **Exploitation**: taking a part of the argument’s type to satisfy the function;
   ii. **Introduction**: wrapping the argument with the type required by the function.
Two Kinds of Coercion in Language

- **Domain-shifting**: The domain of interpretation of the argument is shifted;
- **Domain-preserving**: The argument is coerced but remains within the general domain of interpretation.
Two Kinds of Coercion in Language

- **Domain-shifting**: The domain of interpretation of the argument is shifted;
- **Domain-preserving**: The argument is coerced but remains within the general domain of interpretation.
Two Kinds of Coercion in Language

- **Domain-shifting**: The domain of interpretation of the argument is shifted;
- **Domain-preserving**: The argument is coerced but remains within the general domain of interpretation.
Domian-Shifting Coercion

1. Entity shifts to event:
   I enjoyed the beer

2. Entity shifts to proposition:
   I doubt John.
**Domain-Shifting Coercion**

1. **Entity shifts to event:**
   I enjoyed the beer

2. **Entity shifts to proposition:**
   I doubt John.
Domain-Shifting Coercion

1. Entity shifts to event:
   I enjoyed the beer

2. Entity shifts to proposition:
   I doubt John.
Domain-Preserving Coercion

Count-mass shifting: There’s chicken in the soup.

NP Raising: Mary and every child came.

Natural-Artifactual shifting: The water spoiled.

Natural-Complex shifting: She read a rumor.

Complex-Natural shifting: John burnt a book.

Artifactual-Natural shifting: She touched the phone.
Domain-Preserving Coercion

1. **Count-mass shifting**: There’s chicken in the soup.
2. **NP Raising**: Mary and every child came.
3. **Natural-Artifactual shifting**: The water spoiled.
4. **Natural-Complex shifting**: She read a rumor.
5. **Complex-Natural shifting**: John burnt a book.
6. **Artifactual-Natural shifting**: She touched the phone.
Domain-Preserving Coercion

1. **Count-mass shifting**: There’s chicken in the soup.
2. **NP Raising**: Mary and every child came.
3. **Natural-Artifactual shifting**: The water spoiled.
4. **Natural-Complex shifting**: She read a rumor.
5. **Complex-Natural shifting**: John burnt a book.
6. **Artifactual-Natural shifting**: She touched the phone.
Domain-Preserving Coercion

1. **Count-mass shifting**: There’s chicken in the soup.
2. **NP Raising**: Mary and every child came.
3. **Natural-Artifactual shifting**: The water spoiled.
4. **Natural-Complex shifting**: She read a rumor.
5. **Complex-Natural shifting**: John burnt a book.
6. **Artifactual-Natural shifting**: She touched the phone.
Domain-Preserving Coercion

1. **Count-mass shifting**: There’s chicken in the soup.
2. **NP Raising**: Mary and every child came.
3. **Natural-Artifactual shifting**: The water spoiled.
4. **Natural-Complex shifting**: She read a rumor.
5. **Complex-Natural shifting**: John burnt a book.
6. **Artifactual-Natural shifting**: She touched the phone.
Domain-Preserving Coercion

1. **Count-mass shifting**: There’s chicken in the soup.
2. **NP Raising**: Mary and every child came.
3. **Natural-Artifactual shifting**: The water spoiled.
4. **Natural-Complex shifting**: She read a rumor.
5. **Complex-Natural shifting**: John burnt a book.
6. **Artifactual-Natural shifting**: She touched the phone.
Domain-Preserving Coercion

1. **Count-mass shifting**: There’s chicken in the soup.
2. **NP Raising**: Mary and every child came.
3. **Natural-Artifactual shifting**: The water spoiled.
4. **Natural-Complex shifting**: She read a rumor.
5. **Complex-Natural shifting**: John burnt a book.
6. **Artifactual-Natural shifting**: She touched the phone.
Direct Argument Selection

- The spokesman denied the statement (PROPOSITION).
- The child threw the ball (PHYSICAL OBJECT).
- The audience didn’t believe the rumor (PROPOSITION).
Direct Argument Selection

- The spokesman denied the statement \textit{(PROPOSITION)}.
- The child threw the ball \textit{(PHYSICAL OBJECT)}.
- The audience didn’t believe the rumor \textit{(PROPOSITION)}.
Direct Argument Selection

