

Asking *What-Ifs*

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(Joint work with Justin Bledin, JHU Philosophy.)

What If: The Semantics, Pragmatics, & Psychology of Counterfactuals
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Slides also on my website.

Hypothetical *what ifs*

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The internet provides:



Hypothetical *what ifs*

Many examples on XKCD's 'what if' site:

- (3)
 - a. What if I tried to re-enter the atmosphere in my car?
(a 2000 VW Jetta TDI).
 - b. What if you built a siphon from the oceans on Europa to Earth?

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Europa to Earth?

Intuition

What would the world be like if...?

Hypothetical *what ifs*

Many examples on XKCD's 'what if' site:

- (3) a. What if I tried to re-enter the atmosphere in my car? (a 2000 VW Jetta TDI). Would it do more environmental damage than it is already apparently doing?
- b. What if you built a siphon from the oceans on Europa to Earth? Would it flow once it's set up?

Intuition

What would the world be like if...?

However – people actually interested in much more specific versions of this.

Key points

1. Data: 'what if's are extremely flexible and often used for much more specific questions than purely hypothetical.
2. Compare 'what if's to conditional questions (Rawlins 2010b,a).
3. New proposal: 'what if's are consequentless conditionals that operate as questions. They rely on an existing 'Question Under Discussion' (QUD; Roberts 1996, Ginzburg 1996) in context.
4. Will need to generalize the notion of QUD a bit: incorporate a notion of **decision problem**.
5. Flexibility and complications largely follow from general constraints on conditionals, discourse.

Flexible 'what if's: three more uses

'What if' syntax: there is no consequent

'What if's as suppositional questions

Suggestion uses: generalizing to decision problems

Conclusions

Flexible 'what if's: three more uses

Consequential *what ifs*

- (4) I heard that Alfonso's going to the party – what if Joanna is there?
- (5) A: Alfonso's going to the party.
B: Uh oh, what if Alfonso's there?

Consequential *what ifs*

- (4) I heard that Alfonso's going to the party – what if Joanna is there?
- (5) A: Alfonso's going to the party.
B: Uh oh, what if Alfonso's there?
- (6) Now there's just a VW between Adam and her. What if he sees her? (COCA; narrative text)

Consequential *what ifs*

- Ask about consequences of some information or claim.
- Respond to an accepted assertion (or other informational contribution).
- Same-speaker or cross-speaker.
- Intuition: consequential *what ifs* are like hypothetical ones, but with a much more restricted scope.

Challenging *what ifs*

(Rawlins 2010a: **Conversational Backoff**)

(7) A: I'm not going to go the party.

B: What if Joanna is there? (Are you sure?)

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(8) The boy came right over and boldly proposed that, since they were both there at the same time every week, they could start sharing a paper and save a tree. **“What if we both want the same section?”** Pip said with some hostility. (COCA)

(9) “If I can't talk to you without feeling played, I've got to go for the gun.” **“What if you don't have a gun?”** I asked. (COCA)

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- (7) A: I'm not going to go the party.
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- (9) "If I can't talk to you without feeling played, I've got to go for the gun." **"What if you don't have a gun?"** I asked. (COCA)
- (10) "Push it open, then step away." "What if it's locked?" Peggy said.
- (11) "Hey, maybe the squirrel is underneath those trash bags. Stir it up a bit." "Not funny, what if it attacks?" (COCA)

Challenging *what ifs*

- Respond to an assertion (or other informational contribution), imperative.
- Cross-speaker.
- Prevent acceptance of a claim. (Rawlins 2010a: *conversational backoff*, Bledin & Rawlins 2016: *resistance move*.)
- Rawlins (2010a): 'what if' involves re-asking a QUD with conditionalization.

Suggestive *what ifs*

- (12) A: How can I get to Toronto?
B: What if you take Via Rail?
- (13) A: Who should we invite to give a talk?
B: What if we invite Joanna?
- (14) A: Who could possibly be the murderer?
B: What if the butler lied about his alibi?

Suggestive *what ifs*

- Respond to a question that is either:
 1. A 'planning' question, or a question with collaborative planning in the background.
 2. A 'collaborative brainstorming' question.
- Offer a suggested resolution of some question.

Summary: four *what ifs*

Types of 'what ifs'

Type	function	antecedent
Hypothetical	ask about consequences of some outlandish possibility	none?
Consequential	ask about consequences of some ordinary possibility	informational
Challenging	double check hearer's commitment to some claim	informational
Suggestive	suggest the resolution for some issue	question

How to capture all this??

Full conditional question paraphrases

Observation

There is no stable full conditional question paraphrase across all uses.

Some attempts:

(15) What would would happen if ...?

(16) What would the world be like if ...?

(17) What would be true if ...?

(cf. Ebert et al. 2014 on [aboutness topics](#))

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(17) What would be true if ...?

(cf. Ebert et al. 2014 on [aboutness topics](#))

These go in the right direction, but 'what if's are used to ask more specific questions.

'What if' syntax: there is no
consequent

Main points about the syntax of *what if*

1. No covert consequent – *what if* is a fixed idiom.
2. Treatment of *if*-clause has to be normal, compositional.

Idiosyncratic 'what'

Restricted to just 'what':

(18) What if we invite Joanna?

(19) *{who, when, how, why, where} if we invite Joanna?

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(19) *{who, when, how, why, where} if we invite Joanna?

Compare:

(20) {What, how} about if we invite Joanna?

(21) *{Who, when, why, where} about if we invite Joanna?

'What' can't undergo normal modification:

- (22) a. *What else if we invite Joanna?
b. *What the hell if we invite Joanna?
- (23) a. What else would happen if we invite Joanna?
b. What the hell would happen if we invite Joanna?

The 'if'-clause, externally

Only if conditionals (von Stechow 1994, Herburger, a.o.)

(24) What would happen only if we invite Joanna?

(25) *What only if we invite Joanna?

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(24) What would happen only if we invite Joanna?

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Unconditionals (Rawlins 2013 a.o.)

(26) What would happen whether or not we invite Joanna?

(27) *What whether or not we invite Joanna?

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Other complementizers:

(28) *What when a farmer owns a donkey?

(29) *What if and when we invite Joanna?

The 'if'-clause, externally

An 'if'-clause is required:

(30) Suppose we invite Joanna. *What?

Compare:

- (31)
- a. Suppose we invite Joanna. Then what?
 - b. Suppose we invite Joanna. What would happen?
 - c. If we invite Joanna, then what? (n.b. different meaning than 'what if')

(Not to say that bare 'what??' doesn't have its uses.)

The 'if'-clause, internally

The internals of the 'if'-clause are characteristic of 'if'-clause adjuncts.

Counterfactuals, subjunctive:

(32) What if it {had snowed / were to snow}?

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Counterfactuals, subjunctive:

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Fake past tense (Iatridou 2000, Schulz 2008, 2014):

(33) a. If Peter left in time, he would be in Frankfurt this evening. (Schulz 1-b)

b. How could Peter get to Frankfurt this evening?
What if he left by two?

(34) What if you took Via Rail?

What to make of all this?

1. 'What if' moves are questions (they license answers).
2. Approximate meaning: context-specific instantiation of 'what would be true if ...?'
3. 'What if's are syntactically root-clause-sized idiom chunks, with a fixed 'what if' sequence.
4. The internals of the 'if'-clause appear as normal TP syntax.

