

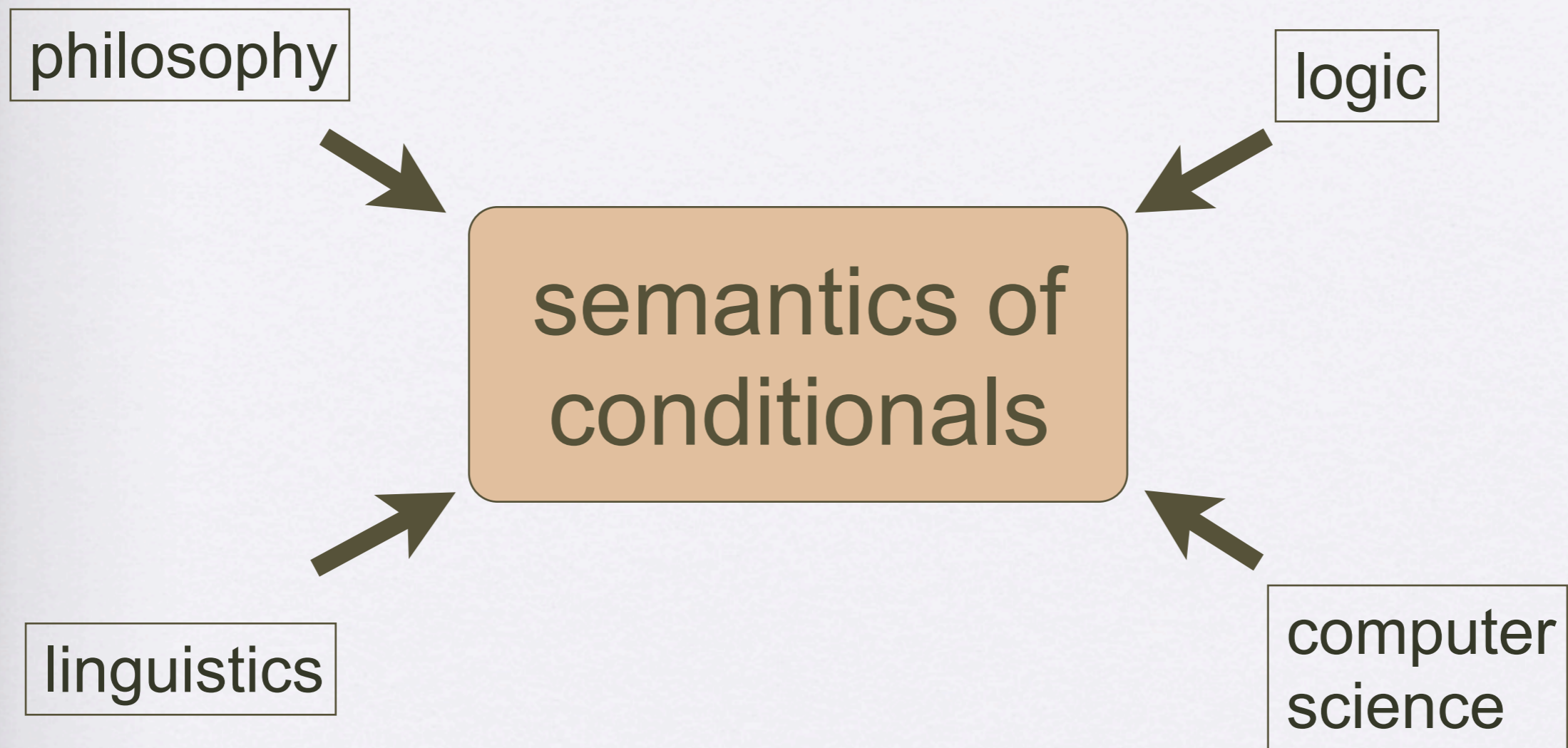
# Conditionals from top to bottom

Katrin Schulz

ILLC

University of Amsterdam

# Motivation



# Motivation

## semantics of conditionals

(1) *If Hanna asks Simon nicely, (then) he will help her.*

Input

$A > C$

X

*[Hanna will ask Simon nicely]*

*[Simon will help Hanna]*

SEMANTICS

Output

$\lambda w.f_M(\llbracket A \rrbracket, \llbracket C \rrbracket, w)$

✓

# Motivation

## compositional semantics of conditionals

(1) *If Hanna asks Simon nicely, (then) he will help her.*

Input

$[[[[[If]_{co}[Hanna\ asks\ Simon\ nicely]_{IP}]]_{CP}[[ (then) ]_{spec}[he\ will\ help\ her]_{I'}]_{IP}]_{CP}$

SEMANTICS

Output

$\lambda w.f_M([A],[C],w)$

# Motivation

## Summary

- ➡ we need a compositional semantics for conditionals
- ➡ there is a lot of activity in this area right now
  - Ippolito '03, '06
  - von Stechow & Grønn '08
  - Pranav & Hacquard '09
- ➡ most of these approaches use **the modal approach** towards the logical form of conditionals

# Central claims

- If you want to do compositional semantics for conditionals, then **the modal approach** is not the best way to go.
- There is more to **dynamic semantics** than just anaphora and presupposition resolution.

# A closer look at the subject

What we will call a conditional today

(2) *If it rains (then) we will all get terribly wet and miserable.*

(3) *If [as you say] it is going to rain this afternoon, why don't we just stay at home and watch a video?*

- adverbial clause with *if* as CP-relative element in the subordinated sentence

- *then* insertion naturally possible

- event-conditionals (Haegeman), situation conditional (Declerck), content conditional (Sweetser)

# The modal approach

# The modal approach

**Kratzer '78, '79, '81**

1. (Bare) conditionals are implicitly modalized.
2. The antecedent restricts the restrictor of this modal.

## “conditional modality”

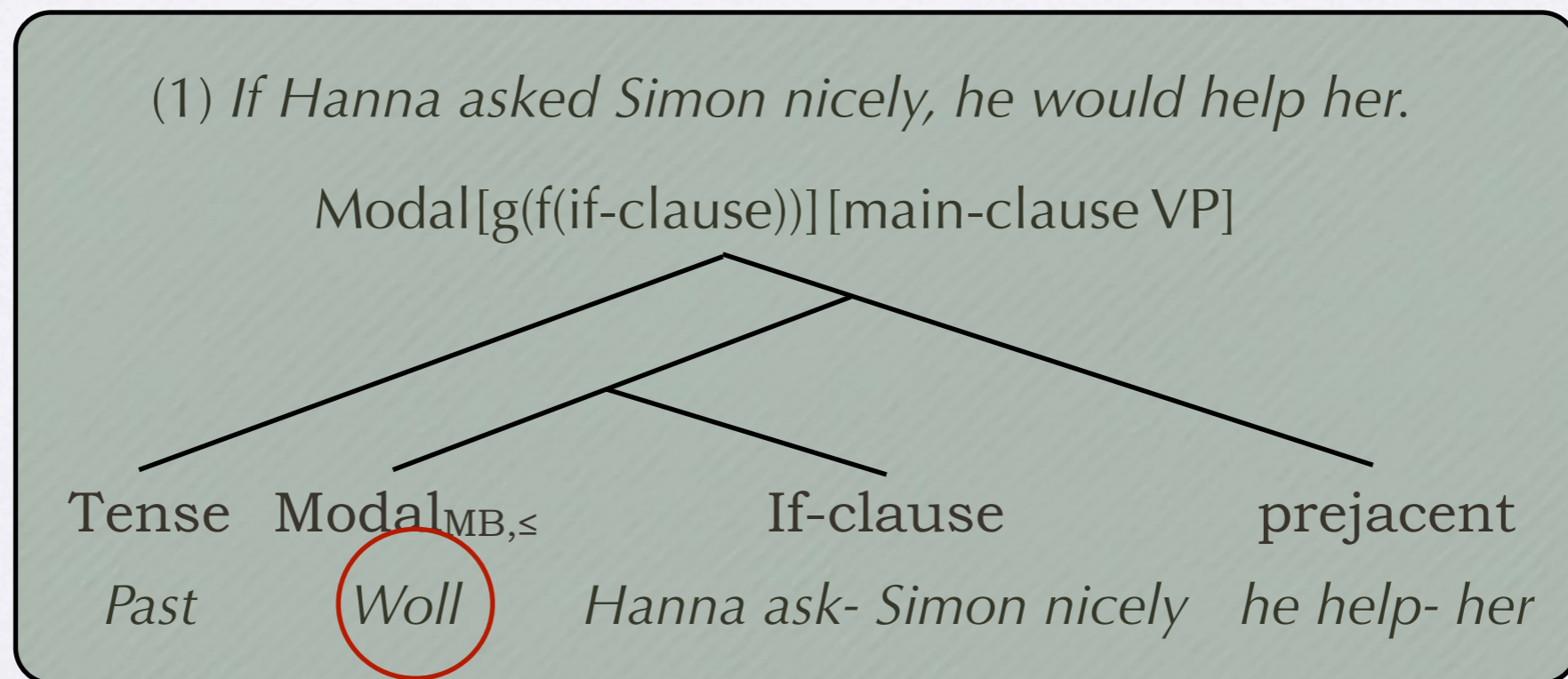
For any modal base  $f$  and ordering source  $g$ :  $\llbracket \text{if } A \text{ } C \rrbracket^{f,g} = \llbracket C \rrbracket^{f^*,g}$ , where for all  $w \in W$ ,  $f^*(w) = f(w) \cap \llbracket A \rrbracket^{f,g}$ .” (Kratzer, manuscript '09)

- ▶ there is an universal modal in the logical form of the consequent that picks up the arguments  $f^*$  and  $g$
- ▶ this is a language-independent pattern for how conditionals are interpreted

# The modal approach

Ippolito '03, '06, von Stechow & Grønn '08

3. *WOLL* in the main clause of (English) conditionals spells out of the modal of Kratzer's approach.



# The modal approach

**Ippolito '03, '06, von Stechow & Grønn '08**

3. *WOLL* in the main clause of (English) conditionals spells out of the modal of Kratzer's approach.
4. *WOLL* c-commands the if-clause. Semantically, it binds the temporal and modal perspective of the if-clause.
5. The (tense) morphology in the if-clause is semantically void (sequence-of-tense).
6. *If* in the subordinated sentence of conditionals is semantically void.

# The modal approach


## Summary

1. (Bare) conditionals are implicitly modalized.
2. The antecedent restricts the restrictor of this modal.
3. WOLL in the main clause of (English) conditionals spells out of the modal of Kratzer's approach.
4. WOLL c-commands the if-clause. Semantically, it binds the temporal and modal perspective of the if-clause.
5. The (tense) morphology in the if-clause is semantically void (sequence-of-tense, agreement).
6. *If* in the subordinated sentence of conditionals is semantically void.

