Unconditionals and conditionality

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0 Overview

- "If"-conditionals: one of the best-studied constructions in natural language semantics.

(1) If you make a salad, you should put feta cheese on it.

- However, vast inventory of conditional-like constructions in natural language, many of which don't involve "if". Two examples:

(2) Standing on a chair, Alfonso can touch the ceiling. (Stump 1985)

(3) To get to Harlem, you have to take the A-train. (von Fintel and Iatridou 2005 inter alia)

- Larger goal: develop a theory of conditional meaning that explains both what is similar, and what is different among varieties of conditional adjuncts.
- **Proposal (similarities)**: a conditional adjunct is any adjunct that serves to restrict the contextual domain of operators in its scope (Rawlins 2008).
  - Generalization of the Lewis-Kratzer-Heim analysis of "if"-conditionals as domain restrictors. (Lewis 1975, Kratzer 1977, 1981, 1986, Heim 1982, Partee 1991, von Fintel 1994)
- **Proposal (differences)**: variation in meaning of conditional adjuncts is caused by differences in internal structure of adjunct (conditional uniformity hypothesis).
- Means: case study of "if"-conditionals vs. unconditionals.

"If"-conditional	(4)	If you make a pizza or a calzone, you should put mushrooms in it.
Alternative unconditional	(5)	Whether you make a pizza or a calzone, you should put mushrooms in it.
Alternative unconditional	(6)	Whether you make a pizza or not, you should put mushrooms in the entree.
Constituent unconditional	(7)	Whatever entree you make, you should put mushrooms in it.
Headed unconditional	(5)	No matter what you make, you should put mushrooms on it.

- How are unconditionals related to "if"-conditionals?
  - Prior researchers agree that they are related, but no agreement as to how. (König 1986, Zaefferer 1990, 1991, Lin 1996, Haspelmath and König 1998, Izvorski 2000a,b, Gawron 2001, Huddleston and Pullum 2002). Most worked-out compositional account (Gawron 2001) defers the issue.
  - Proposal: the two constructions involve temporary restriction of a contextual domain.
  - Semantic composition of adjunct with main clause proceeds by identical principles for each construction.
- What is the internal structure of an unconditional adjunct, and how does this affect its interpretation?
  - 3 previous ideas: interrogative structure (Zaefferer 1990, Lin 1996), free relative structure (Dayal 1997, Izvorski 2000a,b), or something in between (Gawron 2001).
  - (Note: Izvorski 2000a,b assumes FR structure, but argues that this is a CP, and involves a question semantics.)
  - My claim: interrogative structure, matching that of an alternative or "wh-ever" interrogative.
  - Semantics & pragmatics of such structures leads compositionally to semantics of unconditional.

Agenda:

- More details about semantic and pragmatic properties.
- Sketch proposal for unification of "if"-conditionals and unconditionals.
- Pieces of analysis: motivation for interrogative syntax, semantics of alternative and "-ever" questions, interaction of interrogative and conditional structures.
- Detailed implementation of analysis (time permitting).

1 Semantic and pragmatic properties

- **Main desideratum #1:** Unconditionals entail their consequent.[1]

(9) Whether Alfonso or Joanna brings the salad, it will have feta cheese in it.
Entails: The salad will have feta cheese in it.

(10) Compare: If Alfonso or Joanna brings the salad, it will have feta cheese in it.

- Unconditionals have a close paraphrase involving a sequence of "if"-conditionals (König 1986, Lin 1996):

(11) If Alfonso brings the salad, it will have feta cheese in it, and if Joanna brings the salad, it will have feta cheese in it.

1.1 Indifference and ignorance

- **Main desiderata #2:** Unconditionals convey *relational indifference*.

(12) Whether Alfonso or Joanna comes to the party, it will be fun.
Conveys: it doesn't matter who comes

(13) Whoever comes to the party, it will be fun. Conveys: it doesn't matter who comes

- Relational – it may matter for many other purposes who comes to the party.
  - But not for the issue of whether the party will be fun.
- Relational indifference is the main at-issue contribution of an unconditional.
  - Not a presupposition, implicature. Exercise left to reader. Similar to "n'importe qu", cf. Zabbal 2004.
- In addition, unconditionals (especially with past antecedents) characteristically convey ignorance:

[1] This makes them similar to but still different from "concessive conditionals", which in English are expressed with "even if". These can, but do not have to, entail their consequent, depending on the scale structure involved. (They also involve something like the indifference implication.) Exx. from Guerzoni and Lim 2007:

(i) Even if the bridge were standing I wouldn't cross.

(ii) Even if John drank [$_F$ one ounce] of whiskey she would fire him.

This also makes them similar to headed unconditionals, which in Rawlins 2008 I analyze in a parallel way:

(iii) Regardless of/no matter who comes to the party, it'll be fun.

(14) Whether Alfonso or Joanna came to the party, it must have been fun.
Conveys: it doesn't matter (for funness) which one came, and the speaker doesn't know.

(15) Whoever came to the party, it must have been fun.
Conveys: it doesn't matter who came, and the speaker doesn't know.

1.2 Indifference in discourse

- Characteristic discourse use: avoid taking a stance on an issue, while moving the discourse forward.

(16) Scenario: Judges discussing who to award a prize to in a cooking competition.
A: Lisa had the best dessert.
B: Whether or not it was the best dessert, Stephanie had the best over-all meal.
B': Whoever made the best dessert, Stephanie had the best over-all meal.

- B even avoids agreeing to A's claim.

1.3 Domain (un)restriction

- Lewis 1975, Kratzer 1978, 1986: "if"-clauses have a restricting effect on quantificational domain of nearby operators (modals, adverbs of quantification).

(17) The party *should* be fun.

(18) If Alfonso comes to the party, it *should* be fun.

- Unconditionals and domain interaction:

(19) Whether Alfonso or Joanna comes to the party, it *should* be fun.

(20) Whoever comes to the party, it *should* be fun.

- **Main desiderata #3:** Domain must include all (possible) alternatives. "Unrestriction"
- Restriction vs. unrestriction:

(21) a. # Whether Alfonso or Joanna comes to the party, if Alfonso comes, it *should* be fun.
b. # Whoever comes to the party, if Alfonso comes, it *should* be fun.

(22) Compare:
a. Whether Henry or Joanna comes to the party, if Alfonso comes, it *should* be fun.
b. Whoever else comes to the party, if Alfonso comes to the party, it *should* be fun.

Unconditionals keep a quantificational domain open.

2 A semantics for unconditionals

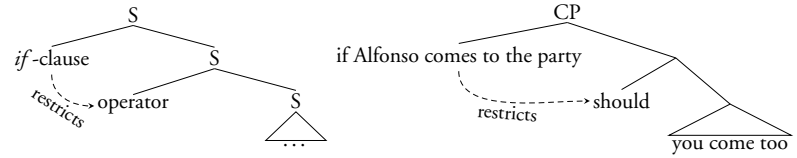
- Proposal: compositional interaction of the meaning of a conditional structure, and the meaning of an interrogative structure, lead to an understanding of unconditionals and their relation to "if"-conditionals.

