

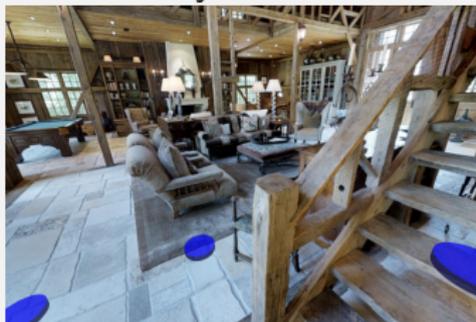
Lecture 3: From Concepts to Indices

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Command: Go to the window by the billard table, then turn right. . .



Anderson et al (2018), Vision-and-Language Navigation: Interpreting visually-grounded navigation instructions in real environments

Lecture 3: From Concepts to Indices

1. From nouns to objects
2. Semantic *buckets*
3. Discourse referents
4. Superpower from structures

From Nouns to Objects

How can pupils find their own rucksacks?



tag/name them

Proper noun phrases

Sky News Breakfast: Tough questions on PPE, Putin and Partygate

- Sky ▷BBC
- Sky News ▷BBC News
- Sky News Breakfast ▷BBC Breakfast
- Putin ▷Boris Johnson
- Partygate?

02/02/2022

Trump and London

Nouns seem to indicate objects

- *Trump* → the 45th president of the U.S.
- *London* → the capital city of the U.K.

Example

Trump will be in the city for meetings with *Queen Elizabeth* and Prime Minister *Theresa May* and protesters are planning a “stop *Trump*” march through central *London*.

Reference to proper nouns

Language

“Donald Trump”

“Trump”

“ex-President”

World model



World



photos are from BBC

Semantic *Buckets*

But there are too many rucksacks. . .

Enumerate them

- (1) a. Elizabeth I
- b. Elizabeth II
- c. George VI

Point to them: Pronoun

- (2) a. Come and look at **this**.
- b. **That**'s a very good idea.
- c. Can I have one of **these**?

- Proper nouns and pronouns, by name, are nouns.
- So do nouns directly link to objects?

London, Two Trumps and Londoners

London Will See Two Trumps: The President and a Balloon Parody

Londoners will get to see two versions of Donald Trump next week: the 45th president of the U.S. and a 20-foot-high inflatable version that's orange and wearing a diaper.

news from www.bloombergquint.com

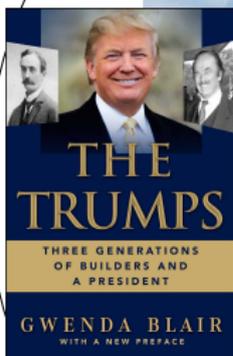


How can pupils find their own rucksacks?



bucket them

The meaning of *Trump* in *Two Trumps*



Build a bucket and then point

Bucketing with nouns



box



shoe

Pointing with determiners

- (3) a. What's in **this** box?
b. I might get myself a pair of **those** shoes.

Red chairs

What if we say “red chairs”?

Now we have an NP headed by a “normal” noun, not a proper noun.

Let's start by imagining a big bucket full of objects called a “chair” in our world model.

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Reference to Buckets



We can treat adjectives like buckets too!

Restriction vs Description

- If there are red and non-red chairs in the world, saying “red chair” **restricts** the reference when compared to “chair”: some chairs are now no longer referred to.
- If there are only red chairs in the world, saying “chair” and “red chair” selects for the same individuals.
- We might still refer to the chairs as “red chairs” even in this world; mentioning the colour is adding information for the listener. The mention of the colour is then a case of **description**, rather than restriction.

Build a fancy bucket

The news

Londoners will get to see two versions of Donald Trump next week: the 45th president of the United States and a 20-foot-high inflatable version that is orange and wearing a nappy.

Mr Trump will be in the city for a meeting with [...]

[...] Trump Baby will fly!

[...] In a crowdfunding request, they wrote that they want the balloon to shadow the president, “haunting the skies — and hopefully the dreams — of the stain on the office of President that is Donald Trump Senior.”

The White House has brushed aside questions about protests during Mr Trump’s trip.

[...]