- The spokesman denied the **statement** (PROPOSITION).
- The child threw the **ball** (PHYSICAL OBJECT).
- The audience didn’t believe the **rumor** (PROPOSITION).
The spokesman denied the statement (PROPOSITION).
The child threw the ball (PHYSICAL OBJECT).
The audience didn’t believe the rumor (PROPOSITION).
The rock fell.

\[
S \\
\text{NP: } e_N \\
\text{the rock} \\
\text{VP} \\
\text{fell} \\
\lambda x: e_N[fall(x)]
\]
The beer spoiled.

\[ \lambda x : e_A[\text{spoil}(x)] \]
John read the book.

\[ : p \cdot i \lambda x : e_N[read(x,y)] \]

\[ \text{Det} \quad \text{NP: phys} \cdot \text{info} \]

\[ \text{VP} \]

\[ \text{V} \quad \text{p} \cdot i \]

\[ \text{read} \quad \text{Det} \quad \text{N} \quad \text{the} \quad \text{book} \]
1. Mutability of Meaning
   - Introduction
   - Language is Compositional

2. Generative Lexicon
   - Strong Compositionality
   - Type Structure
   - Mechanics of Selection

3. Selection at Work
   - Type Coercion
   - Explaining Argument Flexibility

4. Classifiers
   - Arrernte
Coercion of Arguments

- The president denied the *attack*.  
  \[ \text{EVENT} \rightarrow \text{PROPOSITION} \]
- The White House denied this statement.  
  \[ \text{LOCATION} \rightarrow \text{HUMAN} \]
- This book explains the theory of relativity.  
  \[ \text{PHYS} \cdot \text{INFO} \rightarrow \text{human} \]
- d. The Boston office called with an update.  
  \[ \text{EVENT} \rightarrow \text{INFO} \]
Coercion of Arguments

- The president denied the **attack**.
  
  \[ \text{EVENT} \rightarrow \text{PROPOSITION} \]

- The White House denied this statement.
  
  \[ \text{LOCATION} \rightarrow \text{HUMAN} \]

- This book explains the theory of relativity.
  
  \[ \text{PHYS} \bullet \text{INFO} \rightarrow \text{human} \]

- d. The Boston office called with an update.
  
  \[ \text{EVENT} \rightarrow \text{INFO} \]
Coercion of Arguments

- The president denied the attack.
  \text{EVENT} \rightarrow \text{PROPOSITION}

- The White House denied this statement.
  \text{LOCATION} \rightarrow \text{HUMAN}

- This book explains the theory of relativity.
  \text{PHYS} \bullet \text{INFO} \rightarrow \text{human}

- d. The Boston office called with an update.
  \text{EVENT} \rightarrow \text{INFO}
Coercion of Arguments

- The president denied the attack.  
  EVENT $\rightarrow$ PROPOSITION

- The White House denied this statement.  
  LOCATION $\rightarrow$ HUMAN

- This book explains the theory of relativity.  
  PHYS $\bullet$ INFO $\rightarrow$ human

- d. The Boston office called with an update.  
  EVENT $\rightarrow$ INFO
Coercion of Arguments

- The president denied the **attack**.
  \[\text{EVENT} \rightarrow \text{PROPOSITION}\]

- The **White House** denied this statement.
  \[\text{LOCATION} \rightarrow \text{HUMAN}\]

- This book explains the theory of relativity.
  \[\text{PHYS} \oplus \text{INFO} \rightarrow \text{human}\]

- d. The Boston office called with an update.
  \[\text{EVENT} \rightarrow \text{INFO}\]
Coercion of Arguments

- The president denied the **attack**.
  - EVENT $\rightarrow$ PROPOSITION

- The White House denied this statement.
  - LOCATION $\rightarrow$ HUMAN

- This book explains the theory of relativity.
  - PHYS $\cdot$ INFO $\rightarrow$ human

- d. The Boston office called with an update.
  - EVENT $\rightarrow$ INFO
Coercion of Arguments

- The president denied the attack.
  EVENT → PROPOSITION
- The White House denied this statement.
  LOCATION → HUMAN
- This book explains the theory of relativity.
  PHYS • INFO → human
- d. The Boston office called with an update.
  EVENT → INFO
Coercion of Arguments