- Lewis/Kratzer/Heim theory of conditionals (LKH): the semantic function of an "if"-clause is to restrict the domain of a quantificational operator (Lewis 1975/Kratzer 1981, 1986, etc./Heim 1982, Farkas and Sugioka 1983, Partee 1991).

(23) If it rains very hard, my roof *always* leaks.

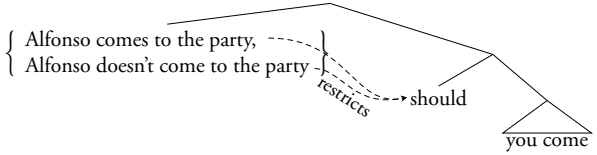
(24) If Alfonso comes to the party, you *should* come too.

(25)

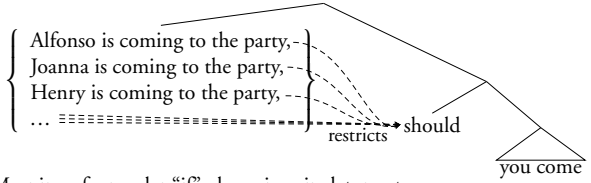


- **The effect of a semantics for interrogatives**: An unconditional adjunct provides not just one but a set of domain restrictions.
- Compositional Hamblin semantics (Hamblin 1973, Kratzer and Shimoyama 2002) provide a generalized mode of meaning combination – *pointwise* combination. (Pointwise function application.)
  - Following Alonso-Ovalle 2004, 2006, 2007, 2009 on counterfactuals with disjunctive antecedents.

(26) Whether Alfonso comes to the party or not, you should come.

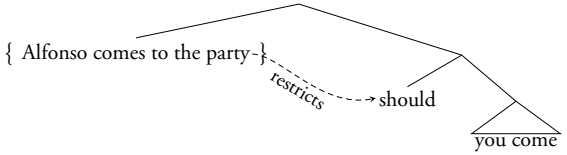


(27) Whoever (else) is coming to the party, you should come.



- Meaning of a regular "if"-clause is a singleton set.
  - When two singleton sets combine, pointwise combination reduces to regular semantic combination.
  - "if"-conditionals behave as we want – behavior reduces to standard LKH analysis.

(28) If Alfonso comes to the party, you should come.



- Analysis realizes the intuition about paraphrase with multiple "if"-conditionals.

- Because of question meaning, alternatives quantified over will be exhaustive.
- Exhaustivity presupposition in the context of a conditional structure: amounts to presupposing that we are looking at every possible way of restricting the domain.
  - (In the context of a regular question, simply constrains possible answers.)
- Because of meaning of modal, each conditional claim will be non-trivial.
- Consequences:
  - Exhaustive set of non-trivial conditional claims – it doesn't matter what domain restrictions we make, the main clause is true!
  - Derives both the contribution of indifference, and the fact that unconditionals entail their consequent.

Details to fill in:

- ☐ Interrogative syntax
- ☐ Semantics for alternative questions
- ☐ Semantics for *-ever* questions
- ☐ Semantics for conditionals
- ☐ A question meaning in a conditional adjunct
- ☐ Composition of adjunct with main clause
- ☐ Detailed implementation

3 Unconditional adjuncts as interrogatives

- Compositional analysis ⊨ semantics follows from syntax.
  - What is the syntax of an unconditional adjunct?

3.1 Alternative unconditionals

- Alternative interrogative structure.
- Structural properties: disjunction, interrogative syntax/morphology.
- Intonational properties: pitch accents on non-final disjuncts, final falling pitch H*L⁻L% (Bartels 1999, Pruitt 2008). Pruitt: Final falling pitch main component.

(29) Would you like decaf or regular?

(30) Alfonso wondered whether he should take the exam now or in the fall.

(31) Whether you want decaf or regular, I need to brew a new pot.

(32) Whether he takes the exam now or in the fall, he will do well.

- Test: Characteristic properties of embedded alternative interrogatives. TP ellipsis following negation ("or not"; cf. Merchant 2003), and the unexpected leftward appearance of "or not".

(33) Alfonso wondered whether the party was cancelled or was not cancelled.

(34) Alfonso wondered whether the party was cancelled *or not*.

(35) Alfonso wondered whether *or not* the party was cancelled.

- Alternative unconditionals show the same pattern:

(36) Whether the party is cancelled or is not cancelled, we should go out tonight.

(37) Whether the party is cancelled *or not*, we should go out tonight.

(38) Whether *or not* the party is cancelled, we should go out tonight.

- In general: no properties to distinguish alternative interrogatives from alternative unconditional adjuncts.[2]
- This is a good time to note the following facts:

(39) * Whether the party is canceled, we should go out tonight.

(40) * Whether Alfonso brings a salad or an entree H*, it will be good. (polar interrogative with disjunction)

(41) * Whether Alfonso brings a salad H*, or an entree H*, it will be good. (Roelofsen and van Gool's 2009 'open questions')

- I.e. alternative interrogative clauses are the *only* type of "whether"-clause that can be adjoined.

3.2 Constituent unconditionals

- Previous assumptions/proposals:
  - Free relatives (Dayal 1997, Izvorski 2000a,b).
  - Interrogatives (Zaefferer 1990, 1991, Huddleston and Pullum 2002).
  - A type of nominal construction distinct from both plain free relatives and interrogatives (Gawron 2001).
- All three hypotheses are a priori plausible.
  - Free relatives – synonymity with "-ever" FR examples:

(42) Whoever comes to the party will have fun.

(43) Whoever comes to the party, they will have fun.

  - Free relatives – a crosslinguistic possibility (Dayal 1995, Quer and Vicente 2009, Gu 2009). E.g. correlative construction in Hindi:

(44) [$_{TP}$ [$_{CP}$ jo laRkii khaRii hai] [$_{TP}$ vo lambii hai]]
REL girl standing is DEM tall is
'The girl who is standing is tall.' (Ex. from Srivastav (1991))

  - Interrogatives – "-ever" can appear in questions:

(45) Whoever could have done that?

(46) Whatever is Alfonso be saying to that woman?

(47) Whatever happened to Joanna?

- See also Grosu 2002, 2003, Rawlins 2008 for additional arguments against a FR account.

[2] Contra Gawron 2001 who claimed the adjuncts were a kind of NP. The motivation, aside from uniformity, is that such clauses can appear in argument positions, including subject position. But it is well known that subject clauses differ from nominal subjects in many ways, e.g. default agreement.

In favor of an interrogative analysis: appearance of a question-only idiom.

- "What was X doing Y" (Pullum 1973, Kay and Fillmore 1999)
- Huddleston and Pullum 2002 (§5.3.6 fn. 17): this is ok in interrogatives, but not FRs. Also allowed in unconditionals.

(48) What were they doing reading her mail?

(49) * She didn't complain about whatever they were doing reading her mail.

(50) Whatever they were doing reading her mail, it didn't lead to any legal problems.

- If "wh-ever" adjunct were a FR, this wouldn't be possible.

Against a free relative/nominal analysis: multiple "wh".

- Possible in questions, unconditionals, not in free relatives (Baker 1968, 1970; as applied to unconditionals, Izvorski 2000b, Gawron 2001, Huddleston and Pullum 2002, Grosu 2003):

(51) Alfonso knows who said what.

(52) * Alfonso talked to who(ever) said what.

(53) Whoever buys whoever's property, the town council will still grant a building permit. (Gawron)

(54) ? Whoever said what to whom, we've got to put this incident behind us and work together as a team. (Huddleston and Pullum)

In favor of an interrogative analysis: echo question licensing.

- Jespersen 1909–1949, Baker 1968, Caponigro 2003: Can only question/echo interrogatives with "what". (Echo-)questioning a FR uses interrogative pronoun based on head of FR.

(55) A: Alfonso knows who Joanna talked to.
B: What does Alfonso know? / Alfonso knows WHAT?
B': * Who does Alfonso know? / Alfonso knows WHO?

(56) A: Alfonso talked to whoever Joanna did.
B: * What did Alfonso talk to? / Alfonso talked to WHAT?
B': Who did Alfonso talk to? / Alfonso talked to WHO?

- Difficult to apply directly to unconditionals; can't directly question or echo-question the adjunct.
- However, a very interesting echo pattern:

(57) A: Whoever Joanna talked to, Alfonso will be jealous.
B: Alfonso will be jealous regardless of WHAT?
B': * Alfonso will be jealous regardless of WHO?

- "Regardless of" takes a question complement.
- Would not predict the B response to be licensed if "wh-ever" adjunct were a free relative.[3]

[3] To really see this prediction, one needs to examine why the test works the way it does. See Rawlins 2008 for such an examination, or ask.

Summary of syntactic evidence

- Alternative unconditional adjuncts look like run-of-the-mill alternative interrogative CPs.
- Constituent unconditionals pattern with interrogative CPs as well. No evidence for new kind of "wh"-structure. (Root "wh-ever" questions.)
- English constituent unconditionals are clearly not free relatives, contra Dayal 1997, Izvorski 2000a,b.

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4 On the semantics of interrogatives

- Groenendijk and Stokhof 1997 – **Hamblin's picture** (cf. Hamblin 1958, 1973, Groenendijk and Stokhof 1984)

(i) An answer to a question is a sentence, or statement.

(ii) The possible answers to a question form an exhaustive set of mutually exclusive possibilities.

(iii) To know the meaning of a question is to know what counts as an answer to that question.

- Hamblin 1973 (see also Karttunen 1977, Hagstrom 1998, Kratzer and Shimoyama 2002, Lahiri 2002 among many others):
  - An interrogative denotes a set of propositions, corresponding to possible answers.

(58) $[\![\textbf{Did Alfonso come to the party}]\!] = \left\{ \begin{array}{c} \lambda w.\text{Alfonso came to the party in } w, \\ \lambda w.\text{Alfonso did not come to the party in } w \end{array} \right\}$

(59) $[\![\textbf{Who came to the party?}]\!] = \left\{ \begin{array}{c} \lambda w.\text{Alfonso came to the party in } w, \\ \lambda w.\text{Joanna came to the party in } w, \\ \lambda w.\text{Henry came to the party in } w, \\ . \\ . \\ . \end{array} \right\}$

- Compositional Hamblin semantics: all constituents denote sets (Hamblin 1973, Kratzer and Shimoyama 2002).
  - Singleton sets correspond to standard denotations.
  - Certain items (disjunction, "wh-ever" items, free choice indefinites) introduce non-singleton alternative sets into composition.
  - Operators such as [Q] manipulate alternatives.
- Alternative questions: disjunction introduces alternatives, licensed by [Q]. (Following von Stechow 1991, Beck and Kim 2006 on alternative questions, Alonso-Ovalle 2005, Simons 2005 on disjunction in Hamblin semantics.)

4.1 Alternative interrogatives

- First pass (Karttunen 1977, Groenendijk and Stokhof 1984):

(60) $[\![\textbf{[Q Did]}_C \textbf{ Alfonso or Joanna bring an entree?}]\!] = \left\{ \begin{array}{l} \lambda w\,.\,\text{Alfonso brought an entree in } w, \\ \lambda w\,.\,\text{Joanna brought an entree in } w \end{array} \right\}$

Mutual exclusivity and exhaustivity

- What about part (ii)?
- Propositional alternatives are:
  - exhaustive if they cover all the situations. (There are no situations where neither are true.)
  - mutually exclusive if they don't overlap on any situations. (There are no situations where both are true.)
- First-pass denotation guarantees neither property.
- Alternative unconditionals illustrate the need for both principles as linguistic presuppositions of the clause.[4]

Exhaustivity:[5]

(61) Scenario: Alfonso, Joanna, or Henry might bring the salad to the potluck.
  a. # Whether Alfonso or Joanna brings the salad, it will have feta cheese in it.
  b. Whether Alfonso, Joanna, or Henry brings the salad, it will have feta cheese in it.

- Example also illustrates the point the exhaustivity must be relativized to the context of utterance.

Mutual exclusivity:

- Without mutual exclusivity (or some other modification) alternatives in (63) will overlap. (Given exhaustivity.)

(62) Scenario: If we get two more entrees we will have enough food, but one won't do.
  a. Whether Alfonso or Joanna brings an entree, we will have enough food. (False)
  b. Whether Alfonso or Joanna brings an entree, we won't have enough food. (True)

- If alternatives overlapped, would go the opposite way.
- Second pass (following Karttunen and Peters 1976, Rawlins 2008, Biezma 2009, Aloni et al. to appear, Biezma and Rawlins 2010):
  - See recent work by Pruitt and Roelofsen (as well as Groenendijk and Roelofsen 2009, Roelofsen and van Gool 2009) for a different approach to exhaustification/exclusification.
  - Ultimately, I think exclusivity below needs to be replaced by an exclusification procedure, in particular, Alonso-Ovalle's innocent exclusion algorithm/operator "♡" (Alonso-Ovalle 2006). Pruitt and Roelofsen in their very latest work make a similar proposal.

[4] Additional arguments can be adduced solely on the basis of root & embedded alternative questions; cf. Karttunen and Peters 1976, Rawlins 2008, Biezma 2009.