'What if's as suppositional questions

Sketch of the proposal

'what if's are consequent-less conditional questions.

Step 1: Temporarily assume the proposition in the 'if'-clause.
(Isaacs & Rawlins 2008, Rawlins 2010a)

Step 2: require that the resulting context be **inquisitive** – that there be a live question to be addressed.

How to deal with the variety of uses? Follows from the interaction of step 2 with various discourse circumstances.

Plan for building up the analysis

1. Informal versions of basic speech acts in a Stalnakerian pragmatics (asserting, questioning).
2. Suppositional analysis of conditionals.
3. Isaacs & Rawlins analysis of conditional questions.
4. Treatment of 'what if' questions.
5. Revisit the four main uses of 'what if's.

Agents in discourse coordinate on a public, shared **common ground**.

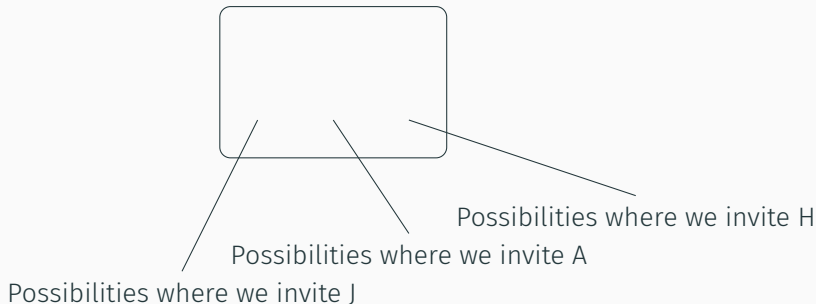
- 'Context': a set of possibilities (possible worlds) compatible with the common ground.

Asserting

Asserting eliminates possibilities (worlds) from the context.

(35) We will invite Joanna.

Input context c is just some set of possibilities (possible worlds):

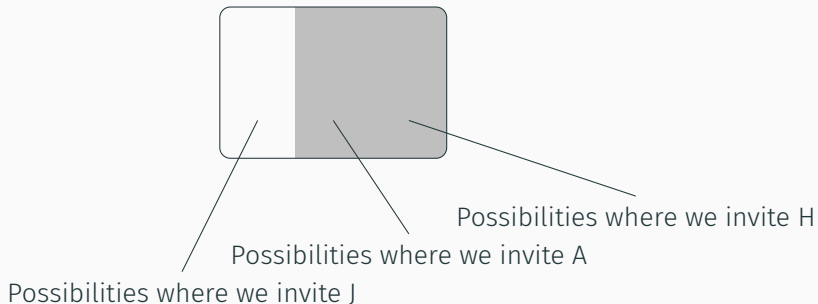


Asserting

Asserting eliminates possibilities (worlds) from the context.

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$c + \ulcorner \text{Assert}(\text{we invite } J) \urcorner$ eliminates incompatible possibilities:

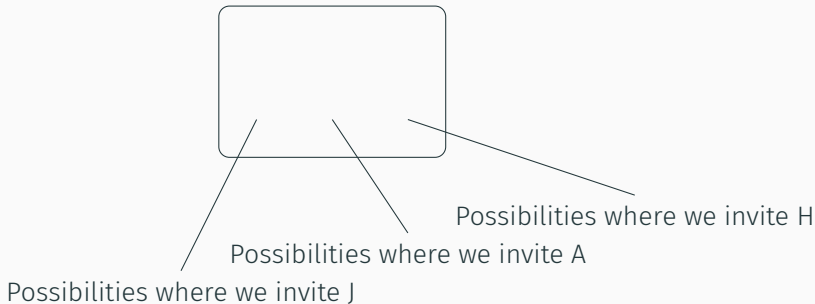


Questioning (simplified)

Questioning partitions the context into exhaustive choices
(Groenendijk 1999 etc)

(36) Who will you invite?

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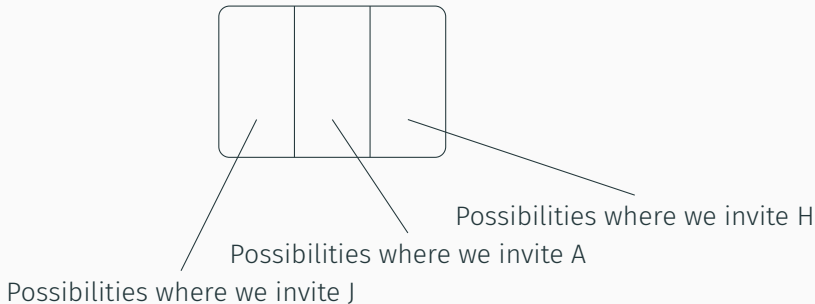


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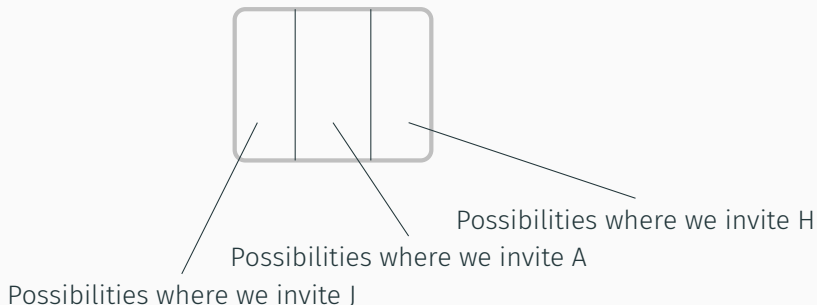
$c + \ulcorner \text{Question}(\text{who will you invite?}) \urcorner$:



Questioning (less simplified)

I will distinguish between the question **as a discourse topic** and the **current question** in context.

A question in context is domain restricted:



Questioning (less simplified)

we invite
Bolon Dzacab

I will distinguish between the question as a discourse topic and the current question in context.

「who will you invite?」 semantically allows many choices!

we invite
Chomsky

we invite
Napoleon

we invite
J+A

we invite
J+Chomsky



Possibilities where we invite H

Possibilities where we invite A

Possibilities where we invite J

we invite
J+A+H

we invite
Kyle

First target: conditional questions

Conditional questions (Hulstijn 1997, Velissaratou 2000, Isaacs & Rawlins 2008, Rawlins 2010a):

(37) If we invite Joanna, will she give a good talk?

Sketch of Isaacs & Rawlins analysis:

Step 1: temporarily assume the proposition in the 'if'-clause.

(38) $c + \ulcorner \text{if } \phi \urcorner = c + \ulcorner \text{Assume}(\phi) \urcorner$ (Kaufmann 2000, Isaacs & Rawlins 2008)

First target: conditional questions

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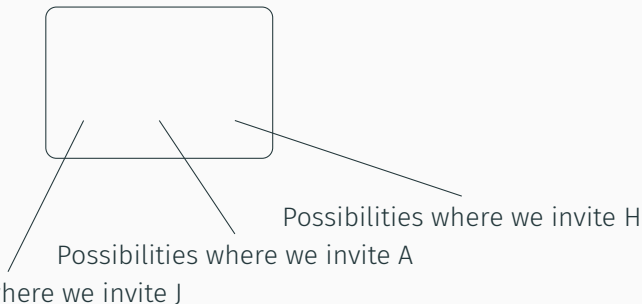
Step 2: update the resulting temporary context with consequent question.

(Suppositional accounts of conditionals: Ramsey 1931, Adams 1965, Mackie 1973, Heim 1983, Edgington 1995 a.m.o)

The suppositional analysis of conditionals

(39) If we don't invite Joanna, we will invite Alfonso.

Input context c is just some set of possibilities:

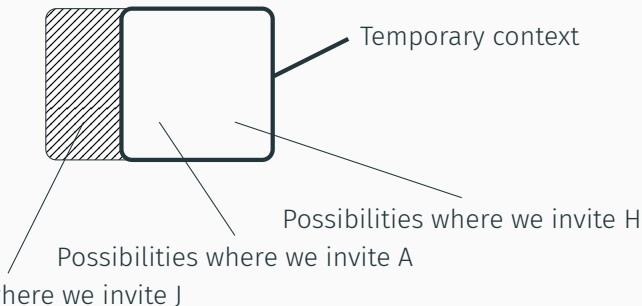


We start as usual.

The suppositional analysis of conditionals

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$c + \ulcorner \text{Assume}(\text{we don't invite } J) \urcorner$:

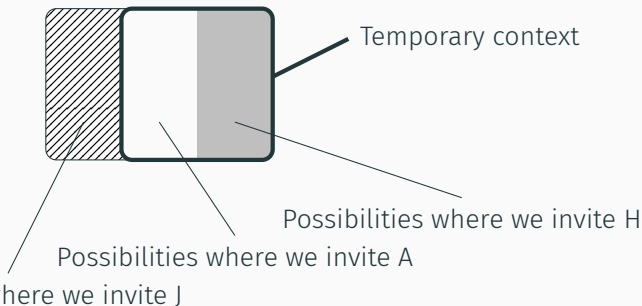


1. $\ulcorner \text{Assume} \urcorner$ introduces a temporary context restriction.

The suppositional analysis of conditionals

(39) If we don't invite Joanna, we will invite Alfonso.

$c + \ulcorner \text{Assume}(\text{we don't invite J}) \urcorner + \ulcorner \text{Assert}(\text{we invite A}) \urcorner$:

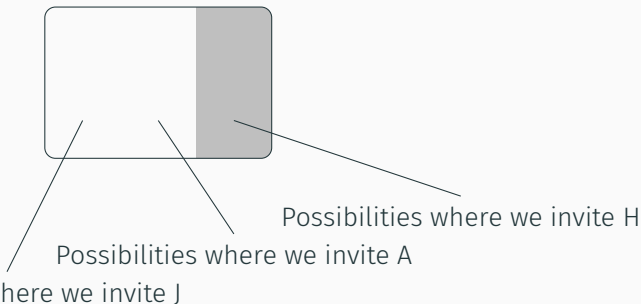


2. $\ulcorner \text{Assert} \urcorner$ eliminates possibilities from (only) the *current* context.

The suppositional analysis of conditionals

(39) If we don't invite Joanna, we will invite Alfonso.

$c + \ulcorner \text{Assume}(\text{we don't invite } J) \urcorner + \ulcorner \text{Assert}(\text{we invite } A) \urcorner + \ulcorner \text{pop} \urcorner$:

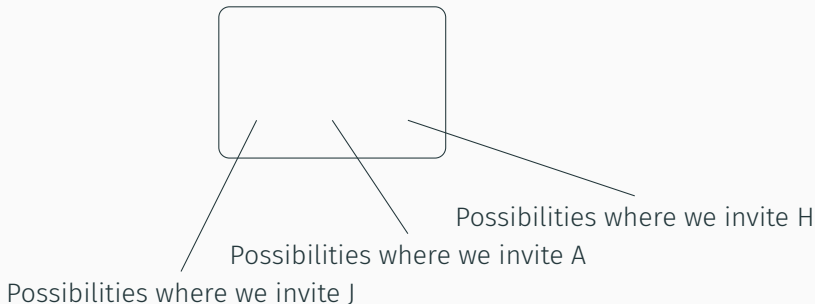


3. $\ulcorner \text{pop} \urcorner$ gets rid of a temporary context restriction.

Conditional questions

- (40) A: If you don't invite Joanna, who will you invite?
B: We will invite Alfonso.

Input context c is just some set of possibilities:

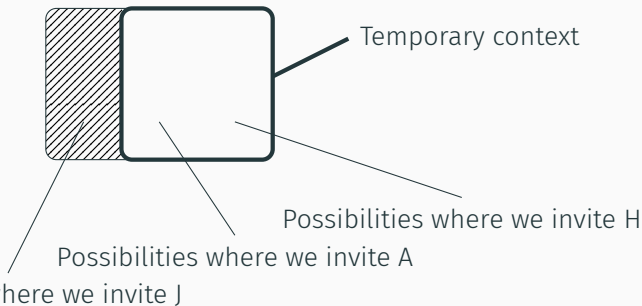


We start as usual.

Conditional questions

- (40) A: If you don't invite Joanna, who will you invite?
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$c + \ulcorner \text{Assume}_A(\text{you don't invite } J) \urcorner$:

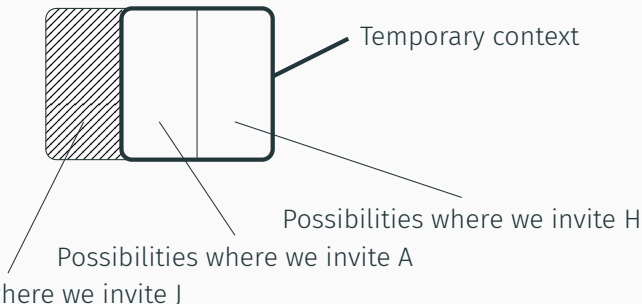


1. $\ulcorner \text{Assume}_A \urcorner$ introduces a temporary context restriction.

Conditional questions

- (40) A: If you don't invite Joanna, who will you invite?
B: We will invite Alfonso.

$c + \ulcorner \text{Assume}_A(\text{you don't invite } J) \urcorner + \ulcorner \text{Question}_A(\text{who do you invite}) \urcorner$:

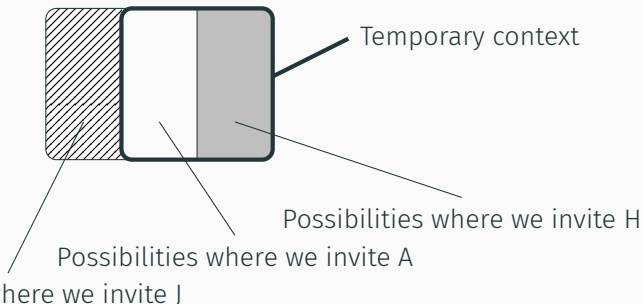


2. $\ulcorner \text{Question}_A \urcorner$ partitions (only) the *current* context.

Conditional questions

- (40) A: If you don't invite Joanna, who will you invite?
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$c + \ulcorner \text{Assume}_A(\text{you don't invite } J) \urcorner + \ulcorner \text{Question}_A(\text{who do you invite}) \urcorner + \ulcorner \text{Assert}_B(\text{we invite } A) \urcorner$

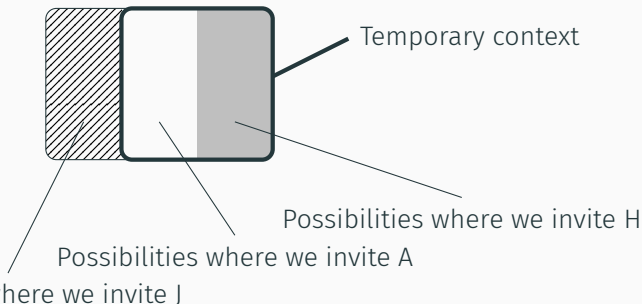


3. $\ulcorner \text{Assert}_B \urcorner$ eliminates possibilities from the current context.

Conditional questions

- (40) A: If you don't invite Joanna, who will you invite?
B: We will invite Alfonso.

$c + \ulcorner \text{Assume}_A(\text{you don't invite } J) \urcorner + \ulcorner \text{Question}_A(\text{who do you invite}) \urcorner + \ulcorner \text{Assert}_B(\text{we invite } A) \urcorner$

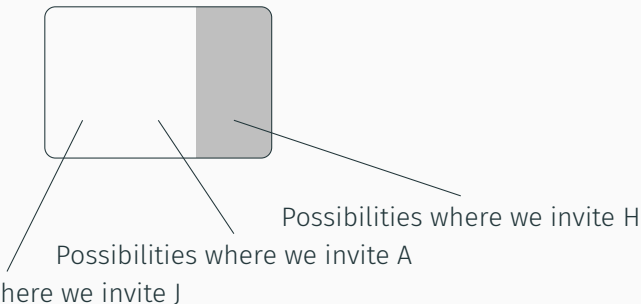


3.5. The question is now completely resolved in context – the current context is **uninquisitive**.

Conditional questions

- (40) A: If you don't invite Joanna, who will you invite?
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$c + \ulcorner \text{Assume}_A(\text{you don't invite } J) \urcorner + \ulcorner \text{Question}_A(\text{who do you invite}) \urcorner + \ulcorner \text{Assert}_B(\text{we invite } A) \urcorner + \ulcorner \text{pop} \urcorner$:



4. $\ulcorner \text{Pop} \urcorner$ gets rid of a temporary context restriction.

Summary of basic context manipulation

A **context** consists of:

- A set of possibilities.
- A temporary assumption. (If there is one currently.)
- A stack of discourse topics / Questions Under Discussion.
- (A stack of assertions under discussion. cf. the Table of Farkas & Bruce 2010.)

Summary of basic context manipulation

A **context** consists of:

- A set of possibilities.
- A temporary assumption. (If there is one currently.)
- A stack of discourse topics / Questions Under Discussion.
- (A stack of assertions under discussion. cf. the Table of Farkas & Bruce 2010.)

Four main operations on the **current context**:

1. Eliminate possibilities.
2. Partition context (introduce a discourse topic / QUD).
3. Introduce a temporary assumption.
4. Clear temporary assumptions (pop).

All operations are domain-restricted to the current contextual possibilities.

What ifs

New analysis of 'what if':

What-ifs are consequent-less conditional questions.

(41) $c + \ulcorner \text{if } \phi \urcorner = c + \ulcorner \text{Assume}(\phi) \urcorner$ (Kaufmann 2000, Isaacs & Rawlins 2008)

(42) $c + \ulcorner \text{what if } \phi \urcorner = c + \ulcorner \text{Assume}(\phi) \urcorner$
Felicitous only if $c + \ulcorner \text{Assume}(\phi) \urcorner$ is **inquisitive**.

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Felicitous only if $c + \ulcorner \text{Assume}(\phi) \urcorner$ is **inquisitive**.

The inquisitivity requirement will often lead to **accommodation** of a QUD, or reuse of a prior QUD.

Re-use of a prior QUD: Challenging *what ifs* revisited

- (43) A: Are you going to the party?
B: No.
A: What if Joanna's there?

Re-use of a prior QUD: Challenging *what ifs* revisited

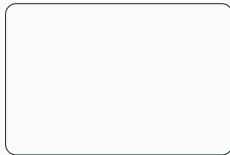
- (43) A: Are you going to the party?
B: No.
A: What if Joanna's there?

Sketch (Rawlins 2010a, Bledin & Rawlins 2016):

- B issues a proposal for updating the common ground, as in Farkas & Bruce (2010).
- A does not accept the proposal, but uses the 'what if' to **resist** B's proposal.
- Supposition draws attention to the possibility that Joanna might be there, which may have been ignored or forgotten before.

Challenging *what ifs* revisited

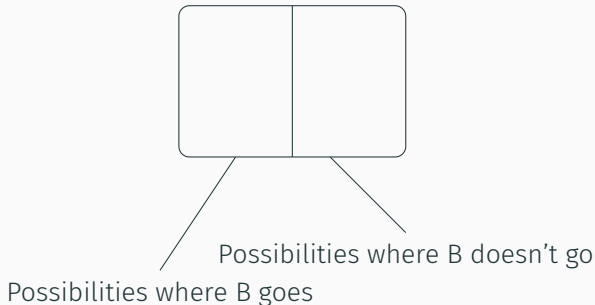
Input context c :



We start as usual.

Challenging *what ifs* revisited

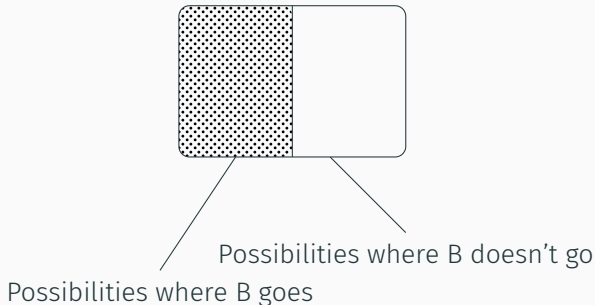
$c \vdash \text{Question}_A(\text{are you going to the party?}) \neg$:



A asks their question and partitions the context.

Challenging *what ifs* revisited

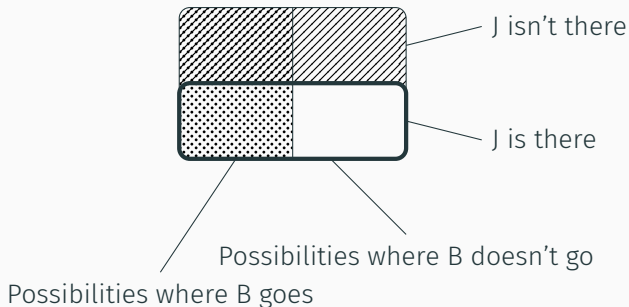
$c + \ulcorner \text{Question}_A(\text{are you going to the party?}) \urcorner + \ulcorner \text{Assert}_B(\text{I'm not going}) \urcorner$:



B **proposes** to exclude some possibilities. Not yet accepted.
(Farkas & Bruce 2010)

Challenging *what ifs* revisited

$c + \ulcorner \text{Question}_A(\text{are you going to the party?}) \urcorner + \ulcorner \text{Assert}_B(\text{I'm not going}) \urcorner + \ulcorner \text{What if}_A \text{ J's there?} \urcorner$



A uses a 'what if' instead of accepting. A's question is **still under discussion**.

Consequential 'what if's

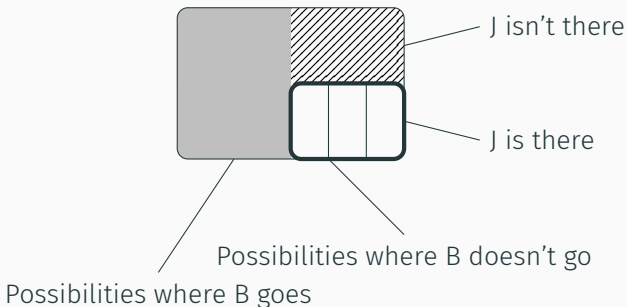
Suppose that the assertion in the previous ex **was** accepted.

- (44) A: Are you going to the party?
B: No.
A: Uh oh, What if Joanna's there?

Consequential 'what if's

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- (44) A: Are you going to the party?
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Accommodate some new QUD??

Generalization

Hypothetical and consequential 'what if's occur when the local overtly triggered QUD is closed, or there is no obviously immediate open QUD at all.

- Proposal: when the topic stack is empty, can accommodate an implicit 'big question'.

What is the world like?

Hypothetical/consequential 'what if's: force accommodation of an implicit 'big question'.

What is the biggest question possible?

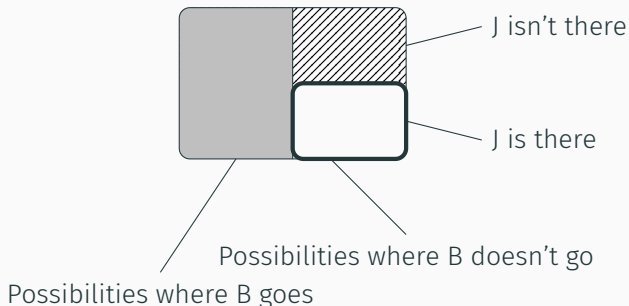
- Hypothetical 'what if's: evidence that it can be quite big. Worst case: every possibility is its own alternative (cf. Ebert et al. 2014 §4.3).

What is the world like?

Hypothetical/consequential 'what if's: force accommodation of an implicit 'big question'.

What is the biggest question possible?

- Hypothetical 'what if's: evidence that it can be quite big. Worst case: every possibility is its own alternative (cf. Ebert et al. 2014 §4.3).

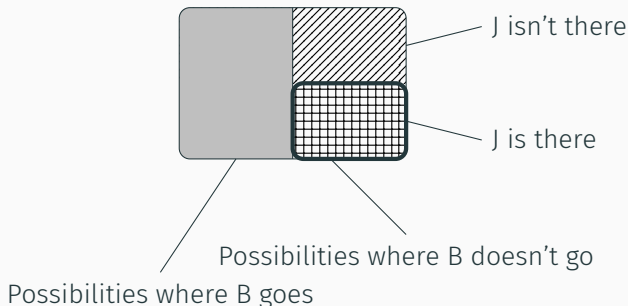


What is the world like?

Hypothetical/consequential 'what if's: force accommodation of an implicit 'big question'.

What is the biggest question possible?

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Hypothetical *what ifs* and non-factual conditional questions

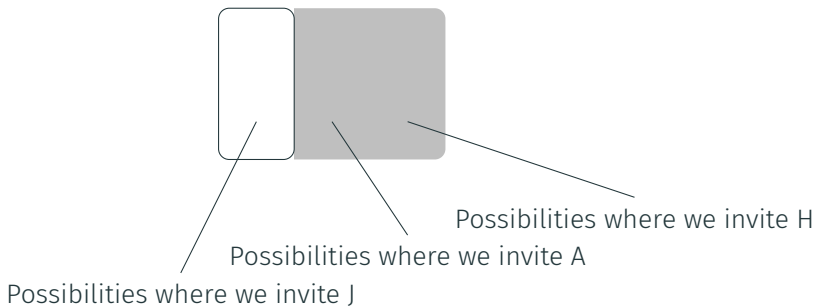
Counterfactuals on a suppositional analysis

Counterfactuals involve another operation: shifting away from the current context.

- von Stechow (2001), Isaacs & Rawlins (2008):
non-monotonically shift context past the ‘**modal horizon**’.
- Basic point: the shifting seen in ‘**what ifs**’ is not substantively different than that seen in regular counterfactuals/subjunctives.
- End up with the discourse topic interpreted against modally remote worlds, i.e. the current question is a **counterfactual QUD** (Ippolito 2013).

Hypothetical *what ifs* and non-factual conditional questions

- (45) What if you hadn't invited Joanna? (Who would you have invited?)



Hypothetical *what ifs* and non-factual conditional questions

we invite
Bolon Dzacab

(45) What if you hadn't invited Joanna? (Who would you have invited?)

we invite
Chomsky

we invite
Napolean

we invite
J+A



we invite
J+Chomsky

Possibilities where we invite H

Possibilities where we invite A

Possibilities where we invite J

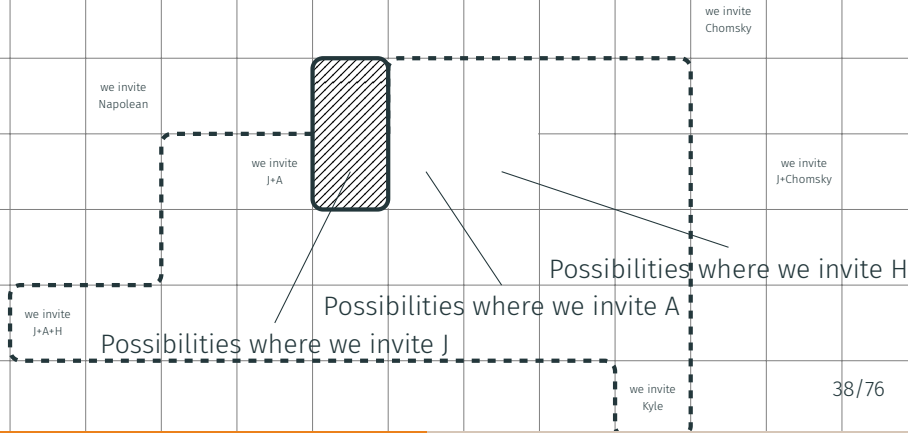
we invite
J+A+H

we invite
Kyle

Hypothetical *what ifs* and non-factual conditional questions

we invite
Bolon Dzacab

(45) What if you hadn't invited Joanna? (Who would you have invited?)



What is the world like?

Hypothetical/consequential 'what if's: force accommodation of an implicit 'big question'.

- **Constraint 1**: often, but not necessarily, anchored at a particular time. (Partition on **historical alternatives** anchored at the 'if'-clause's time in the sense of Kaufmann & Schwager 2009).

What is the world like?

Hypothetical/consequential 'what if's: force accommodation of an implicit 'big question'.

- **Constraint 2:** Bledin & Rawlins (2016): a lower bound on the current QUD is attention – can only 'see' alternatives at the granularity you are attending to.
- Account for forgotten/unlikely possibilities, uncertainty about domain in the style of Yalcin (2008). (See also Lewis 1979, Stalnaker 1984, Rawlins 2008, de Jager 2009, Rawlins 2010a, Klecha 2014, Fritz & Lederman 2015, for related ideas.)