Why not the modal  
approach

# Why not the modal approach?

## Strategy

- 
- ✗. (Bare) conditionals are implicitly modalized.
  - ✗. The antecedent restricts the restrictor of this modal.
  - ✗. WOLL in the main clause of (English) conditionals spells out of the modal of Kratzer's approach.
  - ✗. WOLL c-commands the if-clause. Semantically, it binds the temporal and modal perspective of the if-clause.
  - ✗. The (tense) morphology in the if-clause is semantically void (sequence-of-tense, agreement).
  - ✗. *If* in the subordinated sentence of conditionals is semantically void.

# Why not the modal approach?

~~6. *If* in the subordinated sentence of conditionals is semantically void.~~

- So far the item has not even a syntactic function - it's completely superfluous!
- *If* is no artifact of English: many languages mark conditionals with lexical elements that syntactically behave like functional elements in the CP domain.
- Adverbial clauses with *if* differ semantically from structurally parallel clauses with *because*, *when* or *though*.

# Why not the modal approach?

5. The (tense) morphology in the if-clause is semantically void (sequence-of-tense, agreement).
- This is certainly not the case for indicative conditionals (with *will*).
    - (4) *If Peter found your letter, (then) you are already dead.*
    - (5) *If Oswald did not shoot Kennedy, someone else did.*
    - (6) *If Oswald hadn't shot Kennedy, someone else would have.*
  - There is a group of indicative conditionals (with *will*) that has the same semantics as subjunctive conditionals.
    - (7) *If yesterday there was a lot of rain up in the mountains, we will have a flood down here by tomorrow.*
    - (8) *If yesterday there had been a lot of rain up in the mountains, we would have had a flood down here by tomorrow.*

# Why not the modal approach?

~~5. The (tense) morphology in the if-clause is semantically void (sequence-of-tense, agreement).~~

- This is certainly not the case for indicative conditionals (with *will*).

(4) *If Peter found your letter, (then) I'm talking to a dead body.*

(5) *If Oswald did not shoot Kennedy, someone else did.*

(6) *If Oswald hadn't shot Kennedy, someone else would have.*

- There is a group of indicative conditionals (with *will*) that has the same semantics as subjunctive conditionals.

➡ The (tense) morphology cannot be necessarily semantically void.

# Why not the modal approach?

**Excaperoute:** The tense morphology in the if-clause of subjunctive conditionals is semantically void.

## Fake Tense

In English subjunctive conditionals the Simple Past (also Past Perfect) appear not to be interpreted as semantic past tense (past perfect).

(9) If Peter left in time, he will be in Vienna this evening.

(10) If Peter left in time , he would be in Vienna this evening.

- One still needs a story for the morphological material in if-clauses of indicative conditionals.
- Make sure that you explain the cross-linguistic pattern of fake tense.

*If a language has fake tense, then it has it in the antecedent of counterfactual conditionals.*

# Why not the modal approach?

4. *WOLL* c-commands the if-clause. Semantically, it binds the temporal and modal perspective of the if-clause.

- This should apply to the relevant group of indicative conditionals as well as subjunctive conditionals.
- ➡ Because in indicative conditionals we have semantically functional tense, we need at least a relative semantics for tense.
- ➡ We get a relative interpretation of tense in the antecedent and an absolute interpretation of tense in the consequent.

# Why not the modal approach?

4. *WOLL* c-commands the if-clause. Semantically, it binds the temporal and modal perspective of the if-clause.

- Relative tense in consequent: In conditionals the anchor of the tenses in the consequent can be shifted to the denotation time of the tense in the antecedent

- |  |                               |
|--|-------------------------------|
| (5.i) <i>If he <u>comes</u><sub>1</sub> out smiling, the interview <u>went</u><sub>2</sub> well.</i>                                   | $t_0 < t_2 < t_1$             |
| (5.ii) <i>If the strip <u>bends</u><sub>1</sub>, the temperature <u>rises</u><sub>2</sub>. (Crouch)</i>                                | $*t_0 < t_2 < t_1$            |
| (5.iii) <i>If the strip <u>bends</u><sub>1</sub>, the temperature <u>may</u><sub>2</sub> rise<sub>3</sub>. (Crouch)</i>                | $??t_0 < t_2 < t_1$           |
| (5.iv) <i>?If he <u>came</u><sub>1</sub> out smiling, the interview <u>would</u><sub>2</sub> go<sub>3</sub> well.</i>                  | $??t_0 < t_2 < t_3 < t_1$     |
| (5.v) <i>If he <u>came</u><sub>1</sub> out smiling, the interview <u>would</u><sub>2</sub> have<sub>3</sub> gone<sub>4</sub> well.</i> | $t_0 < t_4 < t_1 = t_2 = t_3$ |

# Why not the modal approach?

~~4. WOLL c-commands the if-clause. Semantically, it binds the temporal and modal perspective of the if-clause.~~

- ▶ Absolute tense in antecedent: In conditionals the anchor of the tenses in the consequent can be shifted to the denotation time of the tense in the antecedent

(6.i) ?If the interview went<sub>1</sub> well, he will come<sub>2</sub> out smiling.

?t<sub>0</sub> < t<sub>1</sub> < t<sub>2</sub>

(6.ii) ?If the interview had<sub>1</sub> gone well, he would come<sub>2</sub> out smiling.

?t<sub>0</sub> < t<sub>1</sub> < t<sub>2</sub>

# Why not the modal approach?

3. *WOLL* in the main clause of (English) conditionals spells out of the modal of Kratzer's approach.

- *WOLL* is no necessary ingredient of English conditionals.
- There seem to be certain restrictions on the modal bases *WOLL* can take that you don't want to extend to conditionals with *WOLL*.
- ...

# Why not the modal approach?

- ~~1. (Bare) conditionals are implicitly modalized.~~
- ~~2. The antecedent restricts the restrictor of this modal.~~

## Multi-dimensional semantics

- The if-clause is not syntactically dominated by the modal.
- It restricts the modal via the modification of parameters of interpretation.

- BUT**
- Why is a modal element in the consequent, or at least some marker in the consequent, not a cross-linguistic strategy to express conditionals?
  - Why is there frequently historical variation within the same language?
  - Learnability?

# Why not the modal approach?

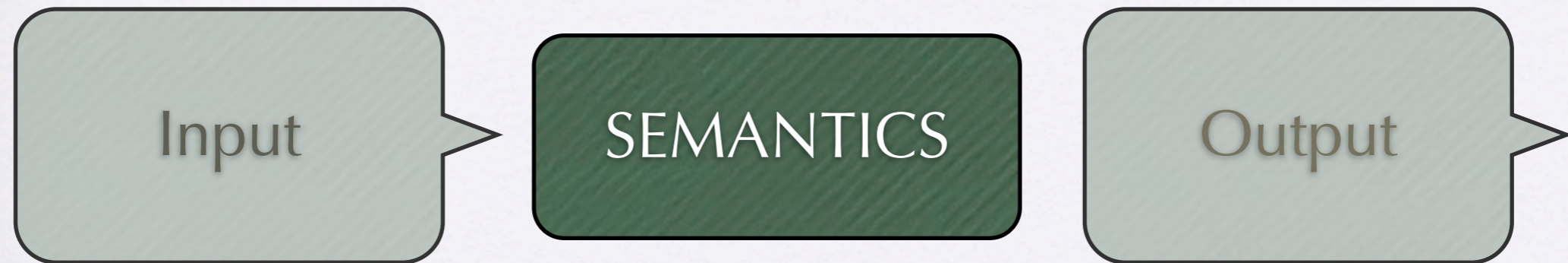
## Summary

From the perspective of the syntax/semantics interface the modal approach is a worst case scenario.

- It introduces semantically crucial material into the logical form that is not visible in the surface structure.
- It does not interpret a substantial part of the material that is visible in the surface structure.

A dynamic approach

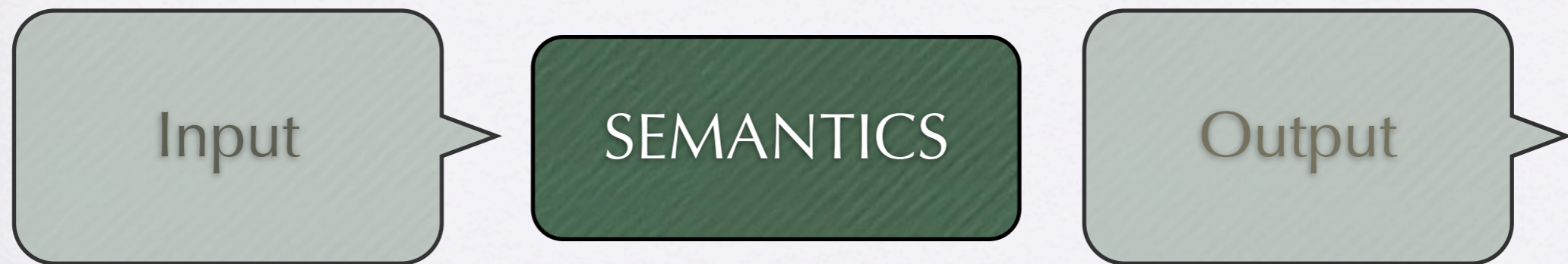
# A dynamic approach



## Objectives for input

- The logical form should fit the surface structure of (English) conditionals.
- The theory should allow for generalization to conditionals in other languages.