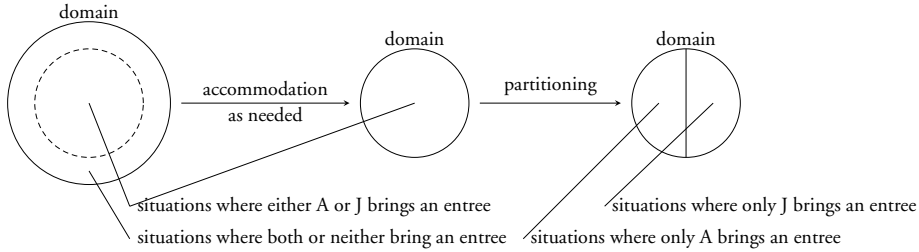
[5] If you want a question to ask, here's one: could the exhaustivity effect be due to the intonation of alternative questions in particular?

(63) $[\![\textbf{[Q Did]}_C \textbf{ Alfonso or Joanna bring an entree?}]\!] = \left\{ \begin{array}{l} \lambda w\,.\,\text{Alfonso brought an entree in } w, \\ \lambda w\,.\,\text{Joanna brought an entree in } w \end{array} \right\}$

Presupposes:
  (i) Every situation (in the domain) is in some alternative in $[\![\alpha]\!]$ (exhaustivity)
  (ii) No situation (in the domain) is in more than one alternative in $[\![\alpha]\!]$ (mutual exclusivity)

- "Domain": domain of discourse – situations under consideration by discourse participants.
  - Following Groenendijk 1999, Isaacs and Rawlins 2008, I take this to be the context set (Stalnaker 1978) – same domain partitioned by questioning.
  - Groenendijk's proposal (cf. Hulstijn 1997): while asserting removes worlds, questioning partitions the context (set).
  - Accommodating mutual exclusivity or exhaustivity ⇒ removing appropriate worlds from domain prior to partitioning it.

(64) **Interpretation of a root alternative question**



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4.2 *Wh-ever* interrogatives

- How do "wh-ever" interrogatives differ from plain constituent interrogatives?

(65) Scenario: S and H are at a conference, and see Alfonso outside the door to the poster session talking to some woman X that S does not recognize.
  a. S: Who is Alfonso talking to?
  b. S: Whoever is Alfonso talking to?

- Ignorance.
- "wh-ever" interrogatives not compatible with implicit domain narrowing.

(66) Scenario: A reality show is nearing the end of its season. 5 candidates are left, and the competition is fierce. On the task for this episode, all of the competitors do extremely well. It is hard to tell who the judges will pick as the person to send home.

a. Who will they pick?

b. Whoever will they pick?

- Each competitor is an unlikely pick.
- Ignorance persists when set of individuals under consideration is fixed.
  - Also, the effect cannot be derived from an extensional domain shifting/widening analysis (cf. den Dikken and Giannakidou's 2002 treatment of "the hell" questions).
- Proposal: "-ever" indicates that the domain of discourse is as wide as possible, relative to the issue the question raises. (cf. widening in Kadmon and Landman 1993)
  - Set of individuals under consideration will have to be wide as a consequence (but won't necessarily widen).
- Domain: same domain as before.
- What does it mean to be wide? Domain includes worlds where propositions in question are very unlikely but still possible.

(67) A domain $D \in \mathscr{P}(\mathscr{W})$ is WIDE relative to a modal base f and ordering source g, and set of alternatives A, iff

$$D \supseteq \{w \mid \exists p \in A : p \text{ is a slight possibility in } w \text{ relative to } f_c \text{ and } g_c\}$$

(68) $c +$ [whatever/on earth $[\alpha]$] $= c +$ [what $[\alpha]$]

defined only if Dom(c) is WIDE relative to $[\![\textbf{what } [\alpha]]\!]^c$, f_c, and g_c.

where f_c is a speaker-oriented epistemic modal base and g_c a circumstantial ordering source.

- Discourse circumstances radically underspecify contexts: the context is subject to vagueness.
- Lewis 1979: In normal circumstances we tend to ignore possibilities that we consider unlikely or not relevant by default.
  - E.g. implicit domain narrowing.
- However, the boundary can be explicitly shifted outwards via accommodation.[6]
  - Wideness presupposition enforces attention to the unlikely possibilities in just this way.
  - Ensures that worlds where an alternative is extremely unlikely are contained in the alternative.
- Widening explains ignorance – a consequence of speaker requiring even the unlikely possibilities to be included in domain.

[6] "Suppose I am talking with some elected official about the ways he might deal with an embarrassment. So far, we have been ignoring those possibilities that would be political suicide for him. He say: 'You see, I must either destroy the evidence or else claim that I did it to stop Communism. What else can I do?' I rudely reply: 'There is one other possibility – you can put the public interest first for once!' *That would be false if the boundary between relevant and ignored possibilities remained stationary.* But it is not false in its context, for hitherto ignored possibilities come into consideration and make it true. And the boundary, once shifted outward, stays shifted. If he protests 'I can't do that', he is mistaken." (Lewis 1979 p.183, my emphasis)

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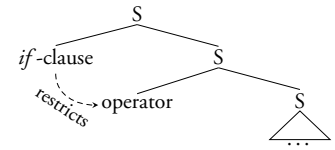
5 Interrogatives in a conditional structure

5.1 Implementing the Lewis/Kratzer/Heim theory

- Conditional adjunct provides a restriction to a modal.

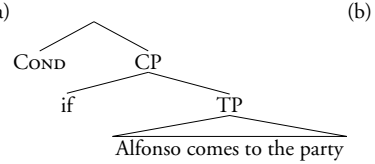
(25)



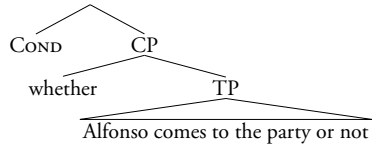
- Implementation question: how to get content of adjunct to the modal?
- Basic idea: conditional adjunct shifts the context (evaluation parameters) that the main clause is interpreted relative to, introducing new restriction into domain.
- Modals interact with this contextual parameter / evaluation parameter.
- Important assumption: modals presuppose that their domain is non-trivial – modal claim is not made based on an empty domain.
  - Following Stalnaker on conditionals.
- Need to disassociate this effect from [**if**] per se. Feature/operator COND that appears on all conditional adjuncts.
  - Lexically provided by C. (Cf. Potts 2003 on interpretation of features; I have LF-ized Potts' algorithm.)
  - Rawlins 2008: feature simultaneously regulates distribution of conditional adjuncts.

(69) **Structure of adjuncts**

(a)



(b)



(70) $[\![\textbf{COND}]\!]^c = \{\lambda p_{\langle st\rangle} . \lambda p'_{\langle c\{st\}\rangle} . \lambda w_s . p'(c + p)(w)\}$

p: restrictor ("if"-clause etc)

p': nuclear scope, context abstracted over

$c + p$: result of updating context (c) temporarily with p

- Key assumption: + updates conversational backgrounds in c. (Or, context set is conversational background.)
  - Domain of questioning = domain of domain restriction = domain of widening = domain of exhaustification.

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☑	Semantics for conditionals
☐	A question meaning in a conditional adjunct
☐	Composition of adjunct with main clause
☐	Detailed implementation

5.2 Pointwise combination and interrogative adjuncts

- Normal mode of semantic combination: function application (Frege). Denotations are functions, and combine with arguments.

$$\text{FA}(f, x) = f(x)$$

- Hamblin's pointwise function application: when a set of functions and a set of arguments combine, every argument is applied to every function. (Used for interpretation of questions, free choice items, disjunction, etc.)
  - Special case A: singleton sets. One function and one argument – combine as in regular function application.

$$\text{PointwiseFA}(\{f\}, \{x\}) = \{f(x)\}$$

  - Special case B: singleton function, set of arguments. Each argument applied to the function in turn; size of resulting set is the same as size of set of arguments.

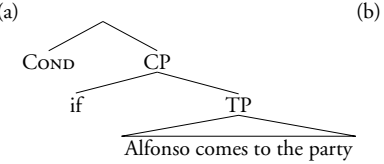
$$\text{PointwiseFA}\left(\{f\}, \left\{\begin{array}{l} x_1, \\ x_2, \\ \ldots \\ x_n \end{array}\right\}\right) = \left\{\begin{array}{l} f(x_1), \\ f(x_2), \\ \ldots \\ f(x_n) \end{array}\right\}$$

  - Special case B′: reverse of B, multiple functions and one argument. Similar result.

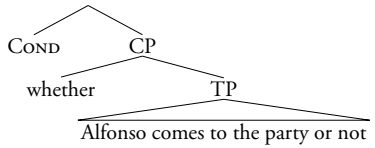
$$\text{PointwiseFA}\left(\left\{\begin{array}{l} f_1, \\ f_2, \\ \ldots \\ f_n \end{array}\right\}, \{x\}\right) = \left\{\begin{array}{l} f_1(x), \\ f_2(x), \\ \ldots \\ f_n(x) \end{array}\right\}$$

(71) **Structure of adjuncts**

(a)



(b)



- "if"-clause instantiates special case A.

  - f = Cond's meaning: a function that builds a domain restrictor for the sentence it is adjoined to.
  - x = CP's meaning: a singleton set containing a proposition (that Alfonso comes to the party).
  - Combination ($f(x)$) is a singleton set containing a domain restrictor – it restricts the domain to situations where Alfonso comes to the party.
- unconditional adjunct in (b) instantiates special case B (internally).
  - f = Cond's meaning, as above.
  - CP's meaning: a set of propositions; two in this case. (x_1 = the proposition that Alfonso comes to the party; x_2 = the proposition that he doesn't.)
  - Combination produces a set of domain restrictors of the same size.

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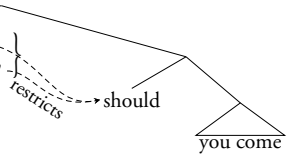
5.3 Composition with main clause

- Combination of unconditional adjunct with main clause:.
  - Main clause – singleton set containing a proposition; proposition is sensitive to contextual domain restriction because of modal.
  - Set of domain restrictors combines pointwise with main clause (case B′).
  - Result: set of conditionalized propositions.

(72) Whether Alfonso comes to the party or not, you should come.

$$\left\{\begin{array}{l} \lambda w.\text{Alfonso comes to the party in } w, \\ \lambda w.\text{Alfonso doesn't come to the party in } w \end{array}\right\}$$



$$= \left\{\begin{array}{l} \lambda w.\text{For all worlds} \in f(w) \text{ where Alfonso comes to the party, you come to the party.} \\ \lambda w.\text{For all worlds} \in f(w) \text{ where Alfonso doesn't come to the party, you come to the party.} \end{array}\right\}$$

(where f is an appropriate selection function, here (specified by "should") providing the set of accessible worlds closest to the speaker's desires.)

- This is the compositional step that is based on Alonso-Ovalle's work.
- Missing some details – what about the extra twists in question meanings? (exhaustivity, mutual exclusivity, wideness)
  - Project as presuppositions of entire sentence.
  - Alternatives most exhaust the possibilities – it is presupposed that at least one of them is true, relative to domain of discourse.

- Alternatives must be mutually exclusive – it is presupposed that no more than one of them is true, relative to domain of discourse.

- Denotation for a constituent unconditional works the same way.
  - Wideness presupposition applies to domain of interpretation for entire sentence.
- Final step: denotation is a non-singleton set, but sentence is declarative. Need a singleton set denotation.
- Hamblin ∀ operator: all alternatives are true (cf. generalized conjunction.).
  - I take ∀ to be a default operator, inserted up to interpretability, following Menéndez-Benito 2006. Forced by root assertion operator requiring singleton.
  - Also following a similar proposal by Cheng and Huang 1996 for Chinese bare conditionals.
  - Main difference from Alonso-Ovalle: he builds this into "if". We can talk about why I think this is wrong, at least for unconditionals.
- Non-triviality presupposition of necessity modal: projects as a *distribution presupposition* – each alternative is non-trivial.
- Possibility modal leads to distribution without presupposition, in virtue of truth-conditions.

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6 All the details

6.1 Conditionality without "if"

- Wide range of structures that are conditional-like in some sense:

(73) Standing on a chair, John can touch the ceiling. (*Weak adjuncts*; Stump 1985)

(74) Had John eaten the calamari, he might be better now. (*Inverted counterfactuals*; Iatridou and Embick 1994)

(75) a. Whenever it rains, it pours. (*"Whenever" adjuncts*; Lewis 1975)[7]

b. John is grouchy when he is hungry. (*Restrictive "if/when"-clauses*; Farkas and Sugioka 1983)

(76) To get to Harlem, you have to take the A-train. (*Infinitival adjuncts*; von Fintel and Iatridou 2005 etc.)

(77) No Hitler, no A-bomb. (*Quantified correlatives*; Lewis 1973 p.4)[8]

(78) You're gonna kill yourself, you keep driving like that. (*Bare TP Adjuncts*; Haiman 1986)

(79) Unless it rains, we will play soccor on Sunday. (*"Unless" exceptives*; von Fintel 1994)

[7] While I won't address them specifically in this talk, these adjuncts are actually a special case of unconditional built from a "when" question.

[8] This is my own term. Lewis called them shortened counterfactual conditionals, and while this one is certainly counterfactual, they needn't be. The quantifiers involved are restricted to weak quantifiers.

(80) The longer John has to wait, the angrier he gets. (*Comparative conditionals*; Beck 1997 etc.)

- "Then" is disallowed with all of these constructions, except a subset of "if"-conditionals.
- Clearly, a general theory of conditionality can't be keyed on "if" or "then".
- What does it mean to be a conditional?

(81) **Generalized LKH conditionals (strict)**
A conditional adjunct is any adjunct which serves to restrict the domain of an operator.

(82) **Generalized LKH conditionals (broad)**
A conditional adjunct is any adjunct which interacts with the domain of an operator (by restriction, exception, etc).

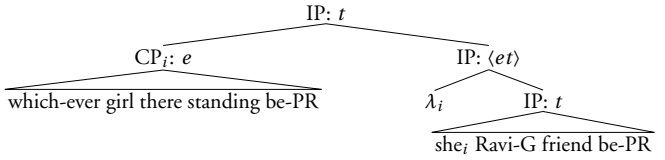
- Unconditionals are conditionals in both the broad, and the strict sense, on my proposal.

6.2 Conditionality

- Main choice point in implementing the LKH theory: how you transmit the content of the [COND] clause to restricted operators.
  - Option 1: movement. Get the [COND]-clause to be the sister of the modal, i.e. build an LF tripartite structure. Heim 1982, Diesing 1992, etc. Many authors assume this for presentational purposes.
  - Option 2: binding. Have the [COND]-clause bind a variable that is sister to the modal. Geis 1985, von Fintel 1994, Schlenker 2004, Bhatt and Pancheva 2006.
  - Option 3: shifting. Have the [COND]-clause shift some parameter of evaluation (such as the context set). Kratzer 1981, Heim 1983, and much work in Hamblin semantics. My earlier work: Isaacs and Rawlins 2008, Rawlins 2008, to appear Reich 2009, though in appearance static, falls into this group.
- In other words: how to implement the '+' operator used pseudo-formally in previous section.
- von Fintel 1994: "It is very probably though that tripartite structures are merely a convenient meta-level notation."
  - I won't spend time here today discussing the movement account (unless you want me to).
  - Most plausible version: [COND]-clauses base-generated adjacent to modal, and move out by SS. (Cf. Bhatt's 2003 account of locality in DP correlatives.)
- Schlenker 2004, Bhatt and Pancheva 2006: "if"-clause adjuncts are like definite descriptions over D_s (as opposed to D_e) – a sort of free relative.
  - Interaction with operator via variable binding – like correlatives in Hindi and other languages.

(83) jo-bhii laRkii vahaaN khaRii hai vo ravi-kii dost hai
which-ever girl there standing be-PR she Ravi-G friend be-PR
'Whichever girl is standing there, she is Ravi's friend.' (Hindi; Dayal 1996 ch. 6 ex. 39)

(84)



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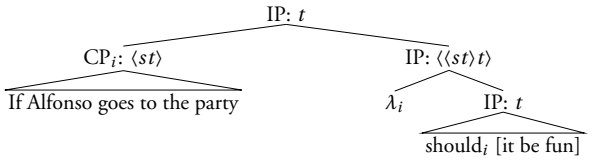
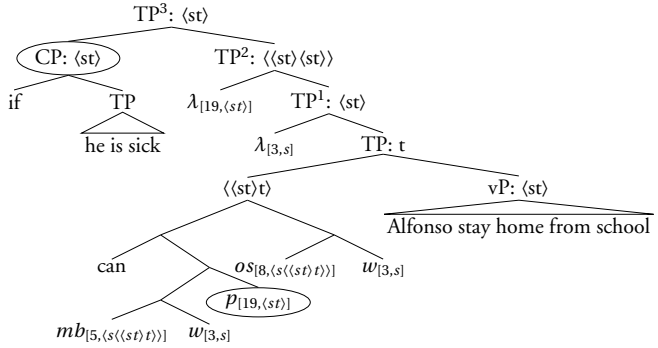


(86) **The correlation requirement in correlatives**
Every relative pronoun in a correlative adjunct must have a corresponding proform in the main clause.

- Schlenker, Bhatt & Pancheva: "then" is the correlative proform. (See also Izvorski 1996.)
  - Perhaps true for "if"-conditionals in some sense, but not true for conditional adjuncts more generally.
  - Only "if"-conditionals, and only a subset of those, take "then".
  - My claim: covert propositional variable (or plural world variable if you prefer) is the correlated proform. See below.

(87) If he is sick, Alfonso can stay home from school.



(88) $[\![\textbf{can}]\!]^{w,h,c} = \{\lambda r_{\langle st \rangle} . \lambda o_{\langle\langle st \rangle t \rangle} . \lambda p_{\langle st \rangle} . [\exists w' : w' \in \text{MAX}_o(r)]\ p(w') = 1\}$
defined only if r is circumstantial, and o is deontic.[9]

(89) **Ordering and closest worlds** (From von Fintel and Heim 2010 (105-6, modified slightly), among many others)
  a. Given a set of world X and a set of propositions P, define the strict partial order $<_P$ as follows:
  $\forall w_1, w_2 \in X : w_1 <_P w_s$ iff $\{p \in P : p(w_2) = 1\} \subset \{p \in P : p(w_1) = 1\}$.
  b. For any set of worlds X (the domain), set of propositions P (the ordering source), and strict partial order $<_P$, let MAX_P be defined as follows:
  $\text{MAX}_P(X) = \{w \in X : \neg\exists w' \in X : w' <_P w\}$

[9]Somewhat non-standard is the fact that these presuppositions do not operate directly on the conversational backgrounds themselves. It is far from clear whether such presuppositions are implementable in this form at all, at least for the modal base. But, as long as these presuppositions are lexical properties of modals, the assumption is a commitment of the syntacticized vesion of Kratzer's analysis. An alternative, more promising approach, would be to derive the circumstantial/epistemic distinction from the syntactic position of the modal, rather than its lexical properties per se (Hacquard 2006).

(90) **Bound variables**: For any variable x in the syntax and type A, $[\![x_{[i,A]}]\!]^h = \{h(i)\}$
defined for h only if $i \in \text{Dom}(h)$ and $h(i) \in D_A$

(91) Assume a type-shifting operation $\bigcap$ to convert from $\{X\} \subseteq D_{\langle\langle st \rangle t \rangle t}$ to type $\langle$st$\rangle$:
$\bigcap(\{X\}) = \{\lambda w_s . \forall p_{\langle st \rangle}$ s.t. $X(p) : p(w) = 1\}$.

(92) **Generalized Hamblin predicate modification**
If α and β are the daughters of γ, and are of type $\langle At \rangle$ for some type A, then:
$[\![\gamma]\!]^h = \left\{P_{\langle At \rangle} : \exists a \in [\![\alpha]\!]^h \exists b \in [\![\beta]\!]^h : P = \lambda X_A . a(X) = b(X) = 1\right\}$

- Composition of modal complex leads to standard Kratzer-style result.

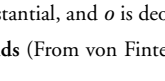
(93) $[\![\textbf{can}\ [[\textbf{mb}_5\ \textbf{w}_3]\ \textbf{p}_{19}]\ [\textbf{os}_8\ \textbf{w}_3]]\!]^h$
$= \{\lambda p_{\langle st \rangle} . [\exists w' : w' \in \text{MAX}_{[h(8)](h(3))}((\bigcap[h(5)](h(3))) \cap h(19)]\ p(w') = 1\}$
defined for h only if $h(5), h(8) \in D_{\langle s\langle\langle st \rangle t\rangle\rangle}$, $(\bigcap[h(5)](h(3))) \cap h(19)$ is circumstantial, and $[h(8)](h(3))$ is deontic.

- Convention: will use terms like $\textbf{mb}_5$ in metalanguage formulas derived relative to an assignment h, to refer to $h(5)$.

(94) $[\![\textbf{can}\ [[\textbf{mb}_5\ \textbf{w}_3]\ \textbf{p}_{19}]\ [\textbf{os}_8\ \textbf{w}_3]]\!]^h$
$= \{\lambda p_{\langle st \rangle} . [\exists w' : w' \in \text{MAX}_{\textbf{os}_8(\textbf{w}_3)}((\bigcap[\textbf{mb}_5(\textbf{w}_3)]) \cap \textbf{p}_{19})]\ p(w') = 1\}$
defined for h only if:
$\textbf{mb}_5, \textbf{os}_8 \in D_{\langle s\langle\langle st \rangle t\rangle\rangle}$, $((\bigcap \textbf{mb}_5(\textbf{w}_3)) \cap \textbf{p}_{19})$ is circumstantial, and $\textbf{os}_8(\textbf{w}_3)$ is deontic.

- How to interpret binding?
  - Issue is complicated in Hamblin semantics (Shan 2004, Rawlins 2008, Novel and Romero 2010, Romero 2010).
  - Ultimate solution: move assignments into metalanguage, one per alternative. (Novel/Romero)
  - Solution here: only deal with special case with binding into singleton sets.
  - Other cases fail badly for binding of world variables.

(95) **Hamblin binding**: For any constituent α of type B,



$= \{P_{\langle AB \rangle} \mid \forall X \in D_A : P(X) \in [\![\alpha]\!]^{h/X \to i}\}$
Defined only if for any assignment h, $|[\![\alpha]\!]^h| = 1$.

(96) $[\![\textbf{TP}^2]\!]^h = \{\lambda q_{\langle st \rangle} . \lambda w^@ . \exists w \in \text{MAX}_{\textbf{os}_8(w^@)}(\bigcap[\textbf{mb}_5(w^@)] \cap q) : \text{A. stays home from school in } w\}$
defined for $h, w^@, q$ only if
$\textbf{os}_5, \textbf{mb}_8 \in D_{\langle s\langle\langle st \rangle t\rangle\rangle}$, $(\bigcap[\textbf{mb}_5(w^@)] \cap q)$ is circumstantial, and $\textbf{os}_8(w^@)$ is deontic.

(97) $[\![\textbf{TP}^3]\!]^h = \left\{ \begin{array}{r} \lambda w^@ . \exists w \in \text{MAX}_{\textbf{os}_8(w^@)}(\bigcap[\textbf{mb}_5(w^@)] \cap (\lambda w' . \text{A. is sick in } w')) : \\ \text{A. stays home from school in } w \end{array} \right\}$
defined for $h, w^@, q$ only if $\textbf{os}_5, \textbf{mb}_8 \in D_{\langle s\langle\langle st \rangle t\rangle\rangle}$,
$(\bigcap[\textbf{mb}_5(w^@)] \cap (\lambda w' . \text{A. is sick in } w'))$ is circumstantial, and $\textbf{os}_8(w^@)$ is deontic.

- How to regulate distribution of variables?
- Some first-pass constraints:

(98) **LF constraints for a binding account of conditionals**

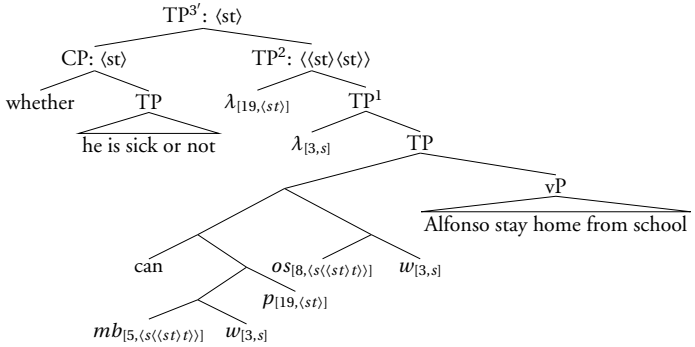
a. A constituent marked with [COND] must be sister to a binder of type ⟨st⟩ at LF.

b. If a (modal) operator is in the immediate scope of a [COND]-clause, it must (at LF) c-command a variable bound by that clause.

- First constraint is clearly a version of the **correlation requirement**, but for $D_{\langle st\rangle}$ correlatives.
- Note: in a pure shifting account these constraints by and large follow.
  - But, binding account more general in certain ways – what gets restricted.

6.3 Alternative unconditionals

(99) Whether he is sick or not, Alfonso can stay home from school.



(100) **Disjunction** (Alonso-Ovalle 2006)
$[\![\textbf{[A [or B]]}]\!] = [\![\textbf{A}]\!] \cup [\![\textbf{B}]\!]$

(101) **Question operator v. 2**
$[\![\textbf{[Q]}\ \alpha]\!]^c = [\![\alpha]\!]^c$
defined for c, α only if $[\![\alpha]\!]^c \subseteq D_{\langle st\rangle}$ and
(i) $\forall w \in cs_c : \exists p \in [\![\alpha]\!]^c : p(w) = 1$ (exhaustivity)
(ii) $\forall p, p' \in [\![\alpha]\!]^c : (p \neq p') \rightarrow \neg\exists w \in cs_c : (p(w) \wedge p'(w))$ (mutual exclusivity)

(102) $[\![\textbf{whether[Q] he is sick or not}]\!]^{c,h} = \{\lambda w.\text{he is sick in } w,\ \lambda w.\text{he is not sick in } w\}$
defined for c only if
(i) $\forall w \in cs_c : \exists p \in \left\{ \begin{array}{l} \lambda w.\text{A. is sick in } w \\ \lambda w.\text{A. is not sick in } w \end{array} \right\} : p(w) = 1$ (exhaustivity)
(ii) $\forall p, p' \in \left\{ \begin{array}{l} \lambda w.\text{A. is sick in } w \\ \lambda w.\text{A. is not sick in } w \end{array} \right\} : (p \neq p') \rightarrow \neg\exists w \in cs_c : (p(w) \wedge p'(w))$ (mutual exclusivity)

- Composes with abstracted main clause via PFA.

(103) **Pointwise Function Application**
If α and β are daughters of γ, and $[\![\alpha]\!] \subseteq D_{AB}$ and $[\![\beta]\!] \subseteq D_A$ for some types A and B, then
$[\![\gamma]\!] = \text{PFA}([\![\alpha]\!], [\![\beta]\!]) = \{Y \in D_B \mid \exists f \in [\![\alpha]\!] : \exists X \in [\![\beta]\!] : f(X) = Y\}$

(104) $[\![\textbf{TP}^{3'}]\!]^{c,h} = \left\{ \left[\begin{array}{r} \lambda w^@.\exists w \in \text{MAX}_{\textbf{os}_8(w^@)}(\bigcap[\textbf{mb}_5(w^@)] \cap (\lambda w'.\text{A. is sick in } w')) : \\ \text{A. stays home from school in } w \end{array} \right], \left[\begin{array}{r} \lambda w^@.\exists w \in \text{MAX}_{\textbf{os}_8(w^@)}(\bigcap[\textbf{mb}_5(w^@)] \cap (\lambda w'.\text{A. is not sick in } w')) : \\ \text{A. stays home from school in } w \end{array} \right] \right\}$
defined for c, h only if (presuppositions on $\textbf{os}_5, \textbf{mb}_8$ omitted, see earlier)
(i) $\forall w \in cs_c : \exists p \in \left\{ \begin{array}{l} \lambda w.\text{A. is sick in } w \\ \lambda w.\text{A. is not sick in } w \end{array} \right\} : p(w) = 1$ (exhaustivity)
(ii) $\forall p, p' \in \left\{ \begin{array}{l} \lambda w.\text{A. is sick in } w \\ \lambda w.\text{A. is not sick in } w \end{array} \right\} : (p \neq p') \rightarrow \neg\exists w \in cs_c : (p(w) \wedge p'(w))$ (mutual exclusivity)

- Distribution effect: possibility unconditionals are strictly stronger than plain possibility sentences.
  - Require at least two verifying worlds, one for each alternative.
- Do we derive similar effect for necessity sentences? Not without further assumption.
- Stalnakerian assumption that domain of quantification cannot be empty:

(105) $[\![\textbf{should}]\!]^{w,h,c} = \lambda r_{\langle st\rangle}.\lambda o_{\langle\langle st\rangle t\rangle}$ s.t. $\underline{\text{MAX}_o(r) \neq \emptyset}.\lambda p_{\langle st\rangle}.[\forall w' : w' \in \text{MAX}_o(r)]\ p(w') = 1$
defined only if r is circumstantial, and o is deontic.

- Non-emptiness presupposition forces distribution over the modal space.

(106) Whether he is sick or not, λ_{19} Alfonso should$(mb_5 \cap p_{19}, os_8)$ stay home from school.

(107) $[\![(106)]\!]^{c,h} = \left\{ \left[\begin{array}{r} \lambda w^@ \text{ s.t. } \underline{\text{MAX}_{\textbf{os}_8(w^@)}(\bigcap[\textbf{mb}_5(w^@)] \cap \lambda w'.\text{A. is sick in } w') \neq \emptyset}. \\ \forall w \in \text{MAX}_{\textbf{os}_8(w^@)}(\bigcap[\textbf{mb}_5(w^@)] \cap \lambda w'.\text{A. is sick in } w') : \\ \text{A. stays home from school in } w \end{array} \right], \left[\begin{array}{r} \lambda w^@ \text{ s.t. } \underline{\text{MAX}_{\textbf{os}_8(w^@)}(\bigcap[\textbf{mb}_5(w^@)] \cap \lambda w'.\text{A. is not sick in } w') \neq \emptyset}. \\ \forall w \in \text{MAX}_{\textbf{os}_8(w^@)}(\bigcap[\textbf{mb}_5(w^@)] \cap \lambda w'.\text{A. is not sick in } w') : \\ \text{A. stays home from school in } w \end{array} \right] \right\}$
defined for c, h only if (presuppositions on $\textbf{os}_5, \textbf{mb}_8$ omitted, see earlier)
(i) $\forall w \in cs_c : \exists p \in \left\{ \begin{array}{l} \lambda w.\text{A. is sick in } w \\ \lambda w.\text{A. is not sick in } w \end{array} \right\} : p(w) = 1$ (exhaustivity)
(ii) $\forall p, p' \in \left\{ \begin{array}{l} \lambda w.\text{A. is sick in } w \\ \lambda w.\text{A. is not sick in } w \end{array} \right\} : (p \neq p') \rightarrow \neg\exists w \in cs_c : (p(w) \wedge p'(w))$ (mutual exclusivity)

- A case where exhaustivity is not semantically guaranteed:

(108) Whether he has a cold or the flu, λ_{19} Alfonso should$(mb_5 \cap p_{19}, os_8)$ stay home from school.

(109) $[\![(108)]\!]^{c,h} = \left\{ \left[\begin{array}{r} \lambda w^@ \text{ s.t. } \underline{\text{MAX}_{\textbf{os}_8(w^@)}(\bigcap[\textbf{mb}_5(w^@)] \cap \lambda w'.\text{A. has a cold in } w') \neq \emptyset}. \\ \forall w \in \text{MAX}_{\textbf{os}_8(w^@)}(\bigcap[\textbf{mb}_5(w^@)] \cap \lambda w'.\text{A. has a cold in } w') : \\ \text{A. stays home from school in } w \end{array} \right], \left[\begin{array}{r} \lambda w^@ \text{ s.t. } \underline{\text{MAX}_{\textbf{os}_8(w^@)}(\bigcap[\textbf{mb}_5(w^@)] \cap \lambda w'.\text{A. has the flu in } w') \neq \emptyset}. \\ \forall w \in \text{MAX}_{\textbf{os}_8(w^@)}(\bigcap[\textbf{mb}_5(w^@)] \cap \lambda w'.\text{A. has the flue in } w') : \\ \text{A. stays home from school in } w \end{array} \right] \right\}$
defined for c, h only if (presuppositions on $\textbf{os}_5, \textbf{mb}_8$ omitted, see earlier)
(i) $\forall w \in cs_c : \exists p \in \left\{ \begin{array}{l} \lambda w.\text{A. has a cold in } w \\ \lambda w.\text{A. has the flu in } w \end{array} \right\} : p(w) = 1$ (exhaustivity)
(ii) $\forall p, p' \in \left\{ \begin{array}{l} \lambda w.\text{A. has a cold in } w \\ \lambda w.\text{A. has the flu in } w \end{array} \right\} : (p \neq p') \rightarrow \neg\exists w \in cs_c : (p(w) \wedge p'(w))$ (mutual exclusivity)

- Finally: collect alternatives with ∀:

