Asking *What-Ifs*

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(Joint work with Justin Bledin, JHU Philosophy.)

What If: The Semantics, Pragmatics, & Psychology of Counterfactuals
20th May, 2017, University of Toronto
Slides also on my website.
Hypothetical *what if*s

(1) What if Napolean had won at Waterloo?
Hypothetical *what ifs*

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(2) A: What if cats could text?
Hypothetical *what ifs*

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(2) A: What if cats could text?
   B: They’d be constantly messaging about food.
   B: They’d demand even more attention.
Hypothetical *what if*s

(1)  What if Napolean had won at Waterloo?

(2)  A:  What if cats could text?  
      B:  They’d be constantly messaging about food. 
      B:  They’d demand even more attention.

The internet provides:

![Image of a text message conversation](image-url)

- Come home. There's an emergency.
- What?? Are you ok?
- My food bowl is half empty.
- I'll be home soon.
- You wish starvation upon me.
- Stop being so dramatic.
- Am weak. Can hardly type.
- Goodbye.
Hypothetical *what if* s

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?
Hypothetical *what ifs*

Many examples on XKCD’s ‘what if’ site:

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b. What if you built a siphon from the oceans on 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 if*s

(Rawlins 2010a: *Conversational Backoff*)

(7) A: I’m not going to go the party.
    B: What if Joanna is there? (Are you sure?)
(Rawlins 2010a: Conversational Backoff)

(7) A: I’m not going to go the party.
B: What if Joanna is there? (Are you sure?)

(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)
(Rawlins 2010a: Conversational Backoff)

(7) A: I’m not going to go the party.
     B: What if Joanna is there? (Are you sure?)

(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)

(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 if* s

- 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 if* s

(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 if* s

<table>
<thead>
<tr>
<th>Type</th>
<th>function</th>
<th>antecedent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypothetical</td>
<td>ask about consequences of some outlandish possibility</td>
<td>none?</td>
</tr>
<tr>
<td>Consequential</td>
<td>ask about consequences of some ordinary possibility</td>
<td>informational</td>
</tr>
<tr>
<td>Challenging</td>
<td>double check hearer’s commitment to some claim</td>
<td>informational</td>
</tr>
<tr>
<td>Suggestive</td>
<td>suggest the resolution for some issue</td>
<td>question</td>
</tr>
</tbody>
</table>

How to capture all this??
Observation
There is no stable full conditional question paraphrase across all uses.

Some attempts:

(15) What 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)
Observation
There is no stable full conditional question paraphrase across all uses.

Some attempts:

(15) What 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)

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?
Idiosyncratic ‘what’

Restricted to just ‘what’:

(18)  What if we invite Joanna?

(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 Fintel 1994, Herburger, a.o.)

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

(25) *What only if we invite Joanna?
The ‘if’-clause, externally

Only if conditionals (von Fintel 1994, Herburger, a.o.)
(24) What would happen only if we invite Joanna?
(25) *What only if we invite Joanna?

Unconditionals (Rawlins 2013 a.o.)
(26) What would happen whether or not we invite Joanna?
(27) *What whether or not we invite Joanna?
The ‘if’-clause, externally

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

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

Unconditionals (Rawlins 2013 a.o.)

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

Other complementizers:

(28)  *What when a farmer owns a donkey?
(29)  *What if and when we invite Joanna?
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 internals of the ‘if’-clause are characteristic of ‘if’-clause adjuncts.

Counterfactuals, subjunctive:

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


(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
‘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 eliminates possibilities (worlds) from the context.

(35)  We will invite Joanna.

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

- Possibilities where we invite $J$
- Possibilities where we invite $A$
- Possibilities where we invite $H$
Asserting eliminates possibilities (worlds) from the context.

(35) We will invite Joanna.

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

- Possibilities where we invite H
- Possibilities where we invite A
- Possibilities where we invite J
Questioning (simplified)

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

(36) Who will you invite?

Input context $c$ is just some set of possibilities:

- Possibilities where we invite $J$
- Possibilities where we invite $A$
- Possibilities where we invite $H$
Questioning partitions the context into exhaustive choices (Groenendijk 1999 etc)

(36) Who will you invite?

\[c + \text{Question(who will you invite?)}\]

- Possibilities where we invite J
- Possibilities where we invite A
- Possibilities where we invite H
I will distinguish between the question as a discourse topic and the current question in context.