Build a fancy bucket

The news

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Build a fancy bucket

- (4) a. the 45th president of the United States
b. a 20-foot-high inflatable version that is orange and wearing a nappy

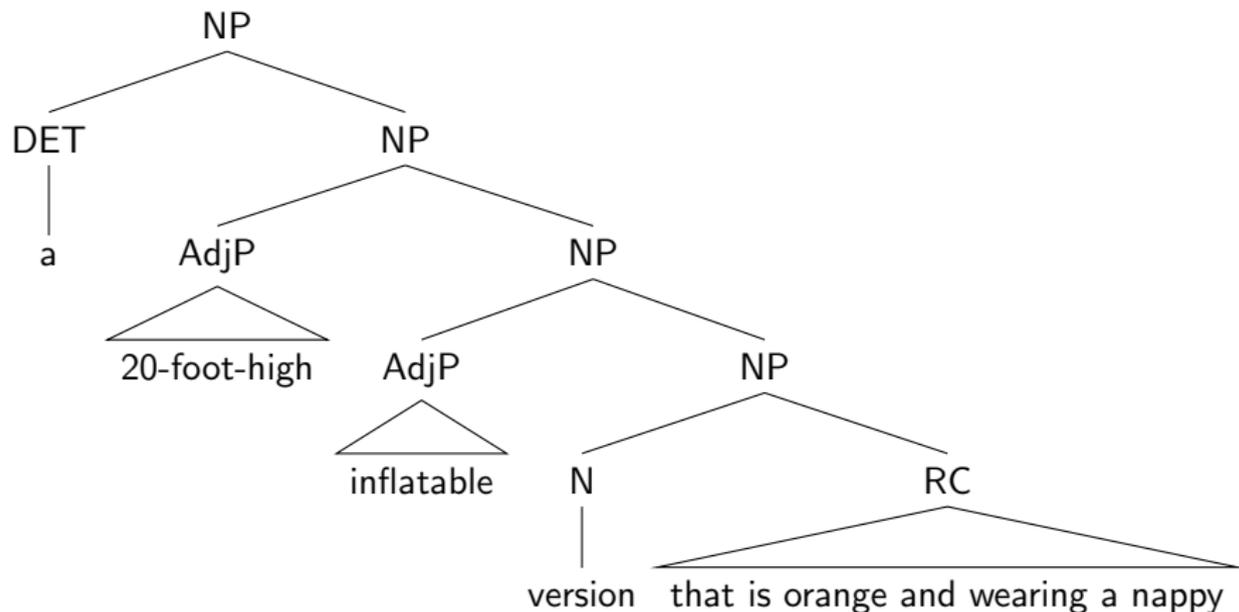
DET + modifiers + NOUN + modifiers

Database and SQL

```
SELECT * FROM Mayors  
WHERE Country='UK' AND City='Cambridge';
```

Syntax for building buckets

Syntactico-semantic composition



More on modification later

Discourse Referents



LEGOLAND
WINDSOR RESORT



Desired properties of a world model

A world model is an abstracted, simplified version of our world.

- The world model should be precise.
- reflect the complexity of the phenomena we think are important
- drop other things we don't care about
- should have a systematic way to be constructed

- Its components should be transparent, ie, it should be easy to see what in our world is what in the model.
- There should be a close link between our model and those phenomena in the real world we care about

Our world model

It consists of

- **discourse referents.** unique variables standing in for actual people and objects in the world
- **semantic predicates.** functions representing “buckets” (certain nouns) and properties and events

We will start with proper names and simple predicates. . .

Trump gave Johnson a golden lighter.

The term “predicate” is also often used to describe a particular syntactic elements. We use “semantic predicate” to distinguish these two concepts.

Extension and intension

The **extension** of a linguistic expression is the set of things it extends to, or applies to.

