Conditionals - from linguistics to philosophy

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INTRODUCTION

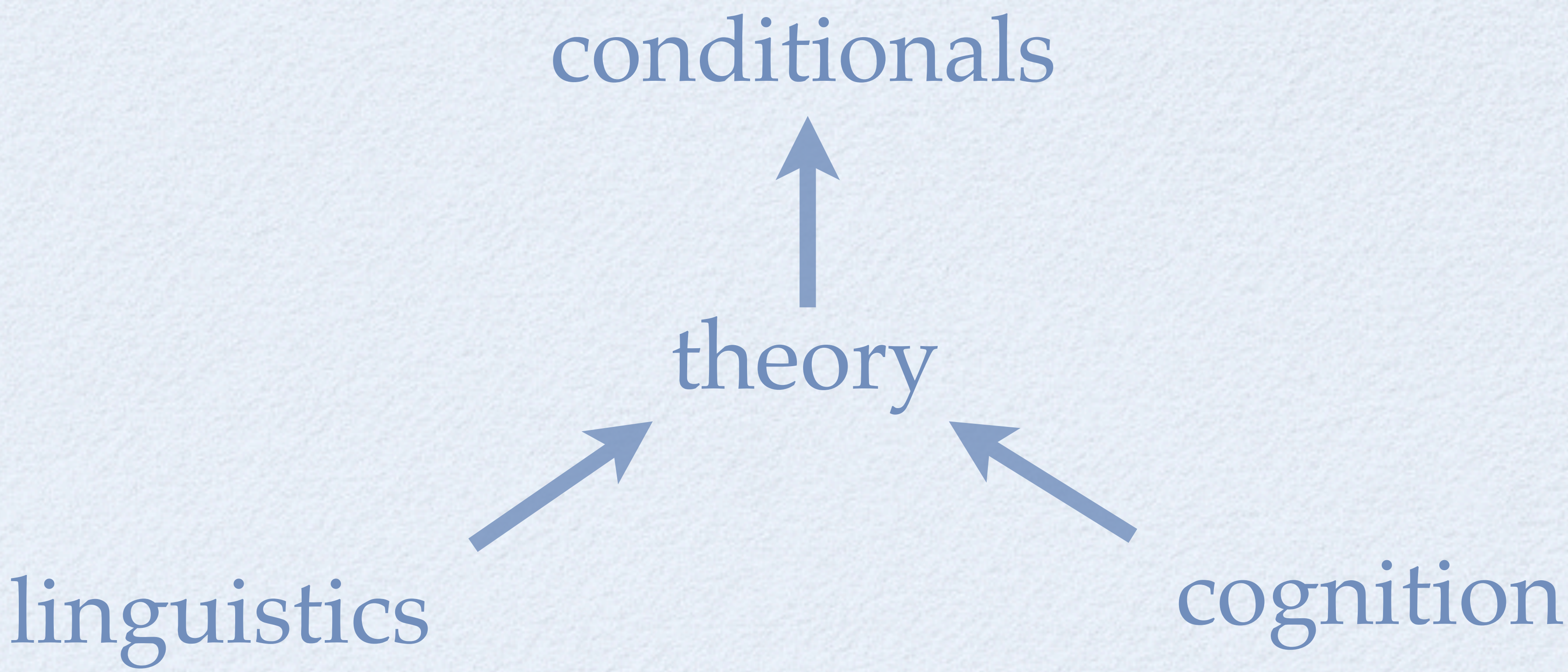
conditionals

↑

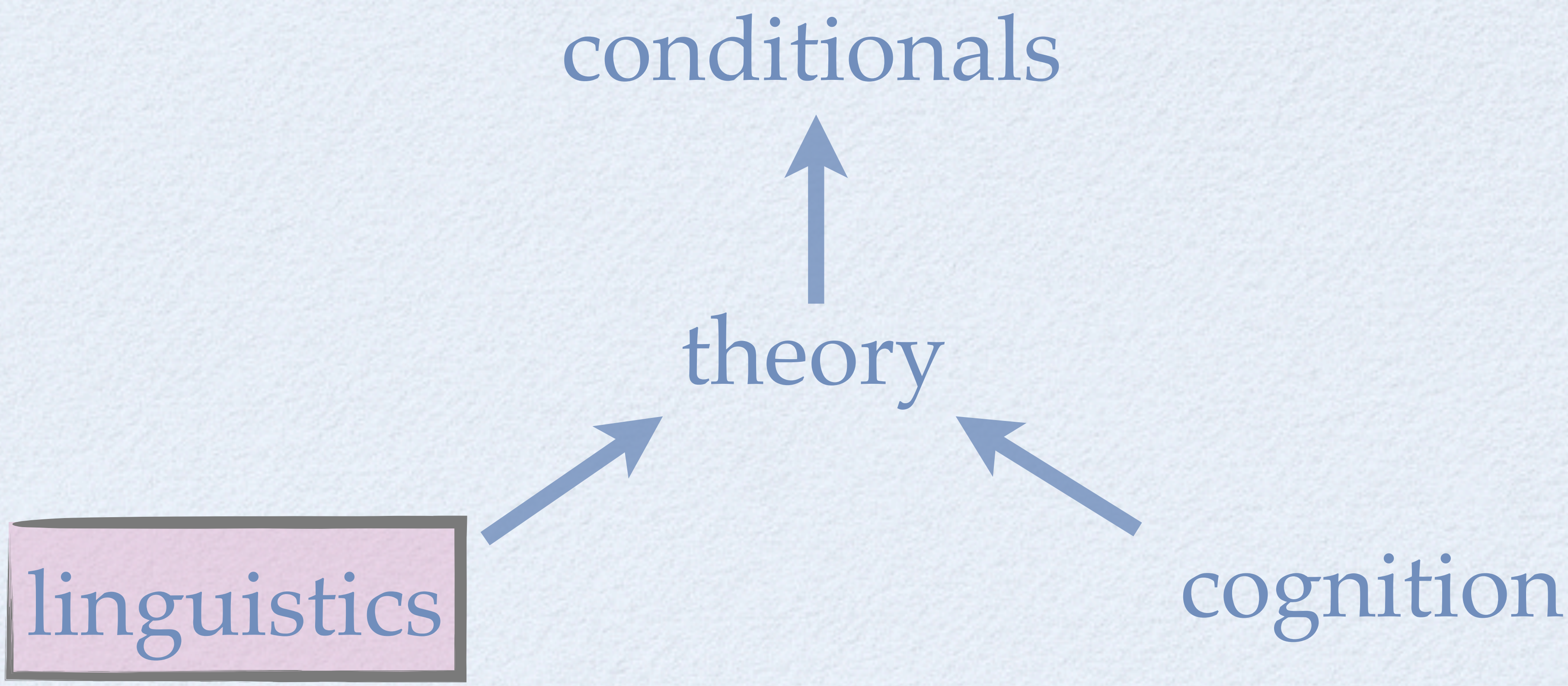
philosophy

"[conditionals are] ... intimately connected with laws, explanation, causation, choice, knowledge, memory, measurement, chance, the asymmetry of past and future, etc; a veritable *Who's Who* of philosophically and scientifically significant concepts." B. Lowe

INTRODUCTION



INTRODUCTION



INTRODUCTION

How to describe the meaning of conditionals?

- Define the meaning of a binary sentence connective “>” in some formal language L.

$$A > C$$

Antecedent Consequent

- the expression A>C is then taken to be the PL translation of a conditional sentence with antecedent A and consequent C.

INTRODUCTION

How to describe the meaning of conditionals?

Truth Conditions

A sentence of the form A > C,

is true in the world w_0 given model M iff ...

$$\boxed{M, w_0 \models A > C \text{ iff } \ldots}$$

INTRODUCTION

How to describe the meaning of conditionals?

Truth Conditions

A sentence of the form A > C,

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$$M, w_0 \models A > C \text{ iff } A \models_D C$$

INTRODUCTION

How to describe the meaning of conditionals?

Assertability Conditions

A sentence of the form $A > C$,

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INTRODUCTION

How to describe the meaning of conditionals?

Assertability Conditions

A sentence of the form A > C,

is assertable in the world w_0 given model M iff ...

$$\boxed{P(C \mid A) \approx 1}$$

INTRODUCTION

THEORY

truth conditions

$$M, w_0 \models A > C \text{ iff } A \mathrel{|}\!\!\equiv_D C$$

formal expression

$$A > C$$

DATA

- intuitions about meaning/acceptability
- intuitions about inference patterns
- eplanative power for related topics (laws, properties)

P1

INTRODUCTION

THEORY

truth conditions

$$M, w_0 \models A > C \text{ iff } A \models_D C$$

formal expression

$$A > C$$

DATA

NL expression

Katrin got up in time BLURB she caught her train

INTRODUCTION

THEORY

truth conditions

$$M, w_0 \models A > C \text{ iff } A \models_D C$$

formal expression

$$A > C$$

DATA

NL expression

If Katrin had gotten up in time,

she would have caught her train

INTRODUCTION

THEORY

truth conditions

$M, w_0 \models A \wedge C$ iff $M, w_0 \models A$ and $M, w_0 \models C$

formal expression

$A \wedge C$

DATA

NL expression

Katrin got up in time and she caught her train

INTRODUCTION

THEORY

truth conditions

$$M, w_0 \models A > C \text{ iff } A \mathrel{|\!\!\equiv}_D C$$

formal expression

$$A > C$$

DATA

NL expression

If Katrin had gotten up in time,

she would have caught her train

P2

INTRODUCTION

THEORY

truth conditions

$$M, w_0 \models A > C \text{ iff } A \mathrel{|\!\!\equiv}_D C$$

formal expression

$$A > C$$

DATA

- semantical/philosophical issues need to be resolved ↯P1
- we need to be able to link the logical form to the actual form of conditionals ↯P2

▸ working on the second problem might help with the first

INTRODUCTION

Outline

1. Where is the operator (and why is it not “if”)?
2. Indicative vs. subjunctive conditionals: what is the difference from a linguistic point of view
3. Summary

Where is the operator (and why is it not "if")?

Where is the operator?

<u>Message:</u>

- "IF" is no conditional connective

$A > C$

If Katrin had been in time, she would have caught her train

Where is the operator?

Argument 1

- conditionals are no coordinated clauses, but subordinated-main clause constructions

Where is the operator?

Argument 1

- conditionals are no coordinated clauses, but subordinated-main clause constructions;
- "if" is not a coordinator like,for instance "and"
  - *if*-clauses can appear sentence-initial and sentence final, *and*-clauses can't
  - *if*-clauses can be modified by *only* and *even*, *and*-clauses can't

Where is the operator?

Argument 1

- they are adverbial clauses

(1) If Andrea arrived late, Clara must have gotten upset.

(2) When Andrea arrived late, Clara got upset.

(3) Because Andrea arrived late, Clara got upset.

(4) Although Andrea arrived late, Clara got upset.

Where is the operator?

<u>Argument 1</u>

- they are adverbial clauses
- they are adjunct clauses (expressing a modifier, not an argument)

Where is the operator?

Argument 2

- IF is no obligatory argument of conditionals

(5)	(agar)	mehnat	karoge	to	safal	hoge
	if	hard-work	do-FUT.2Pl	then	succesful	be-Fut.aPl

If you work hard, you'll be successful.

(6) Had he been here in time, we would have helped him.

Where is the operator?

Argument 3

- Many languages use temporal wh-pronouns or interrogative complementizers as conditional markers

(7) Peter wondered if Sue called the doctor.

(8) Znae li anglijski, ste go vzemat na rabota.
know-3sg Q English, will him take to work.

Where is the operator?

Argument 4

- The if-clause can be bond to another quantificational element. In this case it appears to have no quantificational force itself.

(9) Normally, if I'm late, the train is late, too.

(10)Most students will pass, if they do their homework.

Where is the operator?

<u>Message:</u>

- "IF" is no conditional connective

Where is the operator?

Message:

- “IF” is no conditional connective.
- But where is then the operator “>”???
- And what is “IF” doing???

Where is the operator?

2. if-clauses as referential expressions:

- if-clauses behave like referential expressions (*John, he the vicar*)
  - they can appear in left-dislocated positions
  - they display condition C effects
  - they allow for resumptive pronouns (correlative constructions)

Where is the operator?

2. if-clauses as referential expressions:

- their semantics is related as well

➡ Schlenker 2004: if-clauses show similar logical properties as definite descriptions

Strengthening of the Antecedent:
If *If A; C*, then *If A^B; C*

Contraposition:
If *If A; C*, then *If¬A; ¬C*

Transitivity:
If *If A; B* and *If B; C*, then *If A; C*

Where is the operator?

2. if-clauses as referential expressions:

- their semantics is related as well

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Strengthening of the Antecedent:

If *The x P*, then *The x^y; P.*

Contraposition:

If *The x P*, then *The ¬x; ¬P.*

Transitivity:

If *The x P* and *The Ps Q*, then *The x Q.*

Where is the operator?

<u>2. if-clauses as referential expressions:</u>

- why is that interesting for philosophers?

➡ these observations on the linguistics form of conditionals place restrictions on available semantic theories

  - it doesn't make sense to give conditionals a semantics that is not referential
  - referential expressions normally presuppose the existence of their referent

Where is the operator?

2. if-clauses as referential expressions:

(B) The similarity approach and the limit assumption

Where is the Operator?

<u>2. if-clauses as referential expressions:</u>

(B) The similarity approach and the limit assumption

<u>Basic Idea</u>

A sentence of the form A > C
is true in the actual world w_0 iff the consequent is true in all possible worlds in which

(a) the antecedent is true, and which
(b) in other respects differ minimally from w_0.

Where is the operator?

2. if-clauses as referential expressions:

Truth conditions:

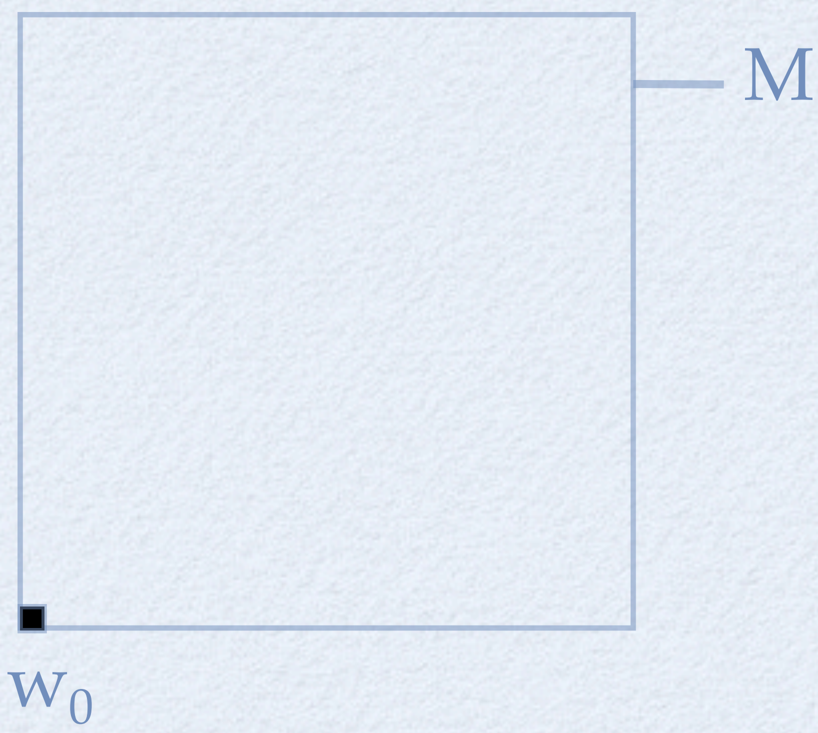
$M,w_0 \mid= A > C$ iff $Min(\leq^{M,w0}, [\![A]\!]^M) \subseteq [\![C]\!]^M$

Where is the operator?

<u>2. if-clauses as referential expressions:</u>

<u>Truth conditions:</u>

$$M,w_0 \models A > C \text{ iff } \mathrm{Min}(\leq^{M,w0}, [\![A]\!]^M) \subseteq [\![C]\!]^M$$



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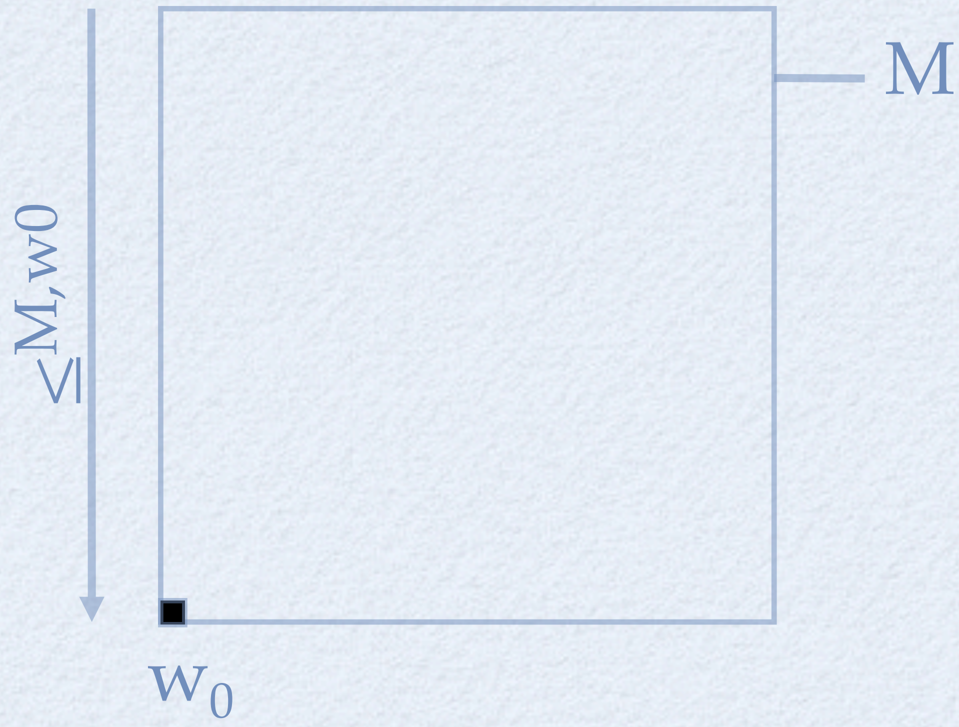

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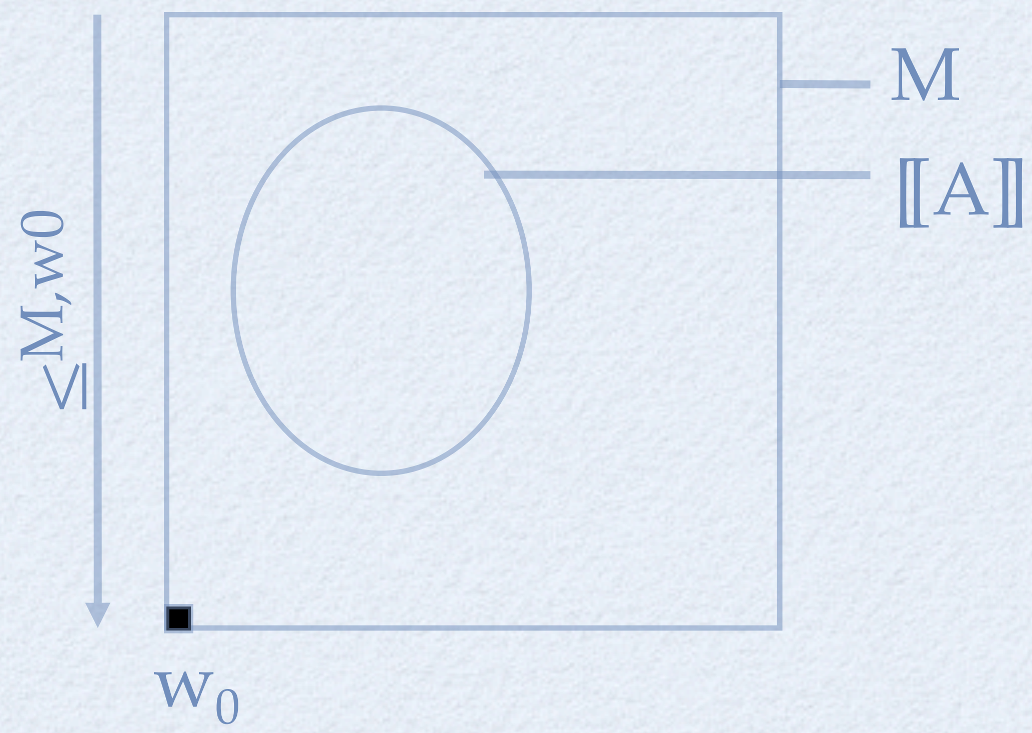

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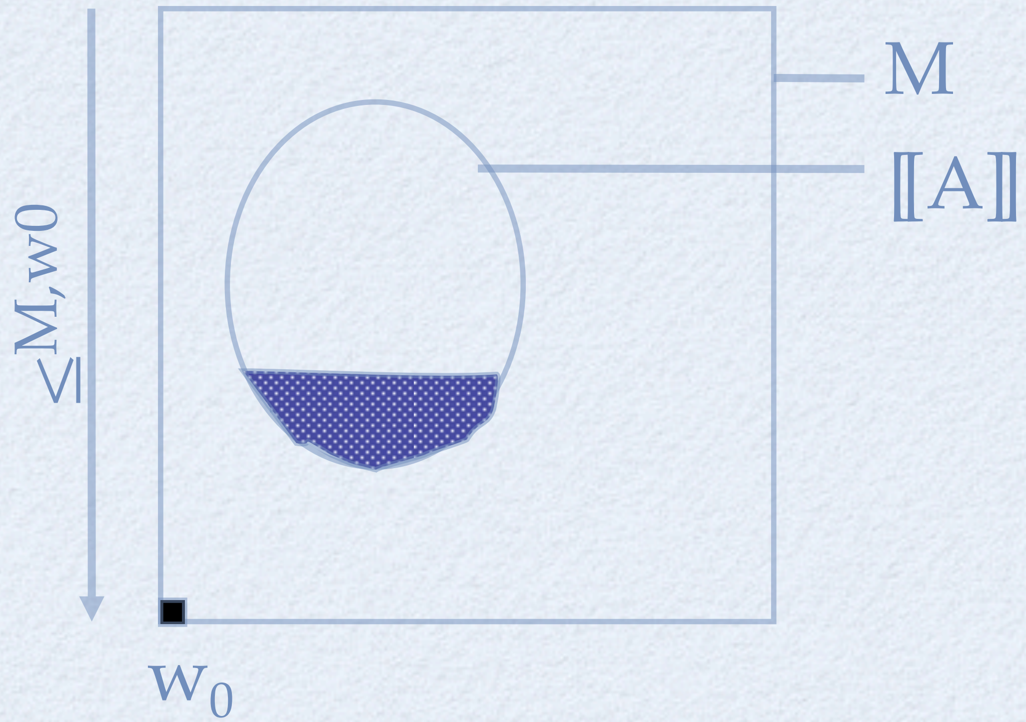

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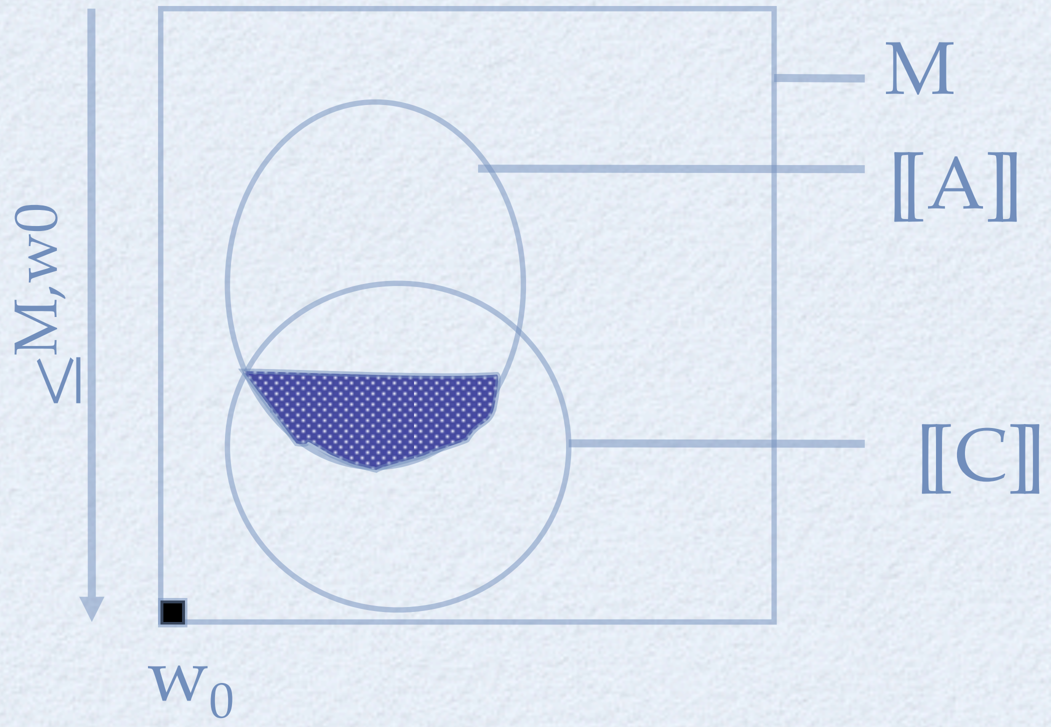

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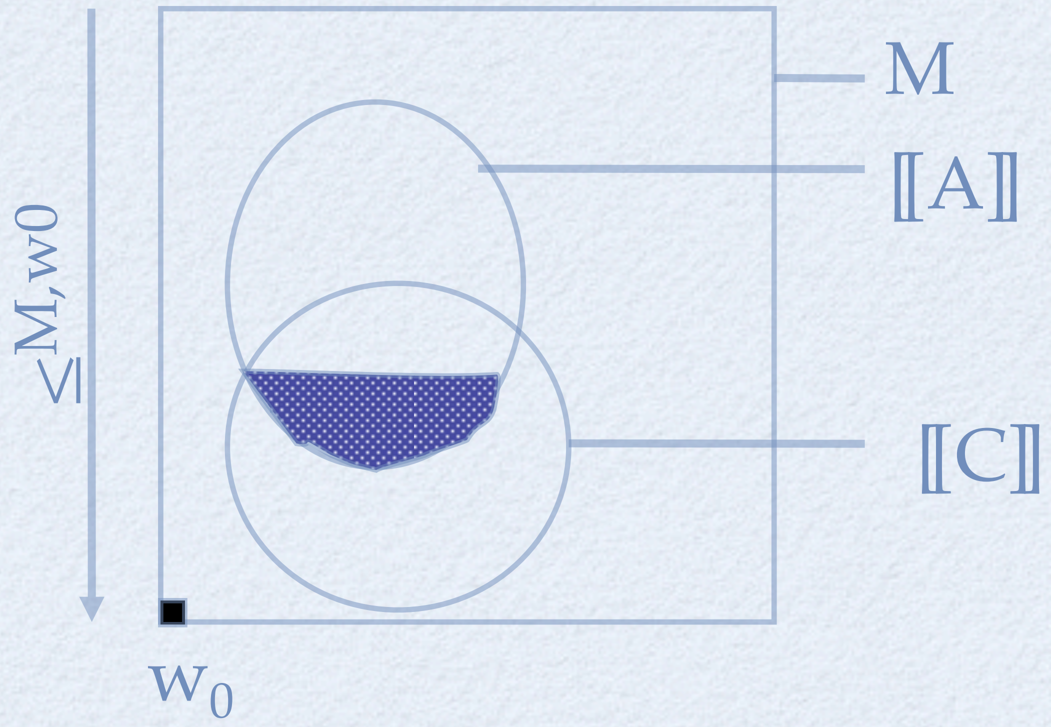

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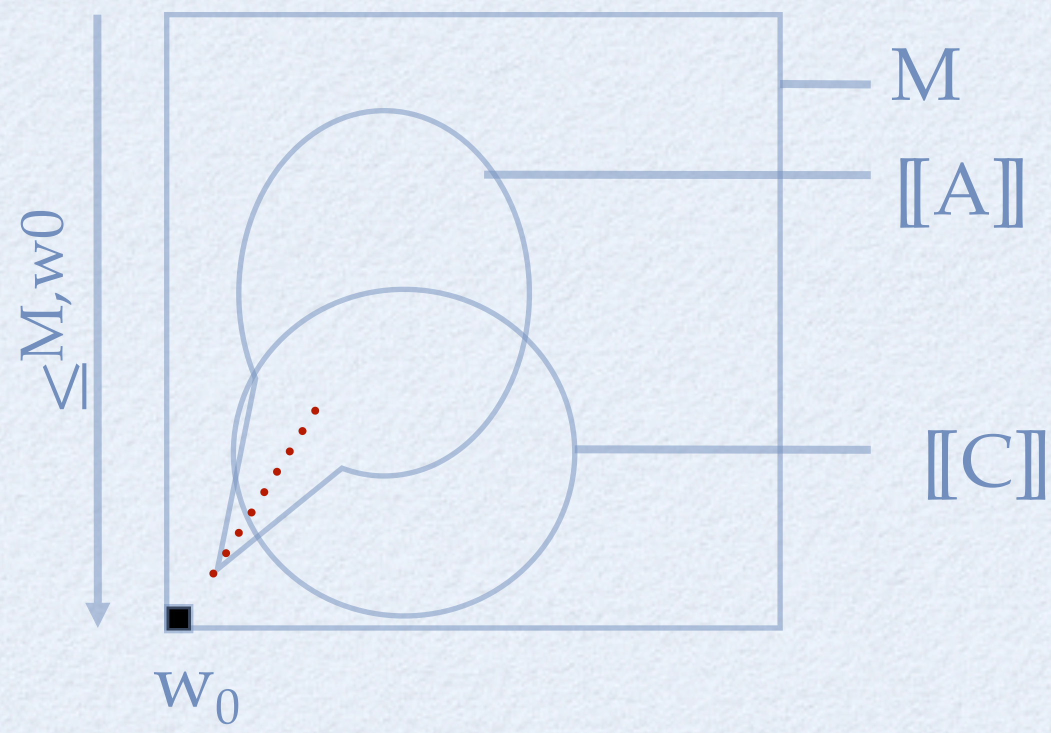


Problem:

- What if $Min(\leq^{M,w0}, [\![A]\!]^M)=\emptyset$?

Solution:

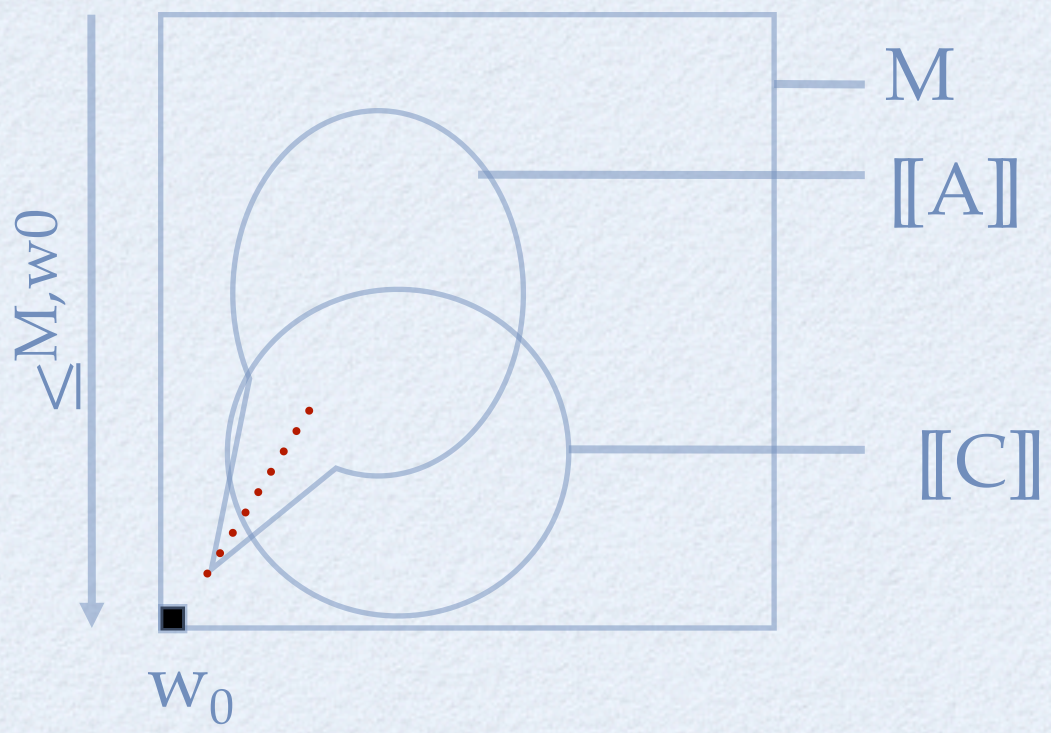
- We reformulate the truth condition (and weaken the logic)
- We ignore the problem (*Limit assumption)*

Where is the operator?

2. if-clauses as referential expressions:

Truth conditions:

$$M,w_0 \models A > C \text{ iff } \mathrm{Min}(\leq^{M,w0}, [\![A]\!]^M) \subseteq [\![C]\!]^M$$



Problem:

- What if $\mathrm{Min}(\leq^{M,w0}, [\![A]\!]^M)=\varnothing$?

Solution:

- Reformulating the logic is not an option.
- There is no problem, conditionals presuppose the *Limit Assumption.*

Where is the operator?

3. if-clauses as free relatives:

- if-clauses look like questions
- if-clauses behave like referential expression

➡ if-clauses are *free relatives*.

(12) *Whoever* locked that door is so dead.

(13) *What* he has in his hand is a gun.

Where is the operator?

3. if-clauses as free relatives:

- if-clauses look like questions
- if-clauses behave like referential expression

➡if-clauses are *free relatives/ correlative constructions*.

(12) *Whoever* locked that door, he is so dead.

(13) *What* he has in his hand, it is a gun.

(14) *If* Peter locked that door, then he will die.

Where is the operator?

3. if-clauses as free relatives:

- if-clauses look like questions
- if-clauses behave like referential expression

➡if-clauses are *free relatives/ correlative constructions*.

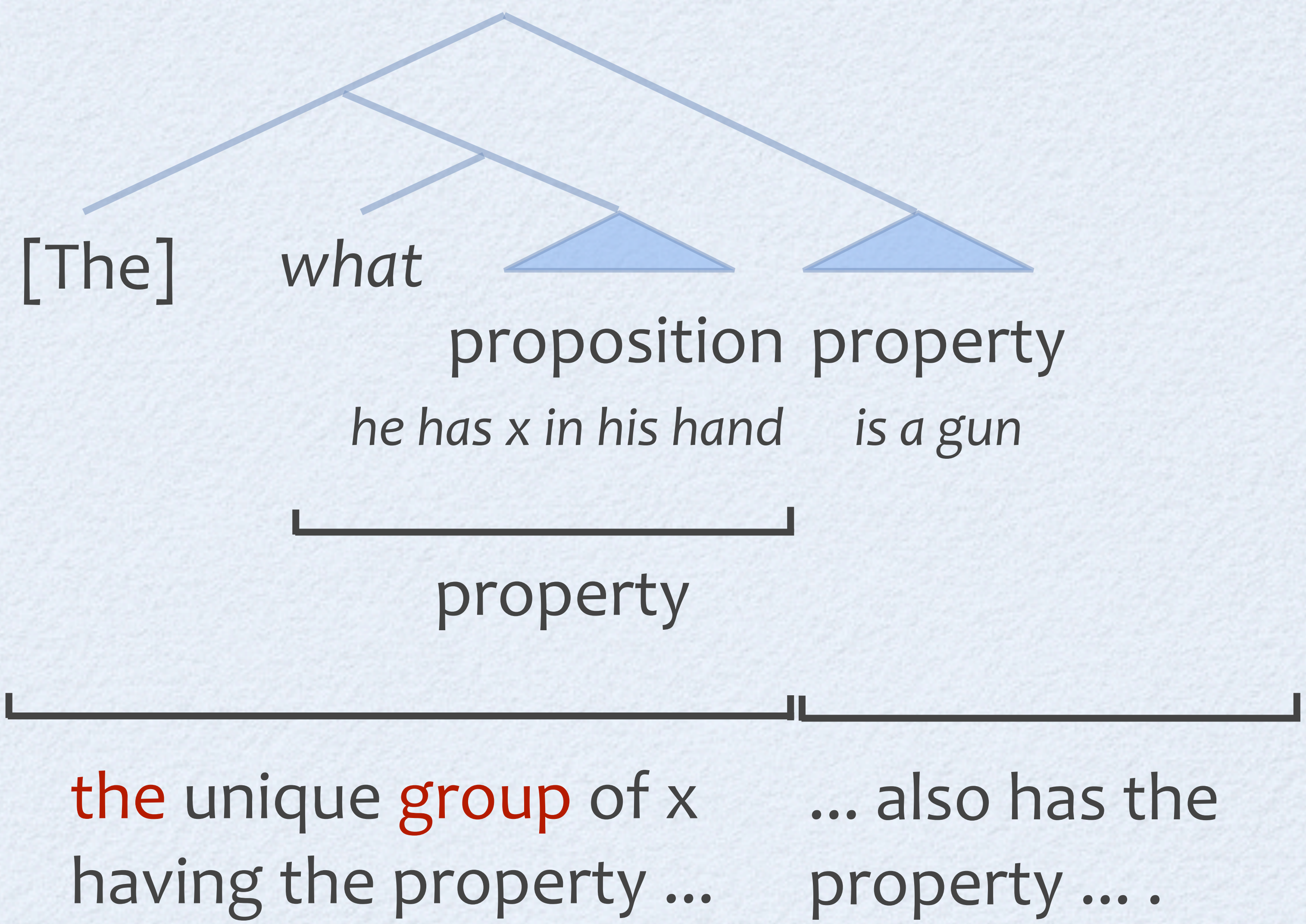
(13) Maliki-rli kaji-ngki yarlki-rni nyuntu ngula-ju kapi-rna luwa-rni ngajulu-rlu.
a. 'As for the dog that bites you, I'll shoot it.'
b. 'If a dog bites you, then I'll shoot it.'

Where is the operator?

3. if-clauses as free relatives:

- if-clauses as free relatives

(13) What he has in his hand is a gun.



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- if-clauses as free relatives

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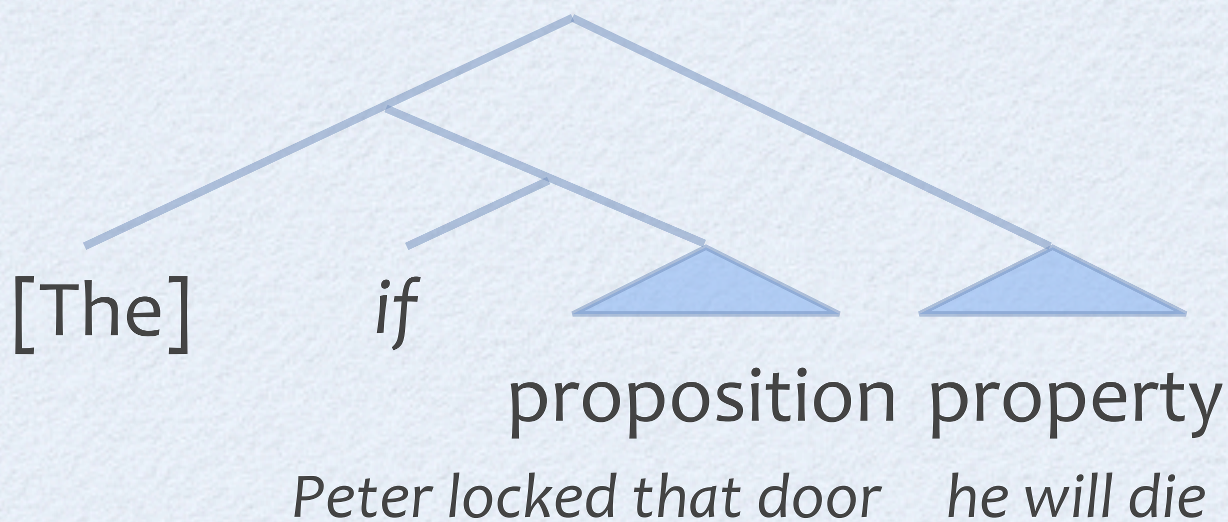


the unique group of w making the proposition ... true ...

... also makes the proposition ... true.

Where is the operator?

3. if-clauses as free relatives:

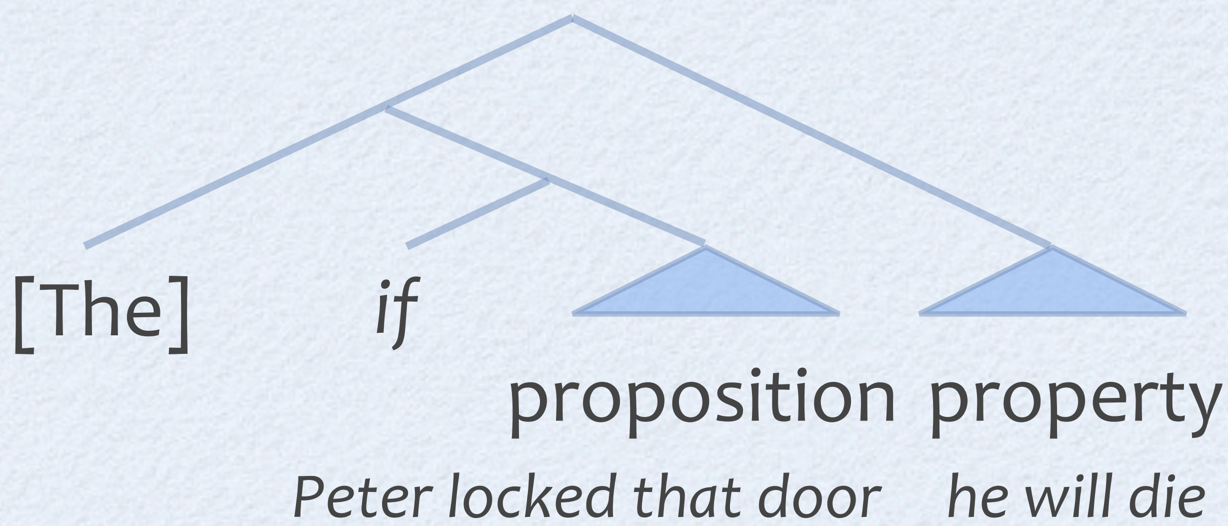
- if is not an operator, but an abstractor making a variable available for binding
- there is a place for a silent operator/quantifier (actually, there are two!)

Where is the operator?

3. if-clauses as free relatives:

- if-clauses as free relatives

  (14)If Peter locked that door, he will die.



the unique group of w making the proposition … true …

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3. if-clauses as free relatives:

- *if* is not an operator, but making a variable available for binding
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- but its meaning has to account for a whole family of construction (plural definite descriptions)

Where is the operator?

3. if-clauses as free relatives:

- *if* is not an operator, but making a variable available for binding
- there is a place for a silent operator/quantifier (actually, there are two!)
- but its meaning has to account for a whole family of construction (plural definite descriptions)
- there is a strong linguistic link between conditionals, free relatives and
  - bare plurals (*tigers have stripes*), and, thereby,
  - generics

Where is the operator?

Outline

1. Where is the operator (and why is it not "if")?
2. Indicative vs. subjunctive conditionals: what is the difference from a linguistic point of view
3. Summary

Indicative vs. Subjunctive Conditionals

Indicative vs. Subjunctive

1. Introduction

(1) If Peter left in time, he will be in Amsterdam this evening.

(2) If Peter left in time, he would be in Amsterdam this evening.

(3) If Peter had left in time, he would have been in Amsterdam this evening.

Indicative vs. Subjunctive

2. The problem

(1) If Peter <u>left</u> in time, he <u>will be</u> in Amsterdam this evening.

(2) If Peter <u>left</u> in time, he <u>would be</u> in Amsterdam this evening.

(3) If Peter <u>had left</u> in time, he <u>would have been</u> in Amsterdam this evening.

Indicative vs. Subjunctive

2. The Problem

Adam's (1975) Kennedy example

(1) If Oswald did not kill Kennedy, then someone else did.

(2) If Oswald had not killed Kennedy, then someone else would have.

Indicative vs. Subjunctive

2. The problem

Veltman's (2005) duchess example

The duchess has been murdered, and you are supposed to find the murderer. At some point only the butler and the gardener are left as suspects. At this point you believe

(2) If the butler did not kill her, the gardener did.

Still, somewhat later after you found out convincing evidence showing that the butler did it, and that the gardener had nothing to do with it you get in a state, in which you will reject the sentence

(3) If the butler had not killed her, the gardener would have.

Indicative vs. Subjunctive

2. The Problem

Lewis' conclusion

"Therefore there really are two different sorts of conditional; not a single conditional that can appear as indicative or as counter-factual depending on the speaker's opinion about the truth of the antecedent."

Indicative vs. Subjunctive

2. The problem

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Indicative vs. Subjunctive

2. The problem

The problem formalized

$A >_I C$ indicative conditional
$A >_S C$ subjunctive conditional

$$\boxed{\begin{array}{l} A \vee C \models \neg A >_I C \\ A \vee C \not\models \neg A >_S C \end{array}}$$

← the direct argument

Indicative vs. Subjunctive

3. A solution

- working out Stalnaker 1975,
  but with a linguistic motivation
  - when interpreting the mood distinction we will take really serious the way it is marked in sentence

- two theses
  1. there is one core interpretation rule for all conditionals
  2. indicatives = subjunctives + beliefs

naked core

2 The Problem

<u>Fake Tense</u>

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

(2) If Peter <u>left</u> in time, he <u>will be</u> in Amsterdam this evening.

(3) If Peter <u>left</u> in time, he <u>would be</u> in Amsterdam this evening.

(4) If Peter <u>had left</u> in time, he <u>would have been</u> in Amsterdam this evening.

2 The Problem

Fake Tense

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

- Fake Tense occurs in other contexts as well

(5) I wished I owned a car.

(6) He behaves like he was sick.

(7) Suppose she failed the test.

(8) It's time we left.

2 The Problem

Fake Tense

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

- Fake Tense occurs in other contexts as well.
- It occurs in various languages from different language families.

English, French, Latin, Classic Greek, Russian, and Old Irish (Indo-European), Cree (Algonquian), Tonga and Haya (Bantu), Chipewyan (Athabascan), Garo (Tibeto Burman), Nitinaht (Wakashan), and Proto-Uto-Aztecan (in the reconstruction of Steele). [James 1982]

Indicative vs. Subjunctive

3. A solution

- four steps
  1. an epistemic notion of entailment
  2. the core interpretation rule
  3. semantics of tense ...
  4. ... applied to conditionals

$$\boxed{\begin{array}{l} A \vee C \models \neg A >_I C \\ A \vee C \not\models \neg A >_S C \end{array}}$$

Indicative vs. Subjunctive

3. A solution

3.1 an epistemic notion of entailment

- we work with an epistemic notion of entailment

  $A \models C$, if you learn that A is true, you will also believe that C is true

Indicative vs. Subjunctive

3. A Solution

3.1 an epistemic notion of entailment

- we work with an epistemic notion of entailment

$A \models C$, if $\sigma[A][C] = \sigma[A]$

Indicative vs. Subjunctive

3. A solution

3.2 update and the core interpretation rule

- for atomic sentences

$$\sigma[A] = \{\, w \in \sigma \mid [\![A]\!]^{M,a}(w) = 1 \}$$

- for disjunction

$$\sigma[A \vee B] = \sigma[A] \cup \sigma[B]$$

- for conditionals

$$\begin{aligned}\sigma[A>B] &= \{\, w \in \sigma \mid [\![A>B]\!]^{M,a}(w) = 1 \} \\ &= \sigma \setminus \{\, w \in \sigma \mid [\![A>B]\!]^{M,a}(w) = 0 \}\end{aligned}$$

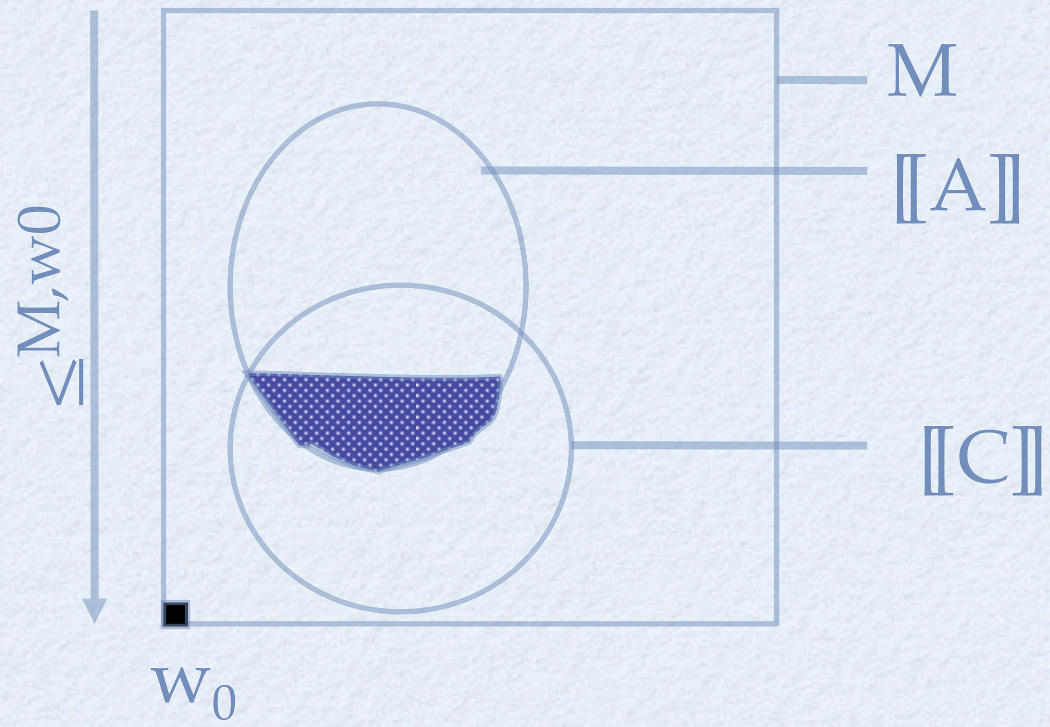
Indicative vs. Subjunctive

3. A solution

3.2 update and the core interpretation rule

- core interpretation rule

$[\![A>C]\!]^{M,a}(w) = 1$ iff $Min_{<}([\![A]\!]^{M}, w) \subseteq [\![C]\!]^{M}$



Indicative vs. Subjunctive

3. A Solution
3.3 A semantics for tense

(2) Peter is in Groningen right now.

refers to some time overlapping the utterance time

(3) Peter was in Groningen yesterday

refers to some time in the past

Indicative vs. Subjunctive

3. A solution

3.3 A semantics for tense

$[\![\mathrm{Pres}_i\, A]\!]^{M,a}$ $(w,t) = 1$ iff (i) $a(t_i) = t$ (presupposition), and

(ii) $[\![A]\!]^{M,a}(w, t_i) = 1$ (truth-conditions)

$[\![\mathrm{Past}_i\, A]\!]^{M,a}$ $(w,t) = 1$ iff (i) $a(t_i) \leq t$ (presupposition), and

(ii) $[\![A]\!]^{M,a}(w, t_i) = 1$ (truth-conditions)

if $a(t_i) = t$ (presupposition), then Pres dominates, because it is more informative (*pragmatic inference*)

Indicative vs. Subjunctive

3. A solution
3.4 ... applied to conditionals

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INDICATIVE VS. SUBJUNCTIVE

3. A SOLUTION
3.4 ... applied to conditionals

$[\![A >_I C]\!]^{M,a}(w,t) = 1$ iff (i) $a(t_i) = t$ (presupposition), and
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$[\![A >_S C]\!]^{M,a}(w,t) = 1$ iff (i) $a(t_i) = t$ (presupposition), and
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Indicative vs. Subjunctive

3. A solution

3.4 ... applied to conditionals

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Indicative vs. Subjunctive

3. A solution

3.4 ... applied to conditionals

$[\![A >_I C]\!]^{M,a}(w) = 1$ iff (i) $a(t_i) = t$ (presupposition), and

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Indicative vs. Subjunctive

3. A Solution

3.4 ... applied to conditionals

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Indicative vs. Subjunctive

3. A solution

3.4 ... applied to conditionals

$[\![A >_I C]\!]^{M,a}(w) = 1$ iff (i) $Min_<([\![A]\!]^M, w) = w$ (presupp.), and

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Indicative vs. Subjunctive

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Indicative vs. Subjunctive

4. The problem re-accessed

$$\boxed{\begin{array}{l} A \vee B \models \neg A >_I B \\ A \vee B \not\models \neg A >_S B \end{array}}$$

$A \models B$, if $\sigma[A][B] = \sigma[A]$

$\sigma =$

w_1: A, B
w_2: ¬A, B
w_3: A, ¬B
w_4: ¬A, ¬B

$\xrightarrow{[A \vee B]}$

w_1: A, B
w_2: ¬A, B
w_3: A, ¬B

$\xrightarrow{[\neg A >_I B]}$

$$\sigma[A>B] = \sigma \setminus \{ w \in \sigma \mid [\![A>B]\!]^{M,a}(w) = 0 \}$$

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Indicative vs. Subjunctive

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Indicative vs. Subjunctive

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Indicative vs. Subjunctive

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Indicative vs. Subjunctive

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- are the w-closest A worlds B worlds?
  - does not depend on σ at all
  - no epistemic effects!!!

Indicative vs. Subjunctive

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w_1: A, B w_2: ¬A, B w_3: A, ¬B w_4: ¬A, ¬B	$\xrightarrow{[A \vee B]}$	w_1: A, B w_2: ¬A, B w_3: A, ¬B	$\xrightarrow{[\neg A >_S B]}$	??? w_2: ¬A, B ???

- are the w-closest A worlds B worlds?
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Indicative vs. Subjunctive

2. The Problem

Lewis' conclusion

"Therefore there really are two different sorts of conditional; not a single conditional that can appear as indicative or as counter-factual depending on the speaker's opinion about the truth of the antecedent."

SUMMARY

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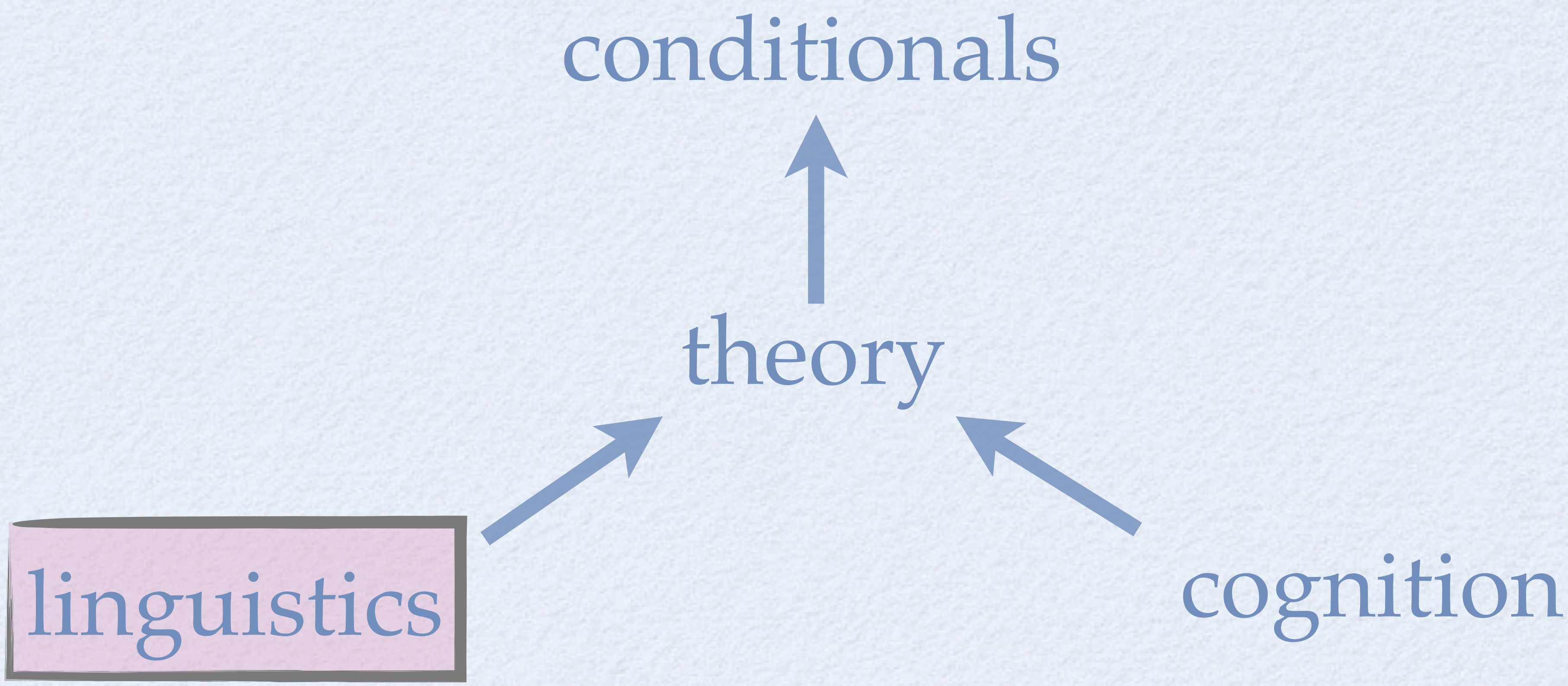

Summary

Outline

1. Where is the operator (and why is it not “if”)?
2. Indicative vs. subjunctive conditionals: what is the difference from a linguistic point of view
3. Summary

$A > C$

If Katrin had gotten up in time, she would have caught her train

Summary

<u>if-clauses as free relatives:</u>

- if-clauses behave like free relatives
- *if* is not an operator, but making a variable available for binding
- there is a place for a silent operator/quantifier (actually, there are two!)
- but its meaning has to account for a whole family of construction (plural definite descriptions)
- there is a strong linguistic link between conditionals, free relatives and generics

SUMMARY

the indicative/subjunctive contrast

Adam's (1975) Kennedy example

(1) If Oswald did not kill Kennedy, then someone else did.

(2) If Oswald had not killed Kennedy, then someone else would have.

Lewis' conclusion

"Therefore there really are two different sorts of conditional; not a single conditional that can appear as indicative or as counter-factual depending on the speaker's opinion about the truth of the antecedent."

SUMMARY

the indicative/subjunctive contrast

- working out Stalnaker 1975,
  but with a linguistic motivation
  - when interpreting the mood distinction we will take really serious the way it is marked in sentence:

  ➜ Fake Tense

- two theses
  1. there is one core interpretation rule for all conditionals
  2. indicatives = subjunctives + believes

Conditionals -
from linguistics to philosophy

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