# A dynamic approach



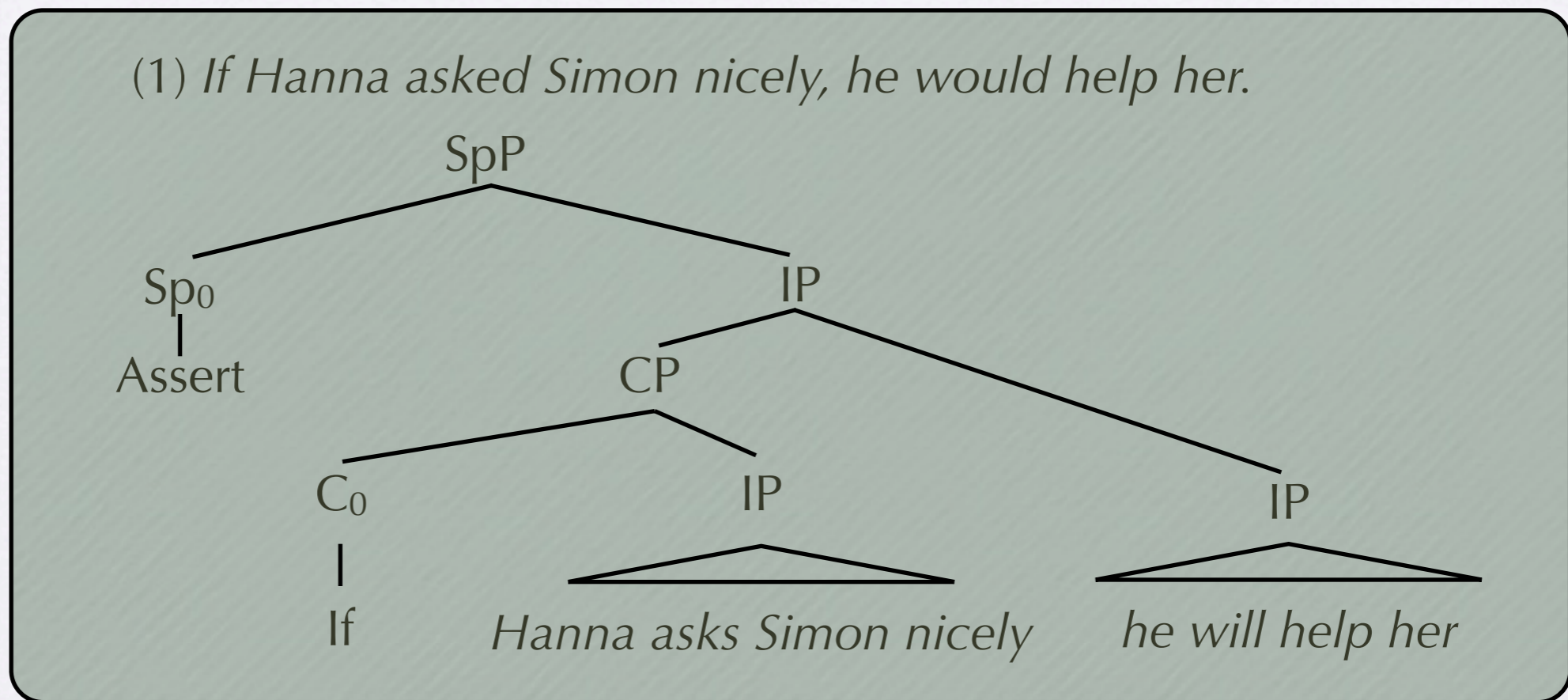
## Observations for input

- The formal marking of conditionals is relatively poor.
  - English is in the large group of languages that
    - mark the antecedent,
    - with a lexical element in CP domain,
    - that originates from WH-pronouns or question words,
    - have a facultative pro-form in consequent.
- ➡ no conditional connective or modal!

# A dynamic approach



# Observations for input



# A dynamic approach



## Objectives for output

- We want to make predictions for indicative as well as subjunctive conditionals.
- We want to be able to use the extensive literature on how the right counterfactual worlds have to be described.

# A dynamic approach



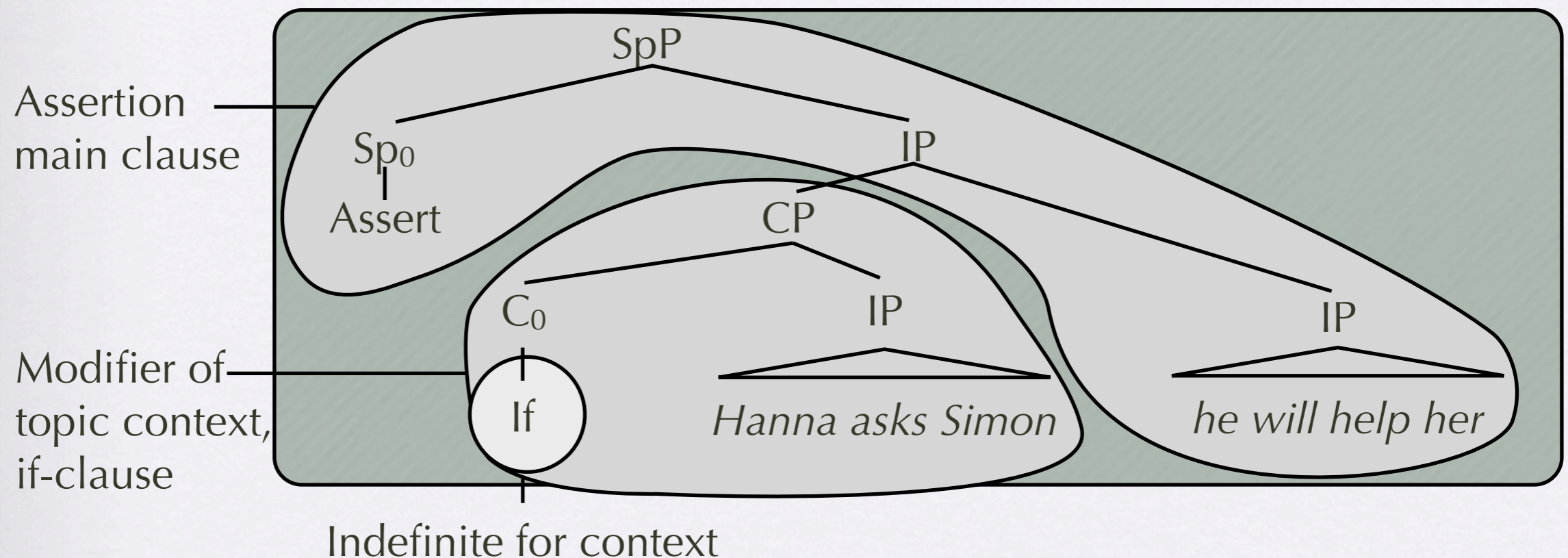
## Observations for output

- Very clear intuitions (captured by modal approach).
- The if-clause introduces a hypothetical scenario.
- The main-clause makes a statement about this hypothetical scenario.

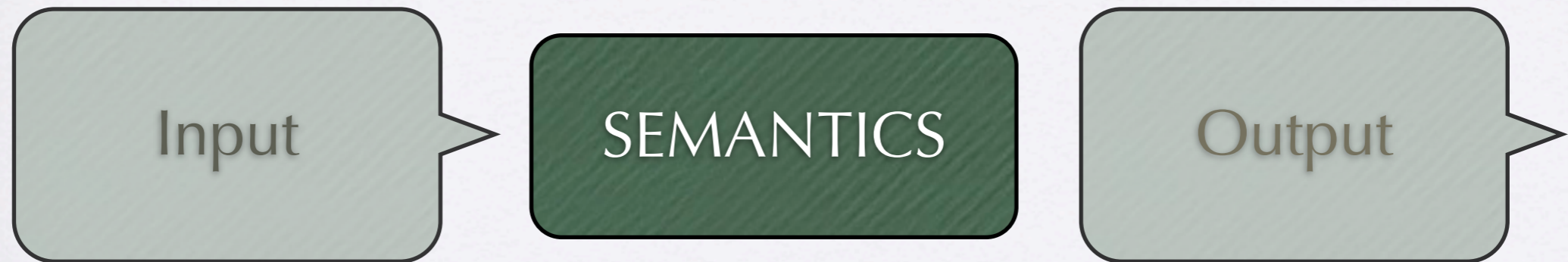
# A dynamic approach



## Observations for output



# A dynamic approach



➡ **Dynamic semantics**

# A dynamic approach

## ➡ Dynamic semantics - Why?

- We have to handle anaphoric relations on the level of contexts/worlds (modal subordinations) -- this is what dynamic semantics is designed for.
- The standard update rule for conditionals (Heim) does the same as the modal approach - but without the modal!



# A dynamic approach

# Standard dynamic semantics for conditionals

$$\sigma[\text{if } \psi, \varphi] = \begin{cases} \sigma, & \text{if } \sigma[\psi][\varphi] = \sigma[\psi] \\ \emptyset & \text{otherwise} \end{cases}$$

sentence

## update function

information state  
(set of possible worlds)


# Problems

- not compositional
- not made for counterfactual conditionals
- no update



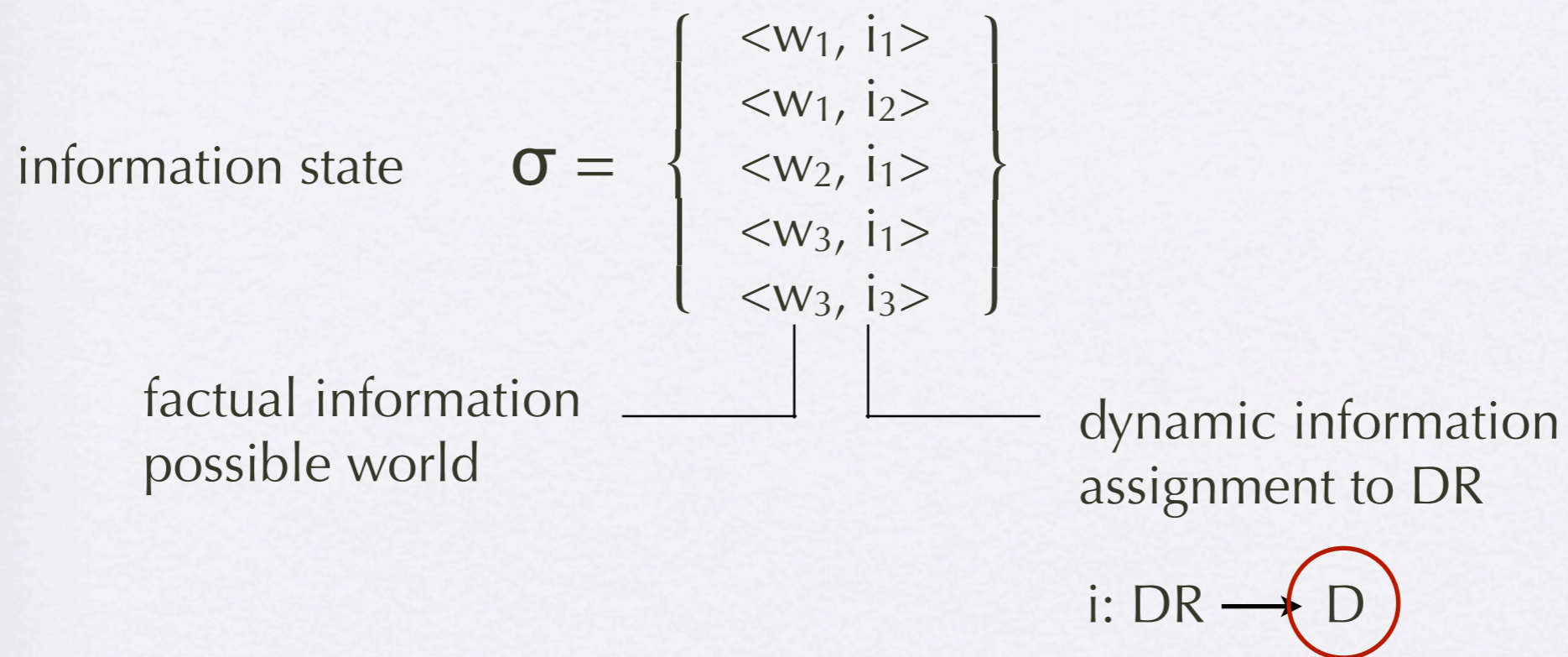
# A dynamic approach

## The proposal in 4 steps

-  1. Ontology
- 2. Assertions
- 3. If-clauses
- 4. Conditionals

# A dynamic approach

## Ontology



# A dynamic approach

# Ontology

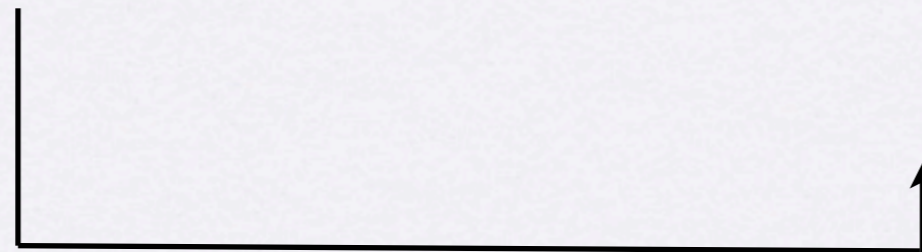
information state

$$\sigma = \left\{ \begin{array}{c} \langle w_1, i_1 \rangle \\ \langle w_1, i_2 \rangle \\ \langle w_2, i_1 \rangle \\ \langle w_3, i_1 \rangle \\ \langle w_3, i_3 \rangle \end{array} \right\}$$

factual information  
possible world

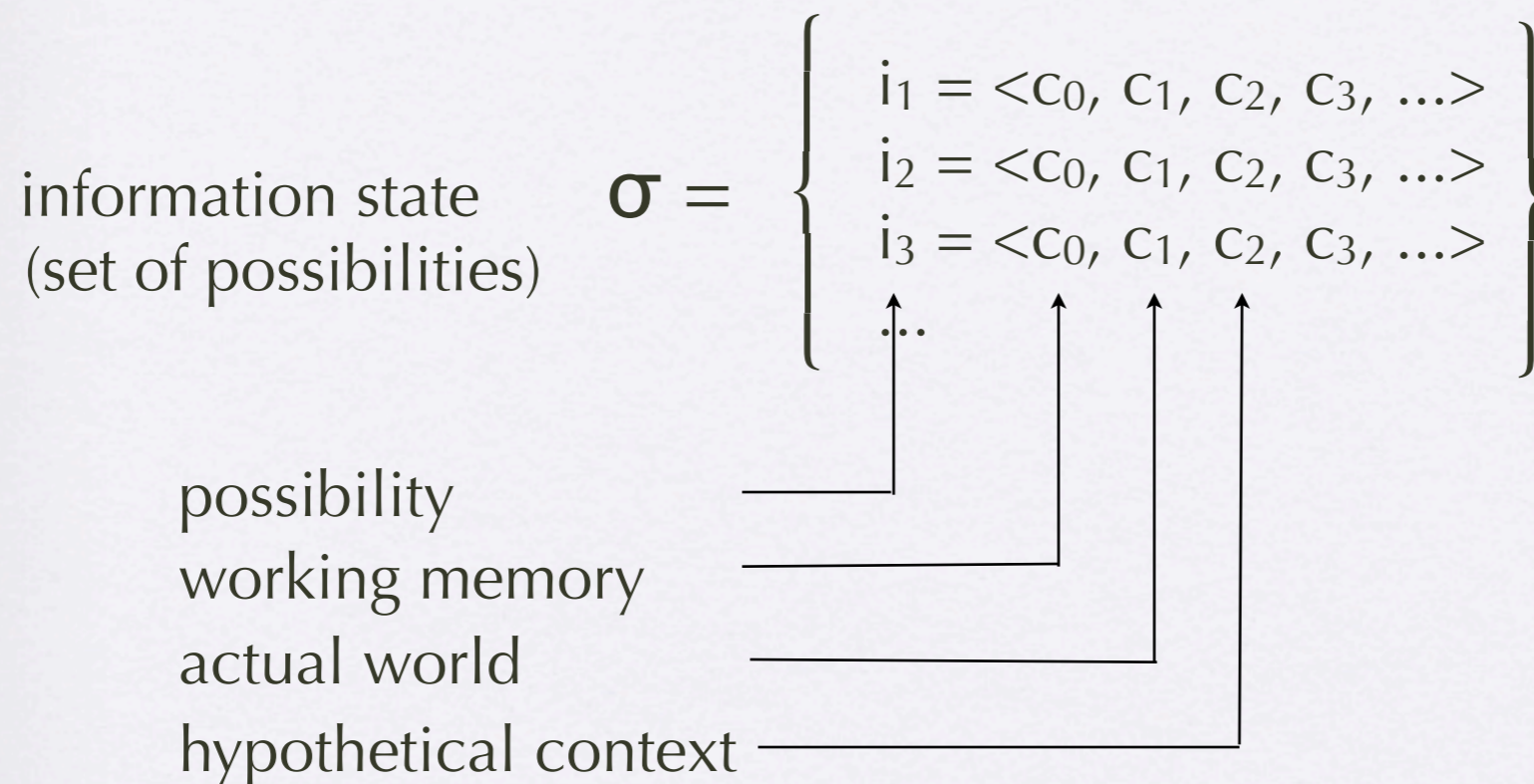
dynamic information  
assignment to DR

i: DR  $\rightarrow$   $(\wp(W))$  contexts



# A dynamic approach

## New Ontology



# A dynamic approach

## Ontology - an example

p1 = Hanna will ask Simon nicely.

p2 = Simon will help Hanna

	w <sub>1</sub>	w <sub>2</sub>	w <sub>3</sub>	w <sub>4</sub>
p <sub>1</sub>	0	0	1	1
p <sub>2</sub>	0	1	0	1

information state  
(set of possibilities)

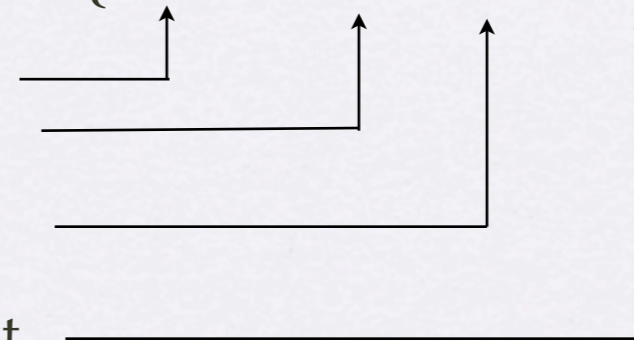
$$\sigma = \left\{ \begin{array}{l} i_1 = \langle \emptyset_0, \{w_1\}_1, \emptyset_2, \dots \rangle \\ i_2 = \langle \emptyset_0, \{w_2\}_1, \emptyset_2, \dots \rangle \\ i_3 = \langle \emptyset_0, \{w_3\}_1, \emptyset_2, \dots \rangle \\ i_4 = \langle \emptyset_0, \{w_4\}_1, \emptyset_2, \dots \rangle \end{array} \right\}$$

possibility

working memory

actual world

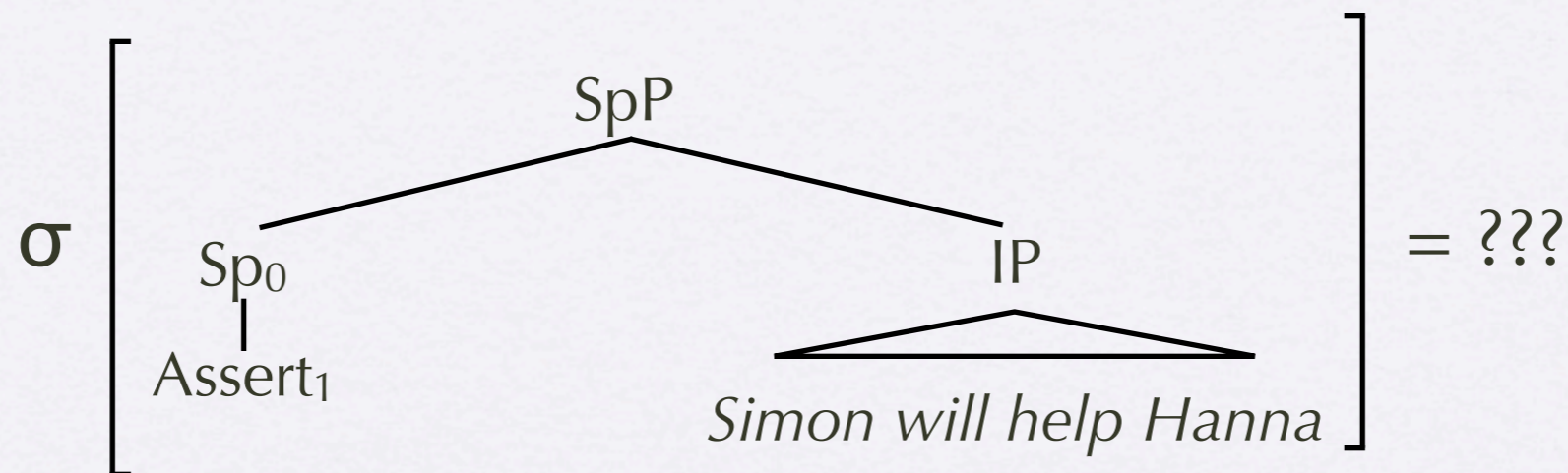
hypothetical context



# A dynamic approach

## Assertions

(8) *Simon will help Hanna.*



$$= \sigma \left[ \underline{u_0 := \text{Update}(\llbracket \text{Simon will help Hanna} \rrbracket, u_1)} \right] [u_0 = u_1]$$

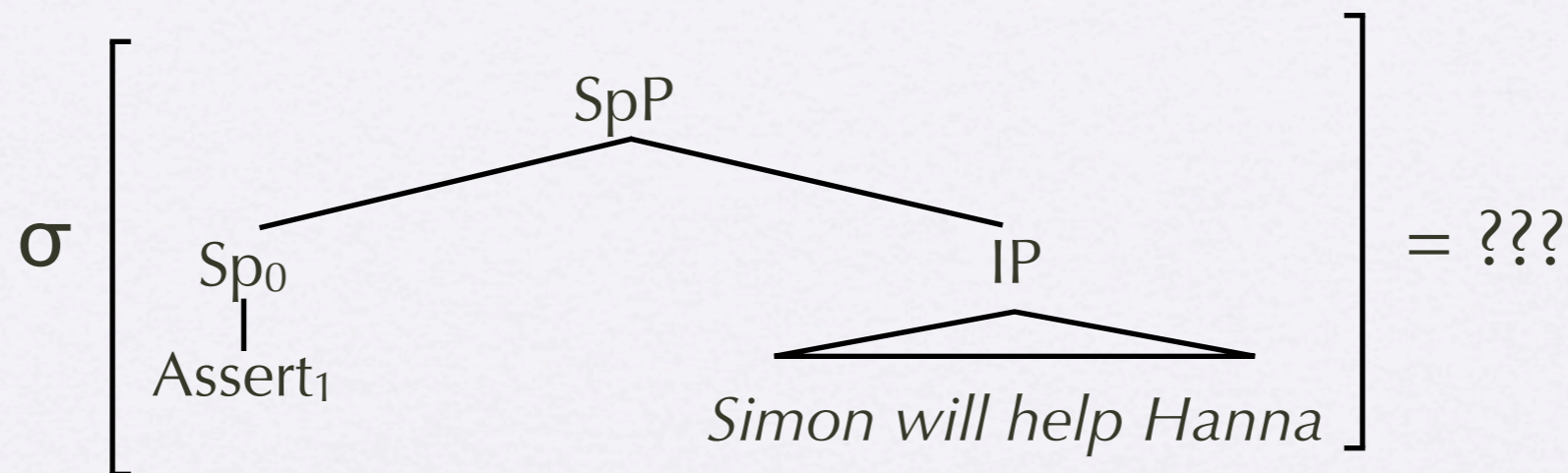
contribution of the IP

$$u_0 := u_1 + \llbracket \text{Simon will help Hanna} \rrbracket$$

# A dynamic approach

## Assertions

(8) *Simon will help Hanna.*



$$= \sigma [u_0 := \text{Update}(\llbracket \text{Simon will help Hanna} \rrbracket, u_1)] \underline{[u_0 = u_1]}$$

contribution of the Speech Act  
the information is about  $u_1$

# A dynamic approach

## Assertions - an example

$$= \sigma [u_0 := \text{Update}(\llbracket \text{Simon will help Hanna} \rrbracket, u_1)] [u_0 = u_1]$$

$$= \left\{ \begin{array}{l} i_1 = \langle \emptyset_0, \{w_1\}_1, \emptyset_2, \dots \rangle \\ i_2 = \langle \emptyset_0, \{w_2\}_1, \emptyset_2, \dots \rangle \\ i_3 = \langle \emptyset_0, \{w_3\}_1, \emptyset_2, \dots \rangle \\ i_4 = \langle \emptyset_0, \{w_4\}_1, \emptyset_2, \dots \rangle \end{array} \right\} \underbrace{[u_0 := \text{Update}(\llbracket p_2 \rrbracket, u_1)] [u_0 = u_1]}_{\text{contribution of the IP}}$$

possibility  $\uparrow$   
 working m.  $\uparrow$   
 actual world  $\uparrow$   
 hypothetical context  $\uparrow$

$$u_0 := u_1 + \llbracket \text{Simon will help Hanna} \rrbracket$$

$p_1$  = Hanna will ask Simon nicely.  
 $p_2$  = Simon will help Hanna

	$w_1$	$w_2$	$w_3$	$w_4$
$p_1$	0	0	1	1
$p_2$	0	1	0	1

# A dynamic approach

## Assertions - an example

$$= \sigma [u_0 := \text{Update}(\llbracket \text{Simon will help Hanna} \rrbracket, u_1)] [u_0 = u_1]$$

$$= \left\{ \begin{array}{l} \text{--- } i_1 = \langle \emptyset_0, \{w_1\}_1, \emptyset_2, \dots \rangle \text{ ---} \\ i_2 = \langle \{w_2\}_0, \{w_2\}_1, \emptyset_2, \dots \rangle \\ \text{--- } i_3 = \langle \emptyset_0, \{w_3\}_1, \emptyset_2, \dots \rangle \text{ ---} \\ i_4 = \langle \{w_4\}_0, \{w_4\}_1, \emptyset_2, \dots \rangle \end{array} \right\} \quad \underbrace{[u_0 = u_1]}$$

contribution of the Speech Act  
the information is about  $u_1$

$p_1$  = Hanna will ask Simon nicely.  
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	$w_1$	$w_2$	$w_3$	$w_4$
$p_1$	0	0	1	1
$p_2$	0	1	0	1

# A dynamic approach

## Assertions - an example

$$\begin{aligned}
 &= \sigma [u_0 := \text{Update}(\llbracket \text{Simon will help Hanna} \rrbracket, u_1)] [u_0 = u_1] \\
 &= \left\{ \begin{array}{l} i_2 = \langle \{w_2\}_0, \{w_2\}_1, \emptyset_2, \dots \rangle \\ i_4 = \langle \{w_4\}_0, \{w_4\}_1, \emptyset_2, \dots \rangle \end{array} \right\}
 \end{aligned}$$

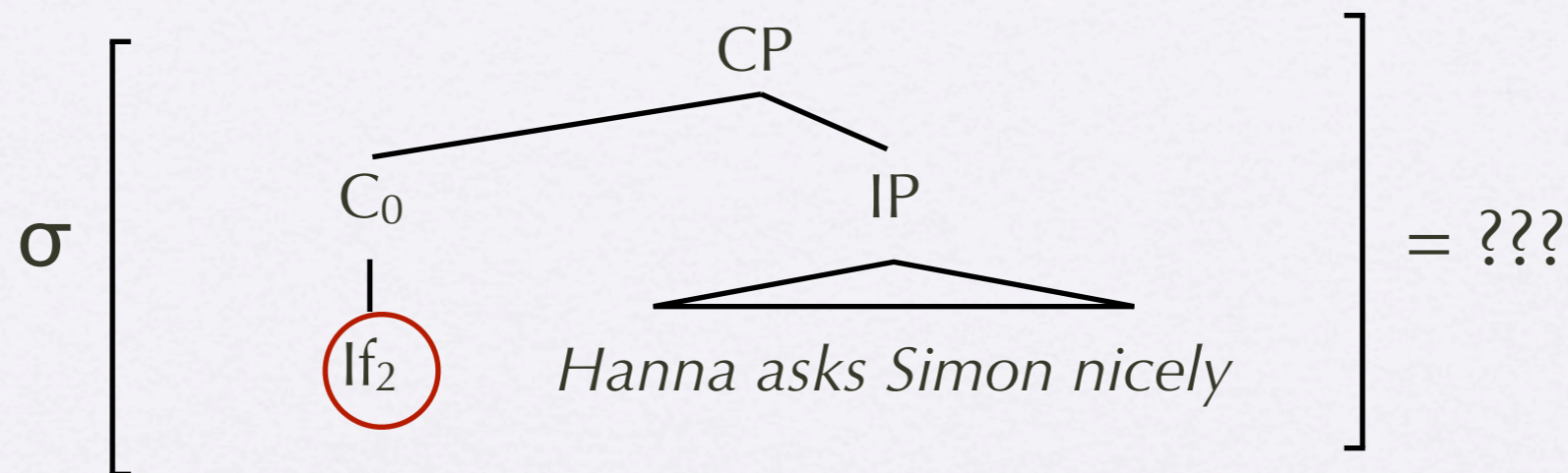
$p_1$  = Hanna will ask Simon nicely.  
 $p_2$  = Simon will help Hanna

	$w_1$	$w_2$	$w_3$	$w_4$
$p_1$	0	0	1	1
$p_2$	0	1	0	1

# A dynamic approach

## If-clauses

(9) *If Hanna asks Simon nicely*



$$= \sigma \left[ \underbrace{u_0 := \text{Update}(\llbracket \text{Hanna asks Simon nicely} \rrbracket, u_1)}_{\text{contribution of the VP}} \right] [u_2 \mid u_0 = u_2]$$

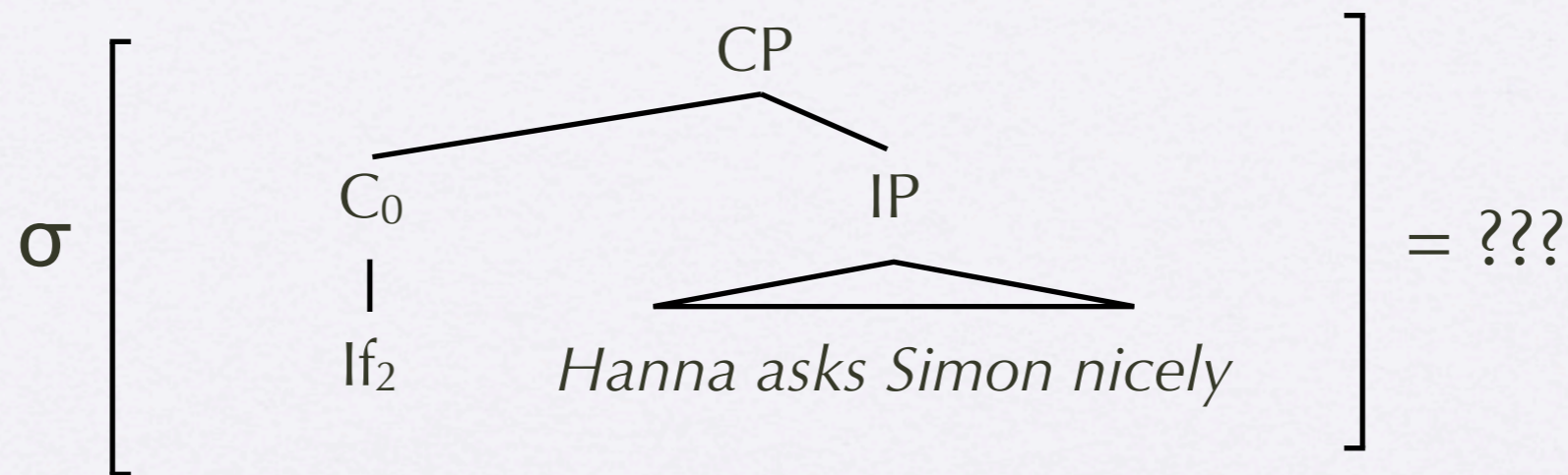
contribution of the VP

$$u_0 := u_1 + \llbracket \text{Hanna asks Simon nicely} \rrbracket$$

# A dynamic approach

## If-clauses

(9) *If Hanna asks Simon nicely*



$$= \sigma [u_0 := \text{Update}(\llbracket \text{Hanna asks Simon nicely} \rrbracket, u_1)] \underbrace{[u_2 \mid u_0 = u_2]}$$

contribution of  $if_2$   
introduces a new context,  
where the new information is stored

# A dynamic approach

## If-clauses - an example

$$\sigma [u_0 := \text{Update}(\llbracket \text{Hanna asks Simon nicely} \rrbracket, u_1)] [u_2 \mid u_0 = u_2]$$

$$= \left\{ \begin{array}{l} i_1 = \langle \emptyset_0, \{w_1\}_1, \emptyset_2, \dots \rangle \\ i_2 = \langle \emptyset_0, \{w_2\}_1, \emptyset_2, \dots \rangle \\ i_3 = \langle \emptyset_0, \{w_3\}_1, \emptyset_2, \dots \rangle \\ i_4 = \langle \emptyset_0, \{w_4\}_1, \emptyset_2, \dots \rangle \end{array} \right\} \underbrace{[u_0 := \text{Update}(\llbracket p_1 \rrbracket, u_1)] [u_2 \mid u_0 = u_2]}_{\text{contribution of the IP}}$$

$u_0 := u_1 + \llbracket \text{Hanna asks Simon nicely} \rrbracket$

$p_1$  = Hanna will ask Simon nicely.  
 $p_2$  = Simon will help Hanna

	$w_1$	$w_2$	$w_3$	$w_4$
$p_1$	0	0	1	1
$p_2$	0	1	0	1

# A dynamic approach

## If-clauses - an example

$$\sigma [u_0 := \text{Update}(\llbracket \text{Hanna asks Simon nicely} \rrbracket, u_1)] [u_2 \mid u_0 = u_2]$$

$$= \left\{ \begin{array}{l} i_1 = \langle \emptyset_0, \{w_1\}_1, \emptyset_2, \dots \rangle \\ i_2 = \langle \emptyset_0, \{w_2\}_1, \emptyset_2, \dots \rangle \\ i_3 = \langle \{w_3\}_0, \{w_3\}_1, \emptyset_2, \dots \rangle \\ i_4 = \langle \{w_4\}_0, \{w_4\}_1, \emptyset_2, \dots \rangle \end{array} \right\} [u_2 \mid u_0 = u_2]$$

contribution of  $if_2$   
introduces a new context,  
where the new information is stored

$p_1$  = Hanna will ask Simon nicely.  
 $p_2$  = Simon will help Hanna

	$w_1$	$w_2$	$w_3$	$w_4$
$p_1$	0	0	1	1
$p_2$	0	1	0	1

# A dynamic approach

## If-clauses - an example

$$\sigma [u_0 := \text{Update}(\llbracket \text{Hanna asks Simon nicely} \rrbracket, u_1)] [u_2 \mid u_0 = u_2]$$

$$= \left\{ \begin{array}{l} i_1 = \langle \emptyset_0, \{w_1\}_1, \emptyset_2, \dots \rangle \\ i_2 = \langle \emptyset_0, \{w_2\}_1, \emptyset_2, \dots \rangle \\ i_3 = \langle \{w_3\}_0, \{w_3\}_1, \{w_3\}_2, \dots \rangle \\ i_4 = \langle \{w_4\}_0, \{w_4\}_1, \{w_4\}_2, \dots \rangle \end{array} \right\}$$

- hypothetical context introduced where if-clause is true
- no possibility eliminated

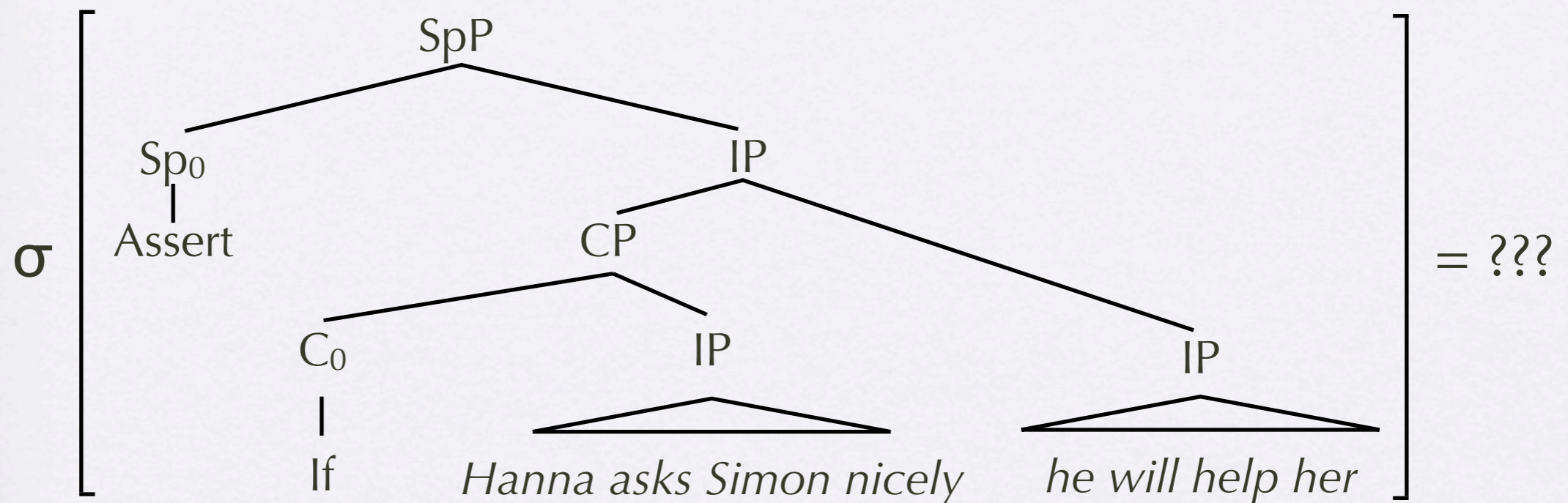
p1 = Hanna will ask Simon nicely.  
p2 = Simon will help Hanna

	w1	w2	w3	w4
p1	0	0	1	1
p2	0	1	0	1

# A dynamic approach

## Conditionals

(1) *If Hanna asks Simon nicely, he will help her.*



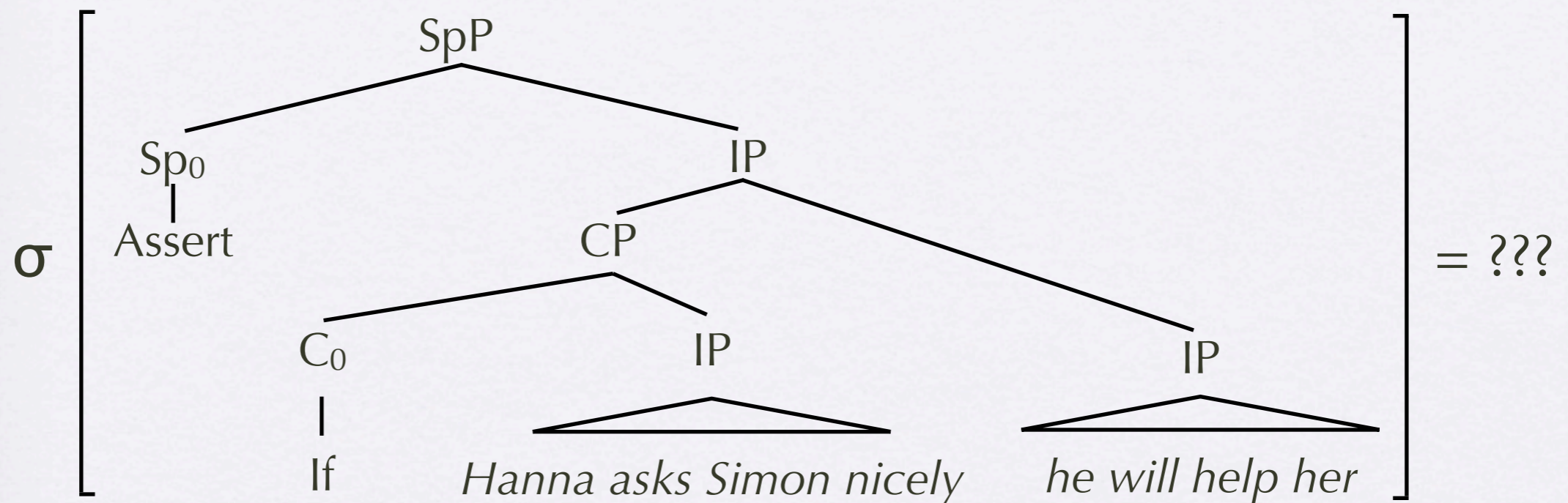
$$= \sigma \left[ \underline{u_0 := \text{Update}(\llbracket \text{Hanna asks Simon nicely} \rrbracket, u_1)} \right] [u_2 \mid u_0 = u_2] \\ [u_0 := \text{Update}(\llbracket \text{he will help her} \rrbracket, u_2)] [u_0 = u_2]$$

contribution of the if-clause IP

# A dynamic approach

## Conditionals

(1) *If Hanna asks Simon nicely, he will help her.*



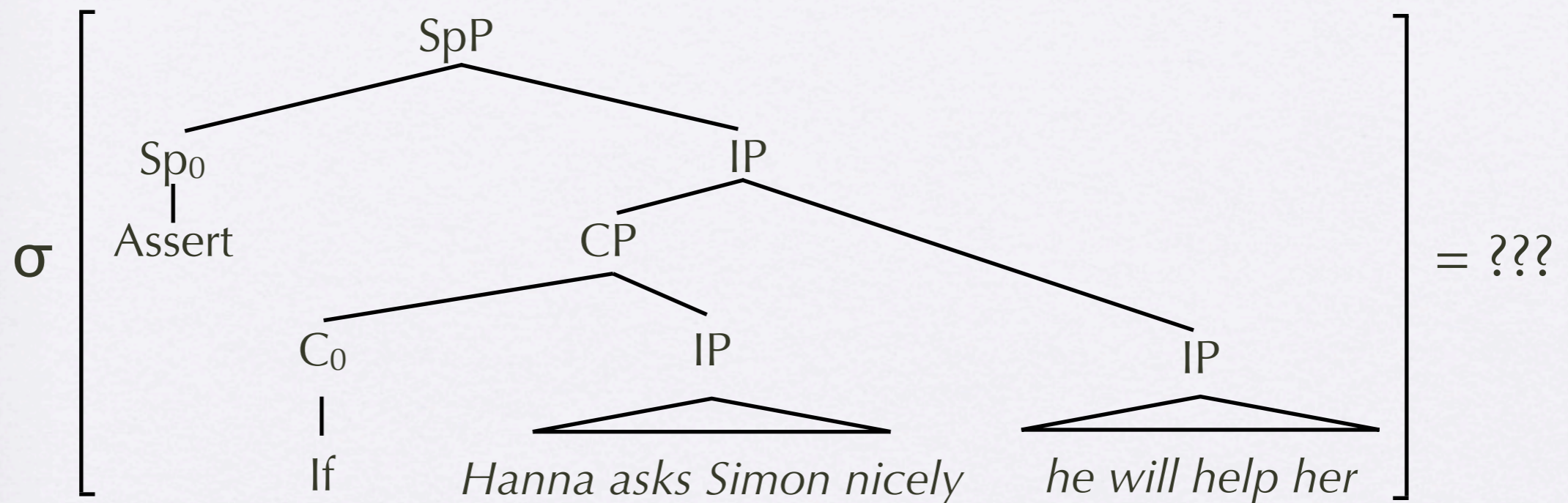
$$= \sigma [u_0 := \text{Update}(\llbracket \text{Hanna asks Simon nicely} \rrbracket, u_1)] \underline{[u_2 \mid u_0 = u_2]} \\ [u_0 := \text{Update}(\llbracket \text{he will help her} \rrbracket, u_2)] [u_0 = u_2]$$

contribution of  $if_2$

# A dynamic approach

## Conditionals

(1) *If Hanna asks Simon nicely, he will help her.*



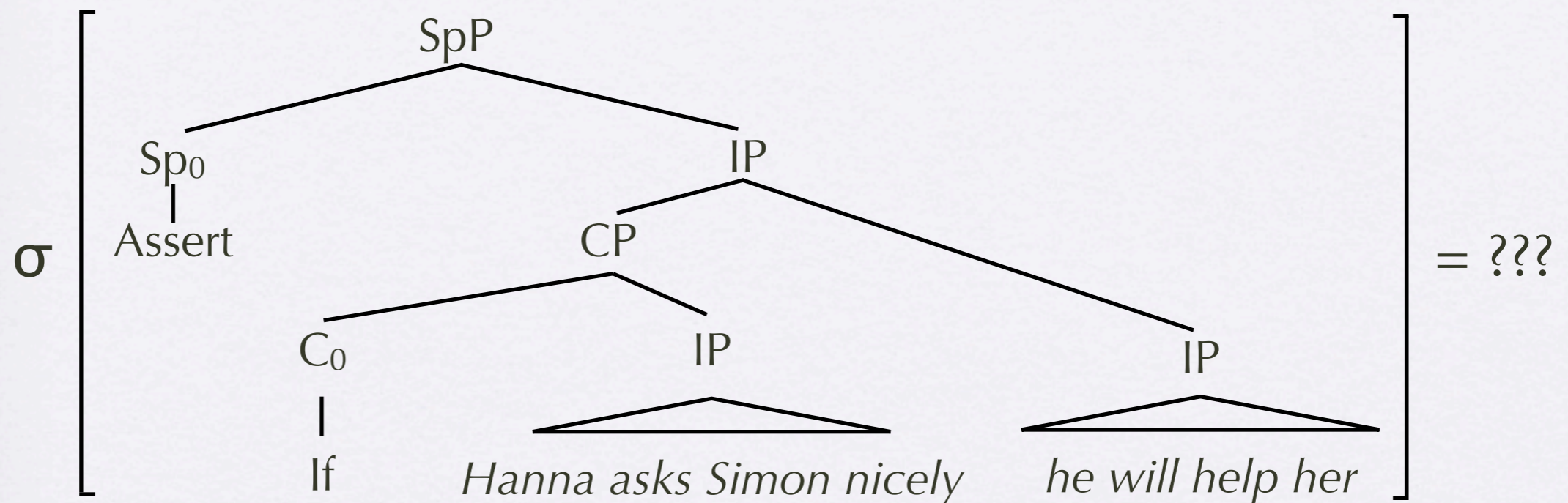
$$= \sigma [u_0 := \text{Update}(\llbracket \text{Hanna asks Simon nicely} \rrbracket, u_1)] [u_2 \mid u_0 = u_2] \\ \underline{[u_0 := \text{Update}(\llbracket \text{he will help her} \rrbracket, u_2)] [u_0 = u_2]}$$

contribution of the main-clause IP

# A dynamic approach

## Conditionals

(1) *If Hanna asks Simon nicely, he will help her.*



$$= \sigma [u_0 := \text{Update}(\llbracket \text{Hanna asks Simon nicely} \rrbracket, u_1)] [u_2 \mid u_0 = u_2] \\ [u_0 := \text{Update}(\llbracket \text{he will help her} \rrbracket, u_2)] [\underline{u_0 = u_2}]$$

contribution of the Speech Act

# A dynamic approach

## Conditionals - an example

$\sigma$   $[u_0 := \text{Update}(\llbracket \text{Hanna asks Simon nicely} \rrbracket, u_1)] [u_2 \mid u_0 = u_2]$   
 $[u_0 := \text{Update}(\llbracket \text{he will help her} \rrbracket, u_2)] [u_0 = u_2]$

$$= \left\{ \begin{array}{l} i_1 = \langle \emptyset_0, \{w_1\}_1, \emptyset_2, \dots \rangle \\ i_2 = \langle \emptyset_0, \{w_2\}_1, \emptyset_2, \dots \rangle \\ i_3 = \langle \emptyset_0, \{w_3\}_1, \emptyset_2, \dots \rangle \\ i_4 = \langle \emptyset_0, \{w_4\}_1, \emptyset_2, \dots \rangle \end{array} \right\} \left\{ \begin{array}{l} \underline{[u_0 := \text{Update}(\llbracket p_1 \rrbracket, u_1)] [u_2 \mid u_0 = u_2]} \\ [u_0 := \text{Update}(\llbracket p_2 \rrbracket, u_2)] [u_0 = u_2] \end{array} \right.$$

contribution of the if-clause IP

$u_0 := u_1 + \llbracket \text{Hanna asks Simon nicely} \rrbracket$

$p_1$  = Hanna will ask Simon nicely.  
 $p_2$  = Simon will help Hanna

	$w_1$	$w_2$	$w_3$	$w_4$
$p_1$	0	0	1	1
$p_2$	0	1	0	1

# A dynamic approach

## Conditionals - an example

$\sigma$   $[u_0 := \text{Update}(\llbracket \text{Hanna asks Simon nicely} \rrbracket, u_1)] [u_2 \mid u_0 = u_2]$

$[u_0 := \text{Update}(\llbracket \text{he will help her} \rrbracket, u_2)] [u_0 = u_2]$

$$= \left\{ \begin{array}{l} i_1 = \langle \emptyset_0, \{w_1\}_1, \emptyset_2, \dots \rangle \\ i_2 = \langle \emptyset_0, \{w_2\}_1, \emptyset_2, \dots \rangle \\ i_3 = \langle \{w_3\}_0, \{w_3\}_1, \emptyset_2, \dots \rangle \\ i_4 = \langle \{w_4\}_0, \{w_4\}_1, \emptyset_2, \dots \rangle \end{array} \right\} \left\{ \begin{array}{l} [u_2 \mid u_0 = u_2] \\ \underline{[u_0 := \text{Update}(\llbracket p_2 \rrbracket, u_2)] [u_0 = u_2]} \end{array} \right.$$

contribution of  $if_2$

introduces a new context,  
where the new information is stored

$p_1$  = Hanna will ask Simon nicely.

$p_2$  = Simon will help Hanna

	$w_1$	$w_2$	$w_3$	$w_4$
$p_1$	0	0	1	1
$p_2$	0	1	0	1

# A dynamic approach

## Conditionals - an example

$\sigma$   $[u_0 := \text{Update}(\llbracket \text{Hanna asks Simon nicely} \rrbracket, u_1)] [u_2 \mid u_0 = u_2]$

$[u_0 := \text{Update}(\llbracket \text{he will help her} \rrbracket, u_2)] [u_0 = u_2]$

$$= \left\{ \begin{array}{l} i_1 = \langle \emptyset_0, \{w_1\}_1, \emptyset_2, \dots \rangle \\ i_2 = \langle \emptyset_0, \{w_2\}_1, \emptyset_2, \dots \rangle \\ i_3 = \langle \{w_3\}_0, \{w_3\}_1, \{w_3\}_2, \dots \rangle \\ i_4 = \langle \{w_4\}_0, \{w_4\}_1, \{w_4\}_2, \dots \rangle \end{array} \right\} \underline{[u_0 := \text{Update}(\llbracket p_2 \rrbracket, u_2)] [u_0 = u_2]}$$

contribution of the main-clause IP  
 $u_0 := u_2 + \llbracket \text{Simon will help Hanna} \rrbracket$

$p_1$  = Hanna will ask Simon nicely.  
 $p_2$  = Simon will help Hanna

	$w_1$	$w_2$	$w_3$	$w_4$
$p_1$	0	0	1	1
$p_2$	0	1	0	1

# A dynamic approach

## Conditionals - an example

$\sigma$   $[u_0 := \text{Update}(\llbracket \text{Hanna asks Simon nicely} \rrbracket, u_1)] [u_2 \mid u_0 = u_2]$

$[u_0 := \text{Update}(\llbracket \text{he will help her} \rrbracket, u_2)] [u_0 = u_2]$

$$= \left\{ \begin{array}{l} i_1 = \langle \emptyset_0, \{w_1\}_1, \emptyset_2, \dots \rangle \\ i_2 = \langle \emptyset_0, \{w_2\}_1, \emptyset_2, \dots \rangle \\ \textcolor{red}{i_3 = \langle \emptyset_0, \{w_3\}_1, \{w_3\}_2, \dots \rangle} \\ i_4 = \langle \{w_4\}_0, \{w_4\}_1, \{w_4\}_2, \dots \rangle \end{array} \right\} \textcolor{red}{[u_0 = u_2]}$$

contribution of the Speech Act  
the information is about  $u_2$

$p_1$  = Hanna will ask Simon nicely.

$p_2$  = Simon will help Hanna

	$w_1$	$w_2$	$w_3$	$w_4$
$p_1$	0	0	1	1
$p_2$	0	1	0	1

# A dynamic approach

## Conditionals - an example

$\sigma$   $[u_0 := \text{Update}(\llbracket \text{Hanna asks Simon nicely} \rrbracket, u_1)] [u_2 \mid u_0 = u_2]$

$[u_0 := \text{Update}(\llbracket \text{he will help her} \rrbracket, u_2)] [u_0 = u_2]$

$$= \left\{ \begin{array}{l} i_1 = \langle \emptyset_0, \{w_1\}_1, \emptyset_2, \dots \rangle \\ i_2 = \langle \emptyset_0, \{w_2\}_1, \emptyset_2, \dots \rangle \\ \\ i_4 = \langle \{w_4\}_0, \{w_4\}_1, \{w_4\}_2, \dots \rangle \end{array} \right\}$$

- Possibilities where the antecedent is false are not eliminated
- We keep the possibilities where the material implication is true

$p_1$  = Hanna will ask Simon nicely.

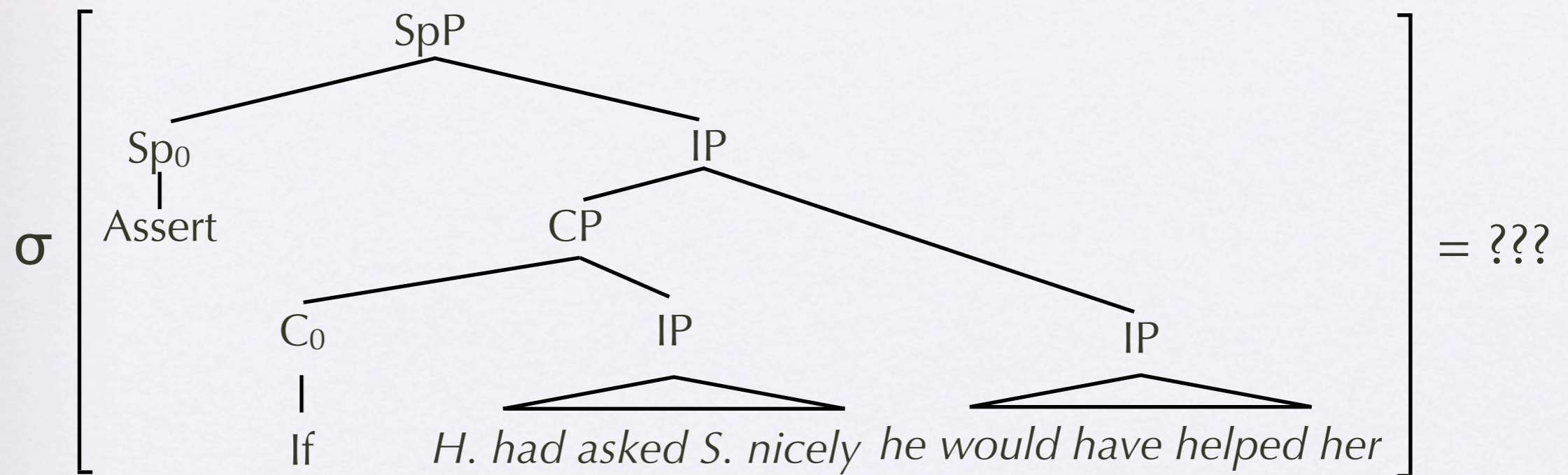
$p_2$  = Simon will help Hanna

	$w_1$	$w_2$	$w_3$	$w_4$
$p_1$	0	0	1	1
$p_2$	0	1	0	1

# A dynamic approach

## Conditionals - a second example

(11) *If Hanna had asked Simon nicely, he would have helped her.*



$$= \sigma [u_0 := \text{Update}(\llbracket \text{H. had asked S. nicely} \rrbracket, u_1)] [u_2 \mid u_0 = u_2] \\ [u_0 := \text{Update}(\llbracket \text{he would have helped her} \rrbracket, u_2)] [u_0 = u_2]$$

# A dynamic approach

## Conditionals - a second example

$\sigma$   $[u_0 := \text{Update}(\llbracket \text{H. had asked S. nicely} \rrbracket, u_1)] [u_2 \mid u_0 = u_2]$

$[u_0 := \text{Update}(\llbracket \text{he would have helped her} \rrbracket, u_2)] [u_0 = u_2]$

$$= \left\{ \begin{array}{l} i_1 = \langle \emptyset_0, \overset{\blacktriangledown}{\{w_1\}_1}, \emptyset_2, \dots \rangle \\ i_2 = \langle \emptyset_0, \{w_2\}_1, \emptyset_2, \dots \rangle \end{array} \right\} \left\{ \begin{array}{l} \underline{[u_0 := \text{Update}(\llbracket p_1 \rrbracket, u_1)] [u_2 \mid u_0 = u_2]} \\ [u_0 := \text{Update}(\llbracket p_2 \rrbracket, u_2)] [u_0 = u_2] \end{array} \right.$$

contribution of the if-clause IP

$u_0 := u_1 + \llbracket \text{Hanna asks Simon nicely} \rrbracket$

$p_1$  = Hanna will ask Simon nicely.

$p_2$  = Simon will help Hanna

	$w_1$	$w_2$	$w_3$	$w_4$
$p_1$	0	0	1	1
$p_2$	0	1	0	1

# A dynamic approach

## Conditionals - a second example

$\sigma$   $[u_0 := \text{Update}(\llbracket \text{H. had asked S. nicely} \rrbracket, u_1)] [u_2 \mid u_0 = u_2]$

$[u_0 := \text{Update}(\llbracket \text{he would have helped her} \rrbracket, u_2)] [u_0 = u_2]$

$$= \begin{cases} i_1 = \langle \{w_3, w_4\}_0, \{w_1\}_1, \emptyset_2, \dots \rangle & \underline{[u_2 \mid u_0 = u_2]} \\ i_2 = \langle \{w_3, w_4\}_0, \{w_2\}_1, \emptyset_2, \dots \rangle & [u_0 := \text{Update}(\llbracket p_2 \rrbracket, u_2)] [u_0 = u_2] \end{cases}$$

contribution of  $if_2$   
introduces a new context,  
where the new information is stored

$p_1$  = Hanna will ask Simon nicely.  
 $p_2$  = Simon will help Hanna

	$w_1$	$w_2$	$w_3$	$w_4$
$p_1$	0	0	1	1
$p_2$	0	1	0	1

# A dynamic approach

## Conditionals - a second example

$\sigma$   $[u_0 := \text{Update}(\llbracket \text{H. had asked S. nicely} \rrbracket, u_1)] [u_2 \mid u_0 = u_2]$

$[u_0 := \text{Update}(\llbracket \text{he would have helped her} \rrbracket, u_2)] [u_0 = u_2]$

$$= \left\{ \begin{array}{l} i_1 = \langle \{w_3, w_4\}_0, \{w_1\}_1, \{w_3, w_4\}_2, \dots \rangle \\ i_2 = \langle \{w_3, w_4\}_0, \{w_2\}_1, \{w_3, w_4\}_2, \dots \rangle \end{array} \right\} \quad \underline{[u_0 := \text{Update}(\llbracket p_2 \rrbracket, u_2)] [u_0 = u_2]}$$

contribution of the main-clause IP  
 $u_0 := u_2 + \llbracket \text{Simon will help Hanna} \rrbracket$

$p_1$  = Hanna will ask Simon nicely.  
 $p_2$  = Simon will help Hanna

	$w_1$	$w_2$	$w_3$	$w_4$
$p_1$	0	0	1	1
$p_2$	0	1	0	1

# A dynamic approach

## Conditionals - a second example

$\sigma [u_0 := \text{Update}(\llbracket \text{H. had asked S. nicely} \rrbracket, u_1)] [u_2 \mid u_0 = u_2]$

$[u_0 := \text{Update}(\llbracket \text{he would have helped her} \rrbracket, u_2)] [u_0 = u_2]$

$$= \left\{ \begin{array}{l} \text{~~i}_1 = \langle \{\text{w}_4\}_0, \{\text{w}_1\}_1, \{\text{w}_3, \text{w}_4\}_2, \dots \rangle \\ \text{~~i}_2 = \langle \{\text{w}_4\}_0, \{\text{w}_2\}_1, \{\text{w}_3, \text{w}_4\}_2, \dots \rangle \end{array} \right\} \underline{[u_0 = u_2]}~~~~$$

contribution of the Speech Act  
the information is about  $u_2$

$p_1$  = Hanna will ask Simon nicely.  
 $p_2$  = Simon will help Hanna

	$w_1$	$w_2$	$w_3$	$w_4$
$p_1$	0	0	1	1
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# A dynamic approach

## Conditionals - a second example

$\sigma$   $[u_0 := \text{Update}(\llbracket \text{H. had asked S. nicely} \rrbracket, u_1)] [u_2 \mid u_0 = u_2]$

$[u_0 := \text{Update}(\llbracket \text{he would have helped her} \rrbracket, u_2)] [u_0 = u_2]$

$= \emptyset$

- inserting your favorite theory for how to do counterfactual semantics in the update rule gives you a compositional update rule for counterfactuals (i.e Veltman '05, Schulz '09)

$p_1$  = Hanna will ask Simon nicely.

$p_2$  = Simon will help Hanna

	$w_1$	$w_2$	$w_3$	$w_4$
$p_1$	0	0	1	1
$p_2$	0	1	0	1

# A dynamic approach

## Summary

- anti-modal approach towards a compositional semantics for conditionals
  - dynamic semantics
  - categorial grammar (with features)
  - type-theoretic (Musken-style)
  - global update (Bittner-style)

## But where is the modal?

- The function of the modal has been taken over by the declarative operator *ASSERT*: it demands identity of contexts.

# Conclusions

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## Central Claims

- If you want to do compositional semantics for conditionals, then **the modal approach** is not the best way to go.
- There is more to **dynamic semantics** than just anaphora and presupposition resolution.

# Conclusions

- If you want to do compositional semantics for conditionals, then **the modal approach** is not the best way to go.

From the perspective of the syntax/semantics interface the modal approach is a worst case scenario.

- It introduces semantically crucial material into the logical form that is not visible in the surface structure.
- It does not interpret a substantial part of the material that is visible in the surface structure.

# Conclusions

## anti-modal semantics of conditionals

Input

[[Assert]<sub>sp0</sub>[[If]<sub>co</sub>[Hanna asks Simon nicely]<sub>IP</sub>]<sub>CP</sub>[he will help her]<sub>IP</sub>]<sub>IP</sub>]<sub>spP</sub> ✓

compositional  
dynamic  
SEMANTICS

Output

update function ✓

# Conclusions

## anti-modal semantics of conditionals

- There is more to **dynamic semantics** than just anaphora and presupposition resolution.

### Inspired by

- C. Ebert, C. Endriss, S. Hinterwimmer (2008): “A unified analysis for Indicative and Biscuit Conditionals as topics”, *Proceedings of SALT 18*, Amherst.
- M. Bittner (draft 2009): *Tense, Mood and Centering*.