Example: *politician*

{Trump, Johnson, ...}

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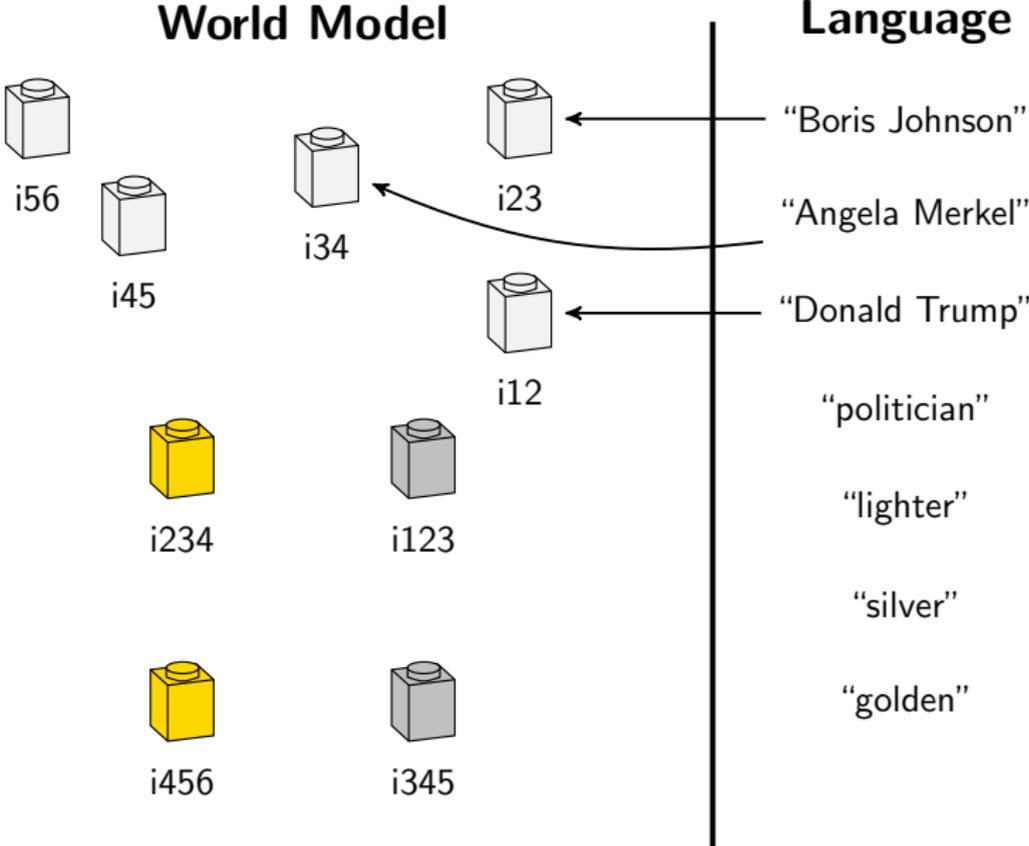
Intensional semantics

e.g. a description from wikipedia

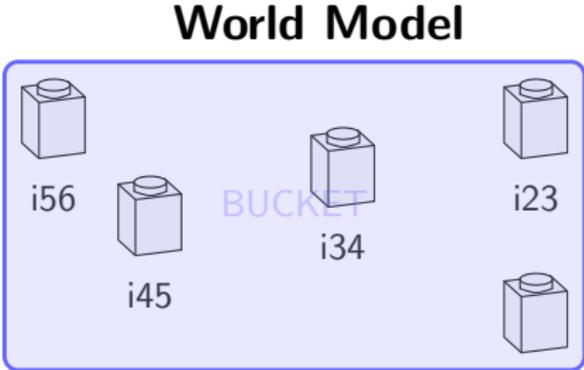
A *politician* is a person active in party politics, or a person holding or seeking an elected seat in government.