What is the world like?

Hypothetical/consequential 'what if's: force accommodation of an implicit 'big question'.

- The Big Question is rather hard to work with.
- **Constraint 3:** If a more tractable QUD isn't salient, the speaker should offer a usable refinement of the Big Question.
- And they often do!

Side note on QUD salience

Contrast with ‘what about if’ questions – allow implicit antecedents, but must be ones that have been plausibly raised in discourse.

(46) #What about if I entered the atmosphere in my car?

(47) A: Alfonso’s going to the party.

B: ??Uh oh, what about if Joanna is there?

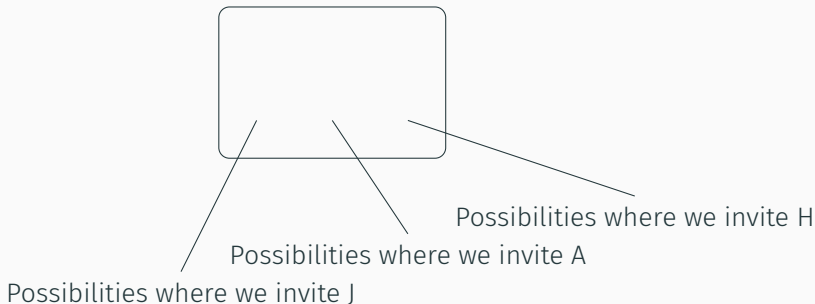
Suggestion uses: generalizing to
decision problems

Two unfinished puzzles

1. What, exactly, to do with suggestion uses?
2. What to do about the intuition that 'what if's are collaborative?

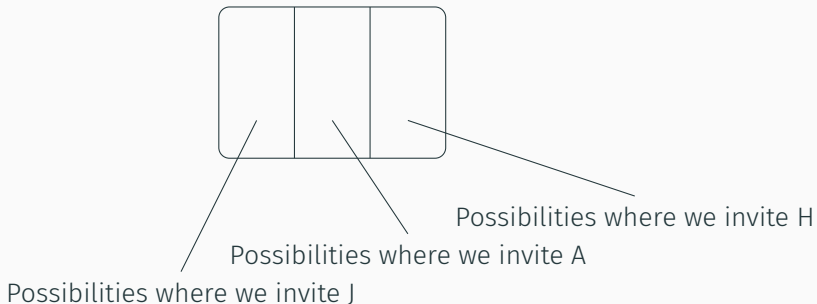
Why suggestion uses are a (familiar) problem

Input context c is just some set of possibilities:



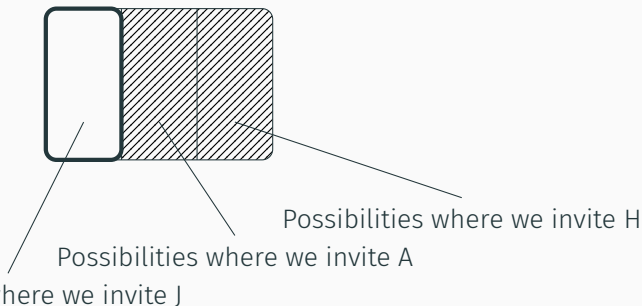
Why suggestion uses are a (familiar) problem

$c + \lceil \text{Question}_A(\text{who should we invite?}) \rceil$:



Why suggestion uses are a (familiar) problem

$c + \lceil \text{Question}_A(\text{who should we invite?}) \rceil + \lceil \text{What if}_B \text{ we invite } J? \rceil$:



Yet another configuration where the current context is **uninquisitive**. This case involves direct response to an unresolved question.

More on suggestion uses

Simple idea 1

Drop the inquisitivity requirement. Current context after supposition is uninquisitive, so question is complete?? **Problem:** answers to suggestion 'what if's.

More on suggestion uses

Simple idea 1

Drop the inquisitiveness requirement. Current context after supposition is uninquisitive, so question is complete?? **Problem:** answers to suggestion 'what if's.

- (48) What if we invite Joanna?
- That's a great idea, let's do it.
 - She would give a good talk.
 - Her talks are too mathematical for this audience.
 - ok / sure.
 - #yes / #no.

More on suggestion uses

Simple idea 2

Current prediction (with a bit more about accommodation): felicitous only if there's an implicit sub-QUD that renders the suppositional context inquisitive.

More on suggestion uses

Simple idea 2

Current prediction (with a bit more about accommodation): felicitous only if there's an implicit sub-QUD that renders the suppositional context inquisitive.

Intuition:

- (49) A: What if we invite Joanna?
implicit: (How would that meet our goals for this talk series?)

More on suggestion uses

Simple idea 2

Current prediction (with a bit more about accommodation): felicitous only if there's an implicit sub-QUD that renders the suppositional context inquisitive.

Problem: too unconstrained, not just any QUDs are available.

(50) A: I wasn't there, who gave the best talk?

B: #What if Joanna did?

e.g.: (What makes a talk good?)

(51) A: I can't see the window, what's the weather like?

B: #What if it's raining?

e.g.: (Where should we go for lunch if it is?)

Generalizing discourse topics

Key intuition

Questions can be asked not just to get information, but to help resolve a **salient decision problem** about actions faced by agents in discourse. (van Rooy 2003)

- ‘What if’s can indicate an unresolved decision problem. (Not just an inquisitive context.)
- Decision problem is instantiated as an immediate conversational (sub-)goal.
- Implementation converges with Roberts (1996, 2012): need to represent both domain goals and conversational goals.

- (52) **Decision problems** are tuples $G = \langle M, S, U \rangle$, where
- $M, S \subseteq \mathcal{P}(W)$.
 - M characterizes a set of possible **actions**.
 - S characterizes a set of possible **states**.
 - U is an ordinal **utility** function $M \times S \rightarrow \mathcal{R}$.

Need to decide among move \times state pairs.

What is an action?

I'm not going to try to pin this down, but large literature exists on planning etc. Some examples:

- opening a window.
- not opening a window.
- making an assertion in discourse.
- changing beliefs.
- ...

We take U to represent the ordering of some agent(s) preferences.

- No indication of strength or intensity.
- (Cf. Condoravdi & Lauer 2012 [preference structures](#), which don't distinguish between moves/states in the same way.)

Decision problems

- Van Rooy's proposal: Some questions can pose not just purely interrogative goals, but more complex decision problems that involve jointly deciding actions and states.

Hypothesis

'What if's are appropriate if there is an unresolved decision problem, not just a QUD.

Resisting imperatives

- (53) A: Open the window.
B: What if it's still raining?

Suppose that imperatives do something like indicate a speaker's **effective preference** for their content (Condoravdi & Lauer 2012), or characterize plans compatible with its content (Charlow 2014a).

Resisting imperatives

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Suppose that imperatives do something like indicate a speaker's **effective preference** for their content (Condoravdi & Lauer 2012), or characterize plans compatible with its content (Charlow 2014a).

B **challenges** A's contribution about what to plan in cases where it is raining:

B's decision problem

	rain, A prefers open	rain, A prefers \neg open	no rain
action: open	1	0	1
action: keep closed	0	1	0

Resisting imperatives

Alternatives determined by decision problem in this context:

$$\left\{ \begin{array}{l} \{w \mid \text{rain, A prefers open in } w\} \cup \{w \mid \text{no rain in } w\}, \\ \{w \mid \text{no rain, A prefers } \neg \text{open in } w\} \end{array} \right\}$$

- Equivalently expressed as a partition on plans, as in Charlow (2014b).
- The 'what if' effectively poses the question: supposing it is raining, what are your preferences?
- N.b. this scenario assumes enough authority that B adopts A's preferences, leading to action.

Suggestion responses

- (54) A: Who should we invite?
B: What if we invite Joanna?

- Suppose that the core goal(/decision problem) is defined by the following utilities:

	state: good talk	state: bad talk
action: invite Alfonso	1	-1
action: invite Joanna	1	-1

Suggestion responses

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- Suppose that the core goal(/decision problem) is defined by the following utilities:

	state: good talk	state: bad talk
action: invite Alfonso	1	-1
action: invite Joanna	1	-1

- To resolve this decision problem under B's supposition, one needs information about whether we are in worlds where Joanna gives a good talk or worlds where she gives a bad talk.

Summary:

- Suggestive 'what if's would be trivial if the QUD were all there is.
- They are appropriate to the extent that agents can infer a salient **decision problem** as a discourse goal, which would lead to inquisitiveness under supposition.
- Decision problem must be relevant to prior QUD.

Felicity conditions on conditionals

Generalization

'if'-clauses need to be topics (in some sense; (Haiman 1978, von Stechow 1994, Ebert et al. 2014, Starr 2014, Biezma & Goebel 2016))

Felicity conditions on conditionals

Generalization

'if'-clauses need to be topics (in some sense; (Haiman 1978, von Stechow 1994, Ebert et al. 2014, Starr 2014, Biezma & Goebel 2016))

Simplest version: 'if'-clause must be relevant to the current question (Starr 2014, Biezma & Goebel 2016).

- 'What if's are in a double bind – discourse pressures tend to lead towards non-inquisitive suppositional contexts, but 'what if' requires inquisitiveness.
- DPs provide strategies for resolving planning questions, and so are licensed without resolving or putting the planning question on hold.

Conclusions

What ifs reviewed

New analysis of 'what if':

What-ifs are consequent-less conditional questions.

(55) $c + \ulcorner \text{if } \phi \urcorner = c + \ulcorner \text{Assume}(\phi) \urcorner$ (Kaufmann 2000, Isaacs & Rawlins 2008)

(56) $c + \ulcorner \text{what if } \phi \urcorner = c + \ulcorner \text{Assume}(\phi) \urcorner$
Felicitous only if $c + \ulcorner \text{Assume}(\phi) \urcorner$ is **inquisitive**.

The inquisitiveness requirement will often lead to **accommodation** of a QUD, or reuse of a prior QUD.

Main points

1. 'What if's are purely suppositional questions.
2. New analysis of 'what if's without a 're-asking' component as in Rawlins (2010a). Crucial: separating QUD/discourse topic from the current question in a specific context.

Main points

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Main points

1. 'What if's are purely suppositional questions.
2. New analysis of 'what if's without a 're-asking' component as in Rawlins (2010a). Crucial: separating QUD/discourse topic from the current question in a specific context.
3. Support for a suppositional analysis of conditionals: **there is no consequent**.
4. To account for the full range of cases, need to generalize regular informational QUD to encompass joint plan+information states.

Future work

- Further licensing constraints on ‘what if’ responses: felicity conditions of ‘if’-clauses in general?
- Many more details of this notion of goal structure remain to be worked out!
- Other morphology that interacts with decision problems? (Davis 2009, ...)
- ‘What about’s:
(57) A: Who should we invite?
B: What about Joanna?
- Other consequentless conditionals: ‘and if’, ‘even if’, ...

Thanks!

My collaborator on the current incarnation of this project, Justin Bledin.

Many, many people for discussion of this and related topics over the years (starting 2005!), including: James Isaacs, Pranav Anand, María Biezma, Cleo Condoravdi, Donka Farkas, Jeroen Groenendijk, Christine Gunlogson, Ruth Kramer, Bill Ladusaw, Mark Norris, Colin Wilson; 2010 audiences at SALT, WCCFL, Rochester; 2016 audiences at the university of Konstanz workshop 'Conditionals at the Crossroads', JHU, the Rutgers unstructured workshop, NASSLLI, SALT, the NY Philosophy of language group, and Justin Bledin's F2016 philosophy of language seminar.

Extra slide: biscuit 'what if's?

- (58) A: What if I'm hungry?
B: There's pizza in the fridge.
- (59) A: What if they ask how old I am?
B: You're 19.

The 'normal' biscuit conditional antecedents license non-subordinate answers for 'what if' questions. (Franke's 'intelligibility' biscuit antecedents don't tend to work.)

Extra slide: two more structural observations

'what if's are unembeddable:

- (60) a. *Alfonso wondered what if it rained.
b. Alfonso wondered, 'what if it rained?'
c. Alfonso wondered what would happen if it rained.

'what if's license NPIs:

- (61) What if we had left any later? Would we have missed the plane?
- (62) What if she ever got mugged? She is a New Yorker and that means she has a contingency plan. (COCA; re Sigourney Weaver)

Appendix: dynamics I

(63) **Contexts**

A context c is a tuple $\langle cs_C, a_C, \mathcal{A}_C, \mathcal{Q}_C \rangle$ where

- $cs_C \subseteq \mathcal{W}$ is a set of worlds (the *context set*)
- $a_C \subseteq \mathcal{W}$ is a set of worlds (the *assumption slot*)
- \mathcal{A}_C is a stack of propositions (the *assertion stack*)
- \mathcal{Q}_C is a stack of sets of propositions (the *topic stack*)

(64) **Answerhood conditions**

Given a question Q that is not yet settled in context c because one or more of its members is not yet evaluated in c (i.e., there is some $P \in Q$ such that $cs_C \cap a_C \not\subseteq P$ and $cs_C \cap a_C \not\subseteq \mathcal{W} - P$):

- P *partially answers* Q in c iff for some alternative $P' \in Q$ that is not yet evaluated in c , P contextually entails P' or P contextually entails $\mathcal{W} - P'$.
- P *completely answers* Q in c iff for each alternative $P' \in Q$, P contextually entails P' or P contextually entails $\mathcal{W} - P'$.

(where P contextually entails P' in c iff $P \cap cs_C \cap a_C \subseteq P'$)

(65) $w \sim_Q v$ iff for each alternative $P \in Q$, $w \in P \equiv v \in P$

(66) **Current QUD**

Where c is a context,

$$\text{QUD}_C = \begin{cases} (cs_C \cap a_C) / \sim_{\text{top}(\mathcal{Q}_C)} & \text{if } \mathcal{Q}_C \neq \langle \rangle \\ \{cs_C \cap a_C\} & \text{otherwise} \end{cases}$$

(67) **Assertive update**

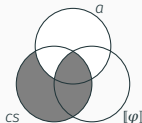
$c + \text{Assert}(\varphi) = \langle cs_C, a_C, \text{push}([\varphi], \mathcal{A}_C), \mathcal{Q}_C \rangle$

Felicity condition: appropriate in c only if

$[\varphi] \cap P = \emptyset$ for some $P \in \text{QUD}_C$.

Appendix: dynamics II

- (68) **Domain-restricted informative update**
 $cs_C \oplus_{a_C} [\varphi] = (cs_C \cap a_C \cap [\varphi]) \cup (cs_C - a_C)$.



- (69) **Confirmation**
 $c + \text{Confirm} = \langle cs_C \oplus_{a_C} \text{top}(\mathcal{A}_C), a_C, \text{pop}(\mathcal{A}_C), \mathcal{Q}_C \rangle$

Defined only if $\mathcal{A}_C \neq \langle \rangle$.

Felicity condition: appropriate in c only if
 $cs_C \oplus_{a_C} \text{top}(\mathcal{A}_C) \neq \emptyset$.

- (70) **Questioning update**
 $c' = c + \text{Question}(\varphi) = \langle cs_C, a_C, \mathcal{A}_C, \text{push}([\varphi], \mathcal{Q}_C) \rangle$

Felicity conditions: appropriate in c only if

a. $|\text{QUD}_{c'}| > 1$

b. if $\mathcal{Q}_C \neq \langle \rangle$, then $\text{QUD}_C \subseteq \text{QUD}_{c'}$

(Inquisitivity)
(Relevance)

- (71) **Assuming**
 $c + \text{Assume}(\varphi) = \langle cs_C, a_C \cap [\varphi], \mathcal{A}_C, \mathcal{Q}_C \rangle$
Defined only if $cs_C \cap a_C \cap [\varphi] \neq \emptyset$.

Appendix: dynamics III

(72) **Clear**

$$c + \text{Clear} = \langle cS_C, \mathcal{W}, \mathcal{A}_C, \mathcal{Q}_C \rangle$$

Defined only if $a_C \neq \mathcal{W}$.

(73) **Dispel**

$$c + \text{Dispel} = \langle cS_C, a_C, \mathcal{A}_C, \text{pop}(\mathcal{Q}_C) \rangle$$

Defined only if $\mathcal{Q}_C \neq \emptyset$.

(74) **Non-triviality**

An update $+X$ is appropriate in c only if at least one of the following conditions fails to hold:

- | | |
|-----------------------|---|
| (i) $cS_{c+X} = cS_C$ | (iii) $\text{top}(\mathcal{A}_{c+X}) = \text{top}(\mathcal{A}_C)$ |
| (ii) $a_{c+X} = a_C$ | (iv) $\text{top}(\mathcal{Q}_{c+X}) = \text{top}(\mathcal{Q}_C)$ |

(75) **What if update**

$$c' = c + \lceil \text{What if } \varphi? \rceil = c + \text{Assume}(\varphi)$$

Felicity condition: appropriate in c only if $|\text{QUD}_{c'}| > 1$

(Inquisitivity)

(76) **Decision problems**

A *decision problem* DP is a tuple $\langle A, S, U \rangle$ where

- $A \subseteq \mathcal{P}(\mathcal{W})$ is a partition of propositions (the *action set*)
- $S \subseteq \mathcal{P}(\mathcal{W})$ is a partition of propositions (the *state space*)
- $U : A \times S \rightarrow \mathbb{R}$ is an *ordinal utility function*

DP is *well-formed* iff for each $a \in A$ and $s \in S$, $a \cap s \neq \emptyset$ (i.e., A and S are “orthogonal” in the sense of Lewis 1988)

Appendix: dynamics IV

(77) **Contexts v. 2**

A context c is a tuple $\langle c_S, a_C, \mathcal{F}_C \rangle$ where $c_S, a_C \subseteq \mathcal{W}$ as before but the table $\mathcal{F}_C = \langle \mathcal{A}_C, \mathcal{G}_C \rangle$ now includes a goal stack \mathcal{G}_C of DPs/sets of propositions in addition to the assertion stack \mathcal{A}_C .

(78) **Current QUD v. 2**

Where c is a context,
$$\text{QUD}_c = \begin{cases} (c_S \cap a_C) / \sim_{\text{top}(\mathcal{G}_{Q_C})} & \text{if } \mathcal{G}_{Q_C} \neq \emptyset \\ \{c_S \cap a_C\} & \text{otherwise} \end{cases}$$

(79) **Restricting DPs**

Given a decision problem $DP = \langle A, S, U \rangle$ and proposition P , $DP \otimes P = \langle A', S', U' \rangle$ where

- $A' = \{a \cap P : a \in A\} - \{\emptyset\}$
- $S' = \{s \cap P : s \in S\} - \{\emptyset\}$
- $U'(a \cap P, s \cap P) = U(a, s)$

(80) **Current DP**

Where c is a context,
$$\text{DP}_c = \begin{cases} \text{top}(\mathcal{G}_{\text{DP}_c}) \otimes (c_S \cap a_C) & \text{if } \mathcal{G}_{\text{DP}_c} \neq \emptyset \\ \text{undefined} & \text{otherwise} \end{cases}$$

(81) **Current goal**

Where c is a context,
$$\text{G}_c = \begin{cases} \text{DP}_c & \text{if } \mathcal{G}_c \neq \emptyset \text{ and } \text{top}(\mathcal{G}_c) = \text{top}(\mathcal{G}_{\text{DP}_c}) \\ \text{QUD}_c & \text{otherwise} \end{cases}$$

(82) **Best action sets (BASes; van Rooy 2003)**

Given a decision problem $DP = \langle A, S, U \rangle$:

- The *best action set* for $a \in A$ is $a^* = \{s : U(a, s) \geq U(a', s) \text{ for all } a' \in A\}$
- The *best action set* for DP is $Q_{DP} = \{\cup a^* : a \in A\}$

Appendix: dynamics V

(83) **Resolved DPs**

- a. DP is resolved iff $\bigcup S \in Q_{DP}$
- b. DP is resolved in c iff $DP_{\otimes}(cs_C \cap a_C)$ is resolved.

(84) **Resolution conditions**

Given a decision problem DP that is not yet resolved in c and a proposition P wholly about the state space of $DP_{\otimes}(cs_C \cap a_C)$:

- a. P resolves DP in c iff DP is resolved in $\langle cs_C \oplus_{a_C} P, a_C, \mathcal{F}_C \rangle$.
- b. P helps to resolve DP in c iff there is an action a and state s of $DP_{\otimes}(cs_C \cap a_C)$ where
 1. there is no b s.t. $a^* \subsetneq b^*$ (a is in play)
 2. $s \in S - a^*$ (s is a conflict state where a is suboptimal)
 3. $P \cap s = \emptyset$ (P excludes s)

(85) **Relevance for current QUDs and DPs**

- a. If the current goal G_C is an unsettled question QUD_C and a speech act is performed that results in a new question Q being pushed onto the goal stack, then any proposition that completely answers Q (in the sense of ((64)-b)) must partially answer QUD_C in c (in the sense of ((64)-a)).
- b. If the current goal G_C is an unresolved decision problem DP_C and a speech act is performed that results in a new question Q being pushed onto the goal stack, then any proposition that completely answers Q must help to resolve DP_C in c (in the sense of ((84)-b)).

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