- The president denied the **attack**.
  
  \[ \text{EVENT} \rightarrow \text{PROPOSITION} \]

- The **White House** denied this statement.
  
  \[ \text{LOCATION} \rightarrow \text{HUMAN} \]

- **This book** explains the theory of relativity.
  
  \[ \text{PHYS} \bullet \text{INFO} \rightarrow \text{human} \]

- d. The Boston office called with **an update**.
  
  \[ \text{EVENT} \rightarrow \text{INFO} \]
Coercion of Arguments

- The president denied the **attack**.
  EVENT → PROPOSITION

- **The White House** denied this statement.
  LOCATION → HUMAN

- **This book** explains the theory of relativity.
  PHYS • INFO → human

- d. The Boston office called with **an update**.
  EVENT → INFO
The water spoiled.

\[ \lambda x : e_A[\text{spoil}(x)] \]

**Diagram:**

- **S**: Root node
- **NP**: Liquid (\( e_N \))
- **VP**: Spoiled
- **V**: the water

Type Coercion: Qualia-Introduction

Pustejovsky (Brandeis University)
John read the rumor.

$y : p \bullet i \lambda x : e_N[\textit{read}(x,y)]$

\[ \text{Det} \quad \text{read} \quad \text{NP:info} \quad \text{VP} \]

\[ \text{the} \quad \text{phys} \bullet \text{info} \quad \text{rumor} \]
Type Coercion: Event Introduction

Mary enjoyed her coffee.

\[ \lambda x. \text{Event}(x, NP) \]

\[ \text{NP} : \text{liquid} \otimes_T \text{drink} \]

Diagram:
- **VP**
  - **V** [event]
  - **NP** [portion]
    - **Det** her
    - **N** [mass]
      - **N** coffee
Mary enjoyed her coffee.

\[ \lambda x. \text{drink}(x, \text{NP}) \]

\[ \text{NP: liquid } \otimes_T \text{ drink} \]

Tree: Enjoyment of coffee

\[ \text{V} \xrightarrow{[\text{event}]} \text{VP} \]

\[ \text{V} \xrightarrow{\text{enjoy}} \text{VP} \]

\[ \text{Det} \xrightarrow{[\text{portion}]} \text{NP} \]

\[ \text{N} \xrightarrow{[\text{mass}]} \text{NP} \]

\[ \text{her} \]

\[ \text{coffee} \]
Type Coercion: Dot Exploitation

1. The police burned the book.
2. Mary believes the book.

The diagram illustrates the syntactic structure of the sentences, with the verbs and nouns annotated to show the type coercion and dot exploitation. The tree structure includes nodes labeled with parts of speech and functional symbols, reflecting the symbolic representation of the sentences.
### Verb-Argument Composition Table

<table>
<thead>
<tr>
<th>Argument is:</th>
<th>Natural</th>
<th>Artifactual</th>
<th>Complex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural</td>
<td>Selection</td>
<td>Qualia Intro</td>
<td>Dot Intro</td>
</tr>
<tr>
<td>Artifactual</td>
<td>Qualia Exploit</td>
<td>Selection</td>
<td>Dot Intro</td>
</tr>
<tr>
<td>Complex</td>
<td>Dot Exploit</td>
<td>Dot Exploit</td>
<td>Selection</td>
</tr>
</tbody>
</table>
1. Mutability of Meaning
   - Introduction
   - Language is Compositional

2. Generative Lexicon
   - Strong Compositionality
   - Type Structure
   - Mechanics of Selection

3. Selection at Work
   - Type Coercion
   - Explaining Argument Flexibility

4. Classifiers
   - Arrernte
Interpreting the Subject in Causatives

- Assume a causative (binary) event structure
- Argument selection:
  - subject is event:
    \[ e \rightarrow (\epsilon \rightarrow t) \]
  - subject is entity:
    \[ e \rightarrow (e \rightarrow t) \]
The relation identified as the initial event and that identified as the resulting event must refer to at least one argument in common.

\[ e_{<_\infty} \]

\[ e_1 \quad e_2 \]

\[ R(x, y, \ldots) \quad P(\ldots, y, \ldots) \]
Coercion of the External Argument

1. If the DP is a direct argument to event, $e_1$, then an interpretation is possible through a coercion.

2. $kill\_act(e_1, x, y, z)$

3. $x=John, y=Mary, z=the\text{-}gun$

Satisfaction of event typing is achieved by exploiting the argument and wrapping it with the event it participates in.
Introducing Agency over Predicates

Wechsler’s Subject Rule is a factor of inherent agency of the argument.

1. John rolled down the hill as fast as he could.
2. John cooled off with an iced latte.

- Human is typed as an acting, rational, animal:

  \[ \text{human} \otimes_A \sigma \otimes_T \tau \]
Wechsler’s Subject Rule is a factor of inherent agency of the argument.

1. John rolled down the hill as fast as he could.
2. John cooled off with an iced latte.

- Human is typed as an acting, rational, animal:
  \[ \text{human} \otimes_A \sigma \otimes_T \tau \]
Wechsler’s Subject Rule is a factor of inherent agency of the argument.

1. John rolled down the hill as fast as he could.
2. John cooled off with an iced latte.

- `Human` is typed as an acting, rational, animal:

  \[human \otimes_A \sigma \otimes_T \tau\]
Introducing Agency over Predicates

Wechsler’s Subject Rule is a factor of inherent agency of the argument.

1. John rolled down the hill as fast as he could.
2. John cooled off with an iced latte.

Human is typed as an acting, rational, animal:

\[ \text{human} \otimes_A \sigma \otimes_T \tau \]
Perception Predicates

The verb hear selects for the type SOUND.

- \( \text{sound} \rightarrow (\text{anim} \rightarrow t) \)
- Conventionalized Attributes of an object:
  1. \( \text{sound}(\text{dog}) = \) barking, whining
  2. \( \text{sound}(\text{rain}) = \) falling, hitting the roof
Perception Predicates

The verb **hear** selects for the type **SOUND**.

- \( \text{sound} \rightarrow (\text{anim} \rightarrow t) \)
- Conventionalized Attributes of an object:
  1. \( \text{sound}(\text{dog}) = \text{barking, whining} \)
  2. \( \text{sound}(\text{rain}) = \text{falling, hitting the roof} \)
Perception Predicates

The verb **hear** selects for the type **SOUND**.

- \( \text{sound} \rightarrow (\text{anim} \rightarrow t) \)
- **Conventionalized Attributes** of an object:
  1. \( \text{sound}(\text{dog}) = \text{barking, whining} \)
  2. \( \text{sound}(\text{rain}) = \text{falling, hitting the roof} \)
Perception Predicates

The verb hear selects for the type SOUND.

- \( \text{sound} \rightarrow (\text{anim} \rightarrow t) \)

- Conventionalized Attributes of an object:
  1. \( \text{sound}(\text{dog}) = \text{barking, whining} \)
  2. \( \text{sound}(\text{rain}) = \text{falling, hitting the roof} \)
The verb **hear** selects for the type **SOUND**.

- $sound \rightarrow (anim \rightarrow t)$
- Conventionalized Attributes of an object:
  1. $sound(dog) = barking, \text{whining}$
  2. $sound(rain) = \text{falling, hitting the roof}$
1. Mutability of Meaning
   - Introduction
   - Language is Compositional

2. Generative Lexicon
   - Strong Compositionality
   - Type Structure
   - Mechanics of Selection

3. Selection at Work
   - Type Coercion
   - Explaining Argument Flexibility

4. Classifiers
   - Arrernte
Classifier Systems in Arrernte (Wilkins, 2000)

1. *thipe*: flying, fleshy creatures;
2. *yerre*: ants;
3. *arne*: ligneous plants;
4. *name*: long grasses;
5. *pwerte*: rock related entities.
Classifier Systems and Coercion

1. *kere*: game animals, meat creatures;
2. *merne*: edible foods from plants;
3. *arne*: artifact, usable thing;

- *kere aherre*: kangaroo as food;
- *merne langwe*: edible food from bush banana;
- *pwerte athere*: a grinding stone
Classifier Systems and Coercion

1. *kere*: game animals, meat creatures;
2. *merne*: edible foods from plants;
3. *arne*: artifact, usable thing;

- *kere aherre*: kangaroo as food;
- *merne langwe*: edible food from bush banana;
- *pwerte athere*: a grinding stone
Classifier Systems and Coercion

1. **kere**: game animals, meat creatures;
2. **merne**: edible foods from plants;
3. **arne**: artifact, usable thing;
4. **tyape**: edible grubs.

- **kere aherre**: kangaroo as food;
- **merne langwe**: edible food from bush banana;
- **pwerte athere**: a grinding stone
Natural vs. Artifactual Entity Types

(15)   \[ \text{lwerre-ke anwerne aherre arunthe-∅ are-ke.} \]
way/path-DAT 1plERG kangaroo many-ACC see-pc
“On the way we saw some kangaroos.”

(16)   \[ \text{the imarte arratye kere aherre-∅ arlkwe-tye.lhe-me-le.} \]
1sgERG then truly meat kangaroo-ACC eat-GO&DO-npp-SS
‘When I got there I ate some kangaroo meat.”
(17)  

\[
\begin{array}{c}
\tilde{N} \\
\text{kangaroo} \odot \text{eat}_T \\
\end{array}
\]

\[
\begin{array}{c}
N_g \\
\text{animal} \odot \text{eat}_T \\
\end{array} \quad \rightarrow \quad 
\begin{array}{c}
\tilde{N} \\
\text{kangaroo} \odot \text{eat}_T \\
\end{array}
\]

\[
\begin{array}{c}
N_s \\
\text{ahere} \\
\end{array}
\]

\[
\begin{array}{c}
N_g \\
\text{animal} \odot \text{eat}_T \\
\end{array} \quad \rightarrow \quad 
\begin{array}{c}
N_s \\
\text{ahere} \\
\end{array}
\]
Lexical Entries distinguish object types

1. **see**
   - **CAT** = verb
   - **ARGSTR** = \[
     \begin{cases}
     \text{ARG}1 = animal \\
     \text{ARG}2 = \text{phys}
    \end{cases}
   \]

2. **eat**
   - **CAT** = verb
   - **ARGSTR** = \[
     \begin{cases}
     \text{ARG}1 = animal \\
     \text{ARG}2 = \text{phys} \otimes \text{eat}_T
    \end{cases}
   \]
Artifactual Selection

\[ \Theta[\text{kangaroo} \sqsubseteq \text{phys}] : \text{kangaroo} \rightarrow \text{phys} \]
Conclusion

1. **Polysemy** challenges compositionality
   1. inherent polysemy
   2. selectional polysemy

2. **Mechanisms of Selection** in language involve:
   1. function application
   2. type coercion by exploitation
   3. type coercion by introduction
   4. type accommodation

3. Classifier constructions support the Natural/Artifactual type distinction

4. Accounted for by Coercion
Conclusion

1. Polysemy challenges compositionality
   1. inherent polysemy
   2. selectional polysemy

2. Mechanisms of Selection in language involve:
   1. function application
   2. type coercion by exploitation
   3. type coercion by introduction
   4. type accommodation

3. Classifier constructions support the Natural/Artifactual type distinction

4. Accounted for by Coercion
Conclusion

1. **Polysemy** challenges compositionality
   - inherent polysemy
   - selectional polysemy

2. **Mechanisms of Selection** in language involve:
   - function application
   - type coercion by exploitation
   - type coercion by introduction
   - type accommodation

3. Classifier constructions support the Natural/Artifactual type distinction

4. Accounted for by Coercion
Conclusion

1. **Polysemy** challenges compositionality
   - 1. inherent polysemy
   - 2. selectional polysemy

2. **Mechanisms of Selection** in language involve:
   - 1. function application
   - 2. type coercion by exploitation
   - 3. type coercion by introduction
   - 4. type accommodation

3. **Classifier constructions** support the Natural/Artifactual type distinction

4. Accounted for by **Coercion**
Conclusion

1. **Polysemy** challenges compositionality
   - inherent polysemy
   - selectional polysemy

2. **Mechanisms of Selection** in language involve:
   - function application
   - type coercion by exploitation
   - type coercion by introduction
   - type accommodation

3. **Classifier constructions** support the Natural/Artifactual type distinction

4. Accounted for by **Coercion**