- intensional, but imprecise description

Discourse referents

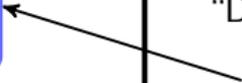


Discourse referents

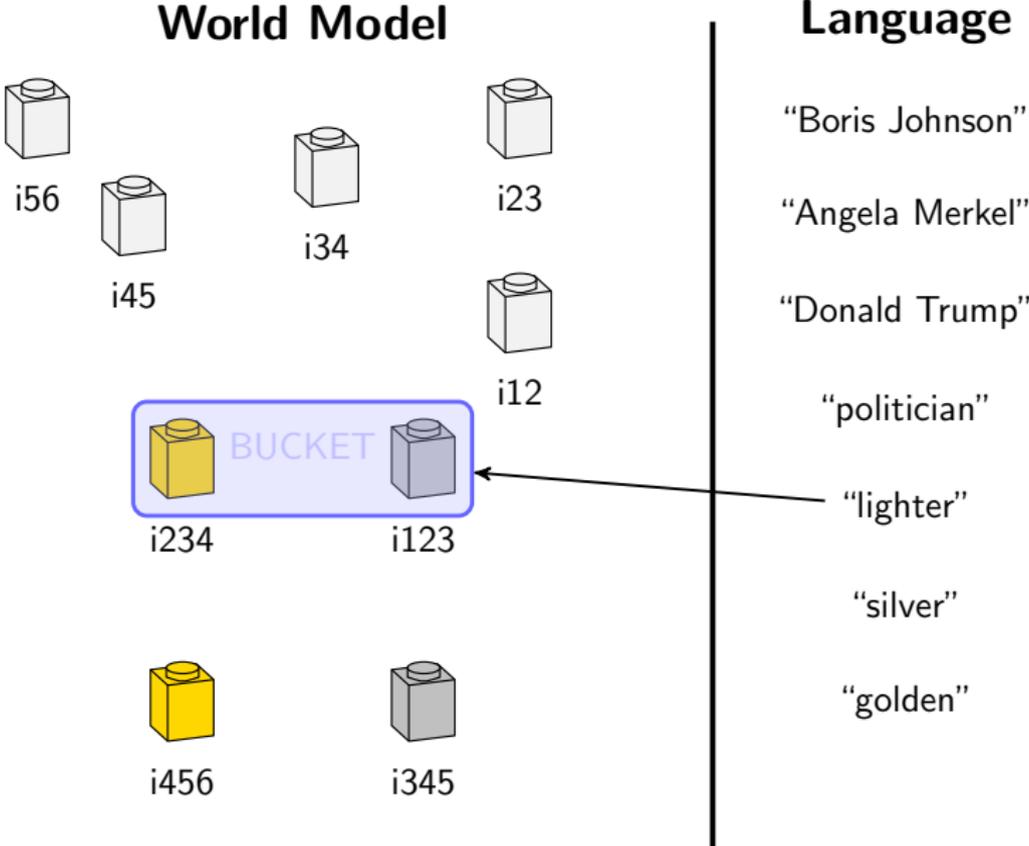


Language

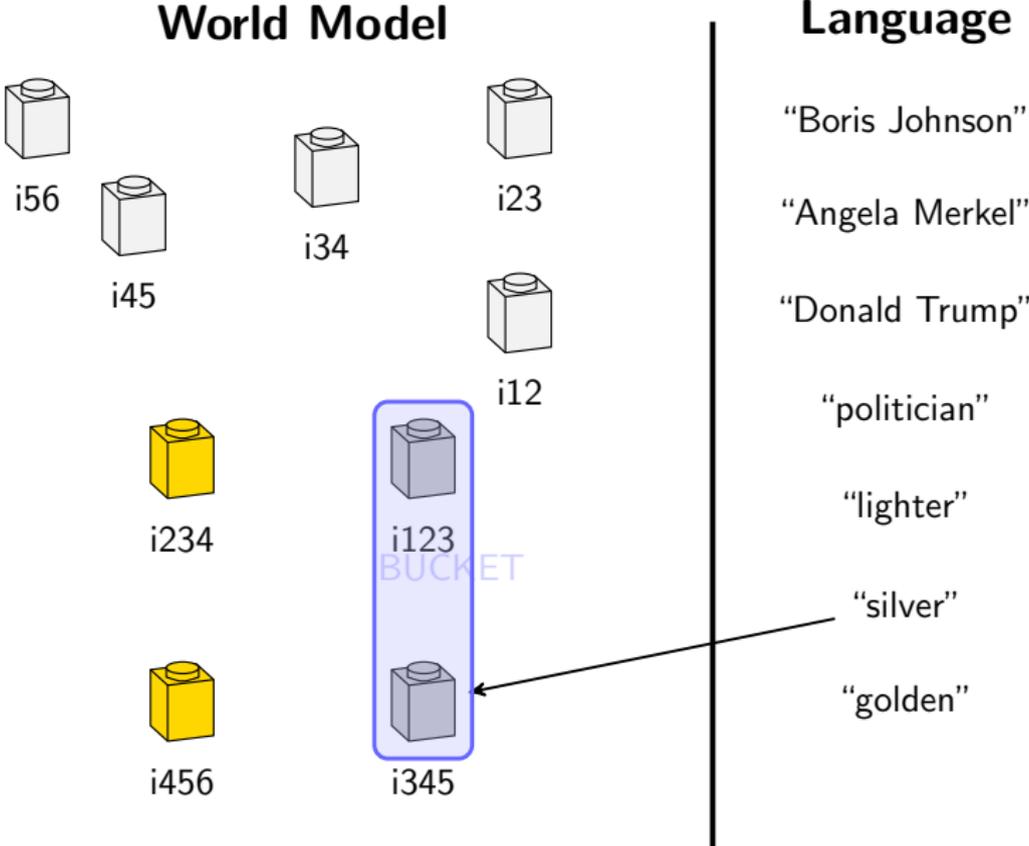
- "Boris Johnson"
- "Angela Merkel"
- "Donald Trump"
- "politician"
- "lighter"
- "silver"
- "golden"



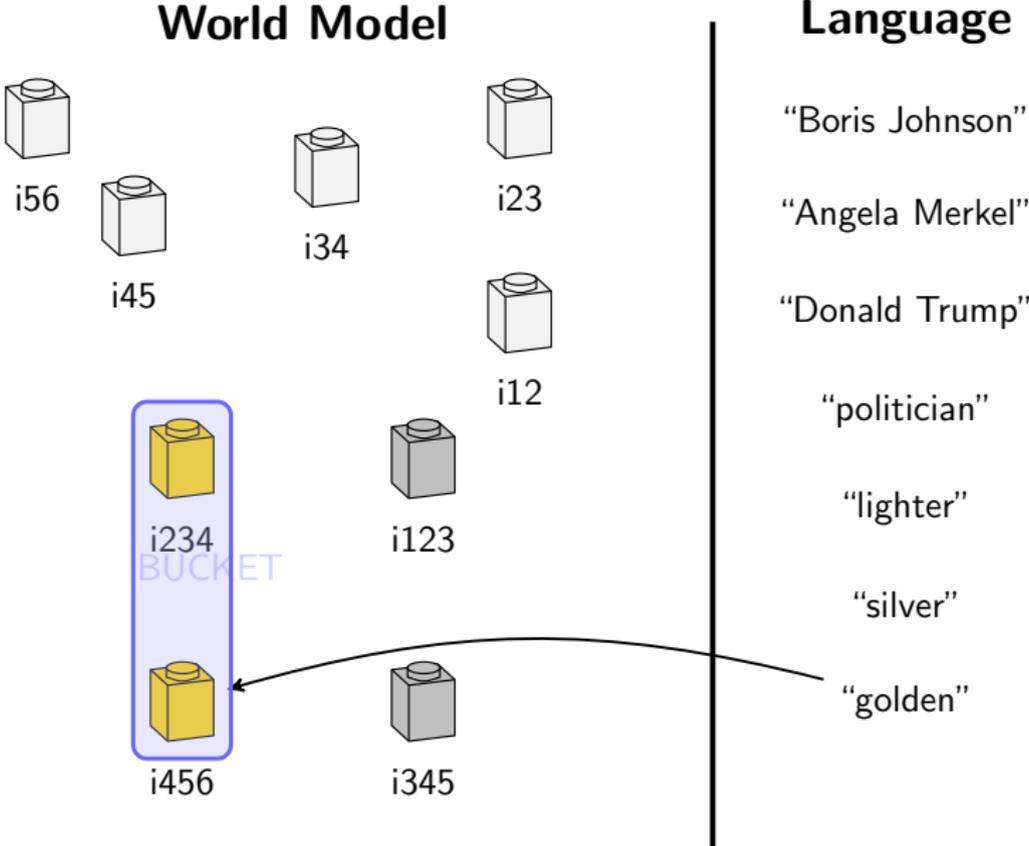
Discourse referents



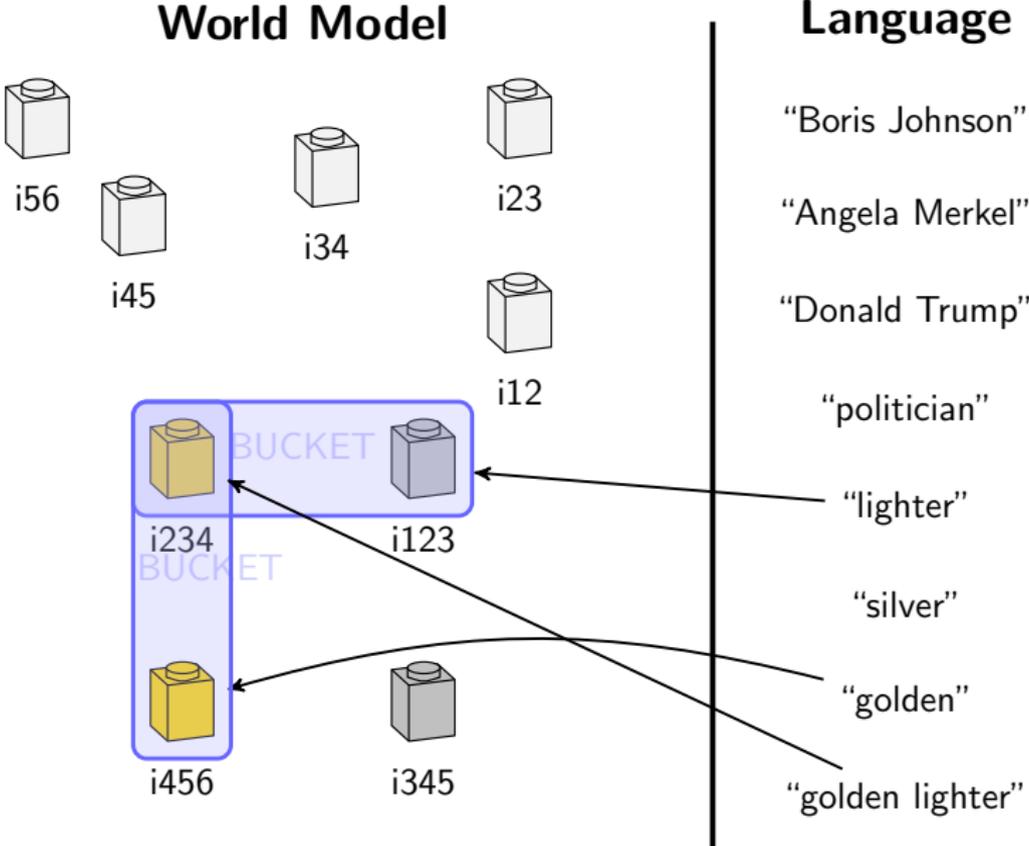
Discourse referents



Discourse referents

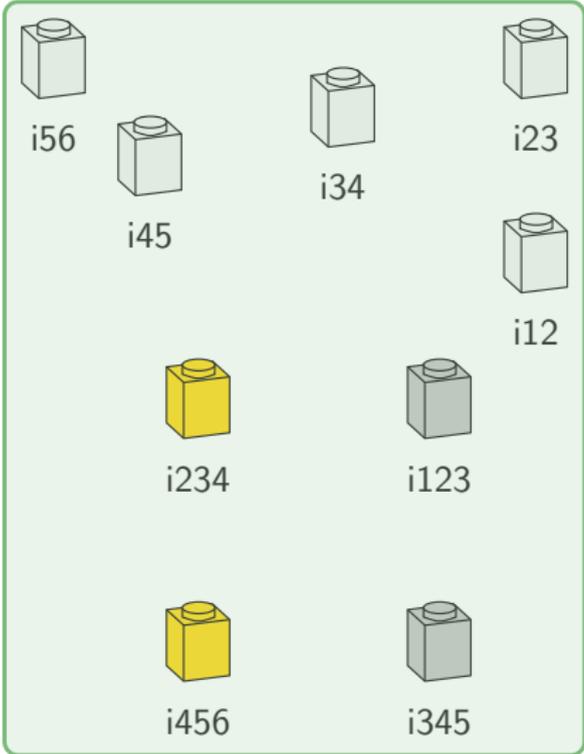


Discourse referents



Discourse referents

World Model



Language

- "Boris Johnson"
- "Angela Merkel"
- "Donald Trump"
- "politician"
- "lighter"
- "silver"
- "golden"
- ...

Extensional interpretation

- An **interpretation** function ($\llbracket \ \rrbracket$) maps language expressions onto objects, sets of objects, sets of sets of..., of the world model.
e.g $\llbracket \textit{politician} \rrbracket = \{i12, i23, i34, i45, i56\}$
- In this lecture, objects of the world model are discourse referents.
- To simplify, proper names are mapped to **unique** discourse referents.
e.g $\llbracket \textit{Angela Merkel} \rrbracket = i34$

Superpower from Structures

Compositional semantics

- $\llbracket \textit{Johnson smokes} \rrbracket$ is not listed in the lexicon.
- But the interpretation of *Johnson smokes* can still be derived from its parts along with a syntactic analysis.
- Finite means make infinite interpretation possible.
- This is exactly the point of compositional semantics

Do you think this is a red chair?