A question in context is domain restricted:

- Possibilities where we invite J
- Possibilities where we invite A
- Possibilities where we invite H
I will distinguish between the question as a discourse topic and the current question in context.

"Who will you invite?" semantically allows many choices!

Possibilities where we invite J
Possibilities where we invite A
Possibilities where we invite H
Possibilities where we invite J+A
Possibilities where we invite J+Chomsky
Possibilities where we invite J+A+H
Possibilities where we invite J+A+H+H

we invite Napoleon
we invite J+A
we invite J+Chomsky
we invite Napoleon
we invite Bolon Dzacab

(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) \( c + \neg \neg \text{if } \phi \neg = c + \neg \neg \text{Assume}(\phi) \neg \) (Kaufmann 2000, Isaacs & Rawlins 2008)

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

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

If we don’t invite Joanna, we will invite Alfonso.

Input context $c$ is just some set of possibilities:

We start as usual.
(39) If we don’t invite Joanna, we will invite Alfonso.

$\text{c+}\lnot\text{Assume(we don’t invite J)}\rhd$:

1. $\lnot\text{Assume}$ introduces a temporary context restriction.
The suppositional analysis of conditionals

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

$C^+ \neg \text{Assume}(\text{we don’t invite } J) + \neg \text{Assert}(\text{we invite } A)$:

2. $\neg \text{Assert}$ eliminates possibilities from (only) the current context.
The suppositional analysis of conditionals

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

$c+$⌜Assume(we don’t invite J)$\downarrow + $⌜Assert(we invite A)$\downarrow + $⌜pop$$\downarrow$:

Possibilities where we invite J
Possibilities where we invite A
Possibilities where we invite H

3. $⌜pop$$\downarrow$ 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.
(40) A: If you don’t invite Joanna, who will you invite?
B: We will invite Alfonso.

c+ΓAssume_A(you don’t invite J)Γ:

1. 「Assume_A」 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+ΓAssume_A(you don’t invite J)∩ + ΓQuestion_A(who do you invite)∩:

2. ΓQuestion_A∩ partitions (only) the current context.
(40) A: If you don’t invite Joanna, who will you invite?  
B: We will invite Alfonso.

c+ refute\(A\) (you don’t invite J) \(\sim\) + refute\(Q\) (who do you invite) \(\sim\) + refute\(B\) (we invite A) \(\sim\)

3. refute\(B\) \(\sim\) 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.

\[
\text{c+} \neg \text{Assume}_A(\text{you don’t invite J}) + \neg \text{Question}_A(\text{who do you invite}) + \neg \text{Assert}_B(\text{we invite A})
\]

3.5. The question is now completely resolved in context – the current context is uninquisitive.
(40)  A: If you don’t invite Joanna, who will you invite?  
   B: We will invite Alfonso.

c+ Assume\(_A\) (you don’t invite J)\(\forall\) + Question\(_A\) (who do you invite)\(\forall\) + Assert\(_B\) (we invite A)\(\forall\) + Pop\(\forall\):

Possibilities where we invite J
Possibilities where we invite H
Possibilities where we invite A
Possibilities where we invite J

4. Pop\(\forall\) gets rid of a temporary context restriction.
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.

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

New analysis of ‘what if’:
What-if’s are consequent-less conditional questions.

(41)  \[ c + \neg \text{if } \phi = c + \neg \text{Assume}(\phi) \] (Kaufmann 2000, Isaacs & Rawlins 2008)

(42)  \[ c + \neg \text{what if } \phi = c + \neg \text{Assume}(\phi) \]
Felicitous only if \[ c + \neg \text{Assume}(\phi) \] is inquisitive.
New analysis of ‘what if’:

What-ifs are consequent-less conditional questions.

(41) \[ c + \neg \text{if } \phi \neg = c + \neg \text{Assume}(\phi) \neg \] (Kaufmann 2000, Isaacs & Rawlins 2008)

(42) \[ c + \neg \text{what if } \phi \neg = c + \neg \text{Assume}(\phi) \neg \]
Felicitous only if \[ c + \neg \text{Assume}(\phi) \neg \] is inquisitive.

The inquisitiveness requirement will often lead to accommodation of a QUD, or reuse of a prior QUD.
Re-use of a prior QUD: Challenging *what if*s 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.
Input context $c$:

We start as usual.
Challenging *what if*s revisited

Question$_A$(are you going to the party?):

- Possibilities where B goes
- Possibilities where B doesn’t go

A asks their question and partitions the context.
Challenging *what if*s revisited

\[ c + \neg \text{Question}_A(\text{are you going to the party?}) + \neg \text{Assert}_B(\text{I’m not going}) \]:

Possibilities where B doesn’t go

Possibilities where B goes

B proposes to exclude some possibilities. Not yet accepted. (Farkas & Bruce 2010)
Challenging *what if*s revisited

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

- J isn’t there
- J is there

Possibilities where B goes
- Possibilities where B doesn’t go

A uses a ‘what if’ instead of accepting. A’s question is still under discussion.
Suppose that the assertion in the previous example was accepted.

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

Possibilities where B goes

J is there

J isn’t there

Possibilities where B doesn’t go

Possibilities where B goes

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).
Hypothetical/consequential ‘what if’ s: force accommodation of an implicit ‘big question’.

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- 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).
Counterfactuals on a suppositional analysis

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

- Basic point: the shifting seen in `what if`'s 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 if* s and non-factual conditional questions

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

Possibilities where we invite H
Possibilities where we invite A
Possibilities where we invite J
Hypothetical *what if* s and non-factual conditional questions

(45) What if you hadn’t invited Joanna? (Who would you have invited?)
Hypothetical *what if* s and non-factual conditional questions

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

Possibilities where we invite Napoleon

Possibilities where we invite J+A

Possibilities where we invite J+Chomsky

Possibilities where we invite J+H

Possibilities where we invite Kyle

Possibilities where we invite Napoleon

Possibilities where we invite J+A

Possibilities where we invite J+Chomsky

Possibilities where we invite J+H

Possibilities where we invite Kyle
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.

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!
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:

- Possibilities where we invite H
- Possibilities where we invite A
- Possibilities where we invite J
- Possibilities where we invite J
Why suggestion uses are a (familiar) problem

$\mathcal{C} + \Gamma \text{Question}_A(\text{who should we invite?}) \vdash$

Possibilities where we invite J
Possibilities where we invite A
Possibilities where we invite H
Why suggestion uses are a (familiar) problem

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

Possibilities where we invite $H$
Possibilities where we invite $A$
Possibilities where we invite $J$

Yet another configuration where the current context is uninquisitive. This case involves direct response to an unresolved question.
Simple idea 1

Drop the inquisitiveness 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?
   a. That’s a great idea, let’s do it.
   b. She would give a good talk.
   c. Her talks are too mathematical for this audience.
   d. ok / sure.
   e. #yes / #no.
Simple idea 2

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

a. $M, S \subseteq \mathcal{P}(W)$.

b. $M$ characterizes a set of possible **actions**.

c. $S$ characterizes a set of possible **states**.

d. $U$ is an ordinal **utility** function $M \times S \rightarrow \mathbb{R}$.

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.)
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.
(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).
(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).

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

B’s decision problem

<table>
<thead>
<tr>
<th></th>
<th>rain,</th>
<th>rain,</th>
<th>no rain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A prefers open</td>
<td>A prefers (\lnot) open</td>
<td></td>
</tr>
<tr>
<td>action: open</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>action: keep closed</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
Resisting imperatives

Alternatives determined by decision problem in this context:

\[
\begin{cases}
  \{w | \text{rain, } A \text{ prefers open in } w\} \cup \{w | \text{no rain in } w\}, \\
  \{w | \text{no rain, } A \text{ prefers } \neg \text{open in } w\}
\end{cases}
\]

- 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.
(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:

<table>
<thead>
<tr>
<th></th>
<th>state: good talk</th>
<th>state: bad talk</th>
</tr>
</thead>
<tbody>
<tr>
<td>action: invite Alfonso</td>
<td>1</td>
<td>-1</td>
</tr>
<tr>
<td>action: invite Joanna</td>
<td>1</td>
<td>-1</td>
</tr>
</tbody>
</table>
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:

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<tr>
<td>action: invite Joanna</td>
<td>1</td>
<td>-1</td>
</tr>
</tbody>
</table>

• 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

<table>
<thead>
<tr>
<th>Generalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘if’-clauses need to be topics (in some sense; (Haiman 1978, von Fintel 1994, Ebert et al. 2014, Starr 2014, Biezma &amp; Goebel 2016)</td>
</tr>
</tbody>
</table>
Felicity conditions on conditionals

Generalization

‘if’-clauses need to be topics (in some sense; (Haiman 1978, von Fintel 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
New analysis of ‘what if’: What-ifs are consequent-less conditional questions.

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

(56)  $c + \neg \text{what if } \phi = c + \neg \text{Assume}(\phi)$

Felicitous only if $c + \neg \text{Assume}(\phi)$ 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.

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3. Support for a suppositional analysis of conditionals: there is no consequent.
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1. ‘What if’ s are purely suppositional questions.


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.
(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.)
‘what if’ 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’ 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 $\langle cs_c, a_c, A_c, Q_c \rangle$ where
a. $cs_c \subseteq W$ is a set of worlds (the context set)
b. $a_c \subseteq W$ is a set of worlds (the assumption slot)
c. $A_c$ is a stack of propositions (the assertion stack)
d. $Q_c$ 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 $cs_c \cap a_c \not\subseteq W - P$):

a. $P$ 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 $W - P'$.
b. $P$ completely answers $Q$ in $c$ iff for each alternative $P' \in Q$, $P$ contextually entails $P'$ or $P$ contextually entails $W - P'$.

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

(66) Current QUD
Where $c$ is a context,

$$QUD_c = \begin{cases} (cs_c \cap a_c) / \sim_{top}(Q_c) & \text{if } Q_c \neq \emptyset \\ \{cs_c \cap a_c\} & \text{otherwise} \end{cases}$$

(67) Assertive update
$c + \text{Assert}(\phi) = \langle cs_c, a_c, \text{push}(\llbracket \phi \rrbracket, A_c), Q_c \rangle$

Felicity condition: appropriate in $c$ only if $\llbracket \phi \rrbracket \cap P = \emptyset$ for some $P \in QUD_c$. 
Appendix: dynamics II

(68) Domain-restricted informative update
\[ c_{SC} \oplus a_{C} \langle \phi \rangle = (c_{SC} \cap a_{C} \cap \langle \phi \rangle) \cup (c_{SC} - a_{C}). \]

(69) Confirmation
\[ c + \text{Confirm} = \langle c_{SC} \oplus a_{C} \text{top}(\mathcal{A}_{C}), a_{C}, \text{pop}(\mathcal{A}_{C}), \mathcal{O}_{C} \rangle \]
Defined only if \( \mathcal{A}_{C} \neq \emptyset \).
Felicity condition: appropriate in \( c \) only if \( c_{SC} \oplus a_{C} \text{top}(\mathcal{A}_{C}) \neq \emptyset \).

(70) Questioning update
\[ c' = c + \text{Question}(\phi) = \langle c_{SC}, a_{C}, \mathcal{A}_{C}, \text{push}(\lceil \phi \rceil), \mathcal{O}_{C} \rangle \]
Felicity conditions: appropriate in \( c \) only if
a. \( |\text{QUD}_{C'}| > 1 \)
\[ \text{(Inquisitiveness)} \]
b. if \( \mathcal{O}_{C} \neq \emptyset \), then \( \text{QUD}_{C} \subseteq \text{QUD}_{C'} \)
\[ \text{(Relevance)} \]

(71) Assuming
\[ c + \text{Assume}(\phi) = \langle c_{SC}, a_{C} \cap \langle \phi \rangle, \mathcal{A}_{C}, \mathcal{O}_{C} \rangle \]
Defined only if \( c_{SC} \cap a_{C} \cap \langle \phi \rangle \neq \emptyset \).
Appendix: dynamics III

(72) Clear
\[ c + \text{Clear} = \langle c_{sc}, W, A_{C}, \mathcal{D}_C \rangle \]
Defined only if \( a_C \neq W \).

(73) Dispel
\[ c + \text{Dispel} = \langle c_{sc}, a_{c}, A_{C}, \text{pop}(\mathcal{D}_C) \rangle \]
Defined only if \( \mathcal{D}_C \neq \emptyset \).

(74) Non-triviality
An update \( +X \) is appropriate in \( c \) only if at least one of the following conditions fails to hold:

\begin{align*}
\text{(i)} & \quad c_{sc+X} = c_{sc} \\
\text{(ii)} & \quad a_{c+X} = a_{c} \\
\text{(iii)} & \quad \text{top}(A_{C+X}) = \text{top}(A_{C}) \\
\text{(iv)} & \quad \text{top}(\mathcal{D}_{C+X}) = \text{top}(\mathcal{D}_{C})
\end{align*}

(75) What if update
\[ c' = c + \lceil \text{What if } \varphi ? \rceil = c + \text{Assume}(\varphi) \]
Felicity condition: appropriate in \( c \) only if \( |\text{QUD}_{c'}| > 1 \) \quad \text{(Inquisitivity)}

(76) Decision problems
A decision problem \( DP \) is a tuple \( \langle A, S, U \rangle \) where
\begin{enumerate}
\item \quad \( A \subseteq \mathcal{P}(W) \) is a partition of propositions (the action set)
\item \quad \( S \subseteq \mathcal{P}(W) \) is a partition of propositions (the state space)
\item \quad \( U : A \times S \rightarrow \mathbb{R} \) is an ordinal utility function
\end{enumerate}
\( DP \) 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 \( (c_{sc}, a_{c}, T_{c}) \) where \( c_{sc}, a_{c} \subseteq W \) as before but the table \( T_{c} = (A_{c}, G_{c}) \) now includes a goal stack \( G_{c} \) of DPs/sets of propositions in addition to the assertion stack \( A_{c} \).

(78) **Current QUD v. 2**
Where \( c \) is a context, \( \text{QUD}_{c} = \begin{cases} (c_{sc} \cap a_{c})/\sim \text{top}(G_{Q_{c}}) & \text{if } G_{Q_{c}} \neq \emptyset \\ (c_{sc} \cap a_{c}) & \text{otherwise} \end{cases} \)

(79) **Restricting DPs**
Given a decision problem \( DP = (A, S, U) \) and proposition \( P \), \( DP \otimes P = (A', S', U') \) where

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

(80) **Current DP**
Where \( c \) is a context, \( \text{DP}_{c} = \begin{cases} \text{top}(G_{DP_{c}}) \otimes (c_{sc} \cap a_{c}) & \text{if } G_{DP_{c}} \neq \emptyset \\ \text{undefined} & \text{otherwise} \end{cases} \)

(81) **Current goal**
Where \( c \) is a context, \( G_{c} = \begin{cases} \text{DP}_{c} & \text{if } G_{c} \neq \emptyset \text{ and } \text{top}(G_{c}) = \text{top}(G_{DP_{c}}) \\ \text{QUD}_{c} & \text{otherwise} \end{cases} \)

(82) **Best action sets** (BASes; van Rooy 2003)
Given a decision problem \( DP = (A, S, U) \):

a. The best action set for \( a \in A \) is
   \( a^* = \{s : U(a, s) \geq U(a', s) \text{ for all } a' \in A\} \)
b. The best action set for \( DP \) is \( Q_{DP} = \bigcup a^* : a \in A \)
Resolved DPs

a. *DP is resolved* iff \( \bigcup S \in Q_{DP} \)

b. *DP is resolved in c* iff \( DP \circ (cs_c \cap a_c) \) is resolved.

Resolution conditions

Given a decision problem \( DP \) that is not yet resolved in \( c \) and a proposition \( P \) wholly about the state space of \( DP \circ (cs_c \cap a_c) \):

a. \( P \) resolves \( DP \) in \( c \) iff \( DP \) is resolved in \( \langle cs_c \oplus a_c, P_a, T_c \rangle \).

b. \( P \) helps to resolve \( DP \) in \( c \) iff there is an action \( a \) and state \( s \) of \( DP \circ (cs_c \cap a_c) \) where

1. there is no \( b \) s.t. \( a^* \subseteq b^* \) (*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 \( s \))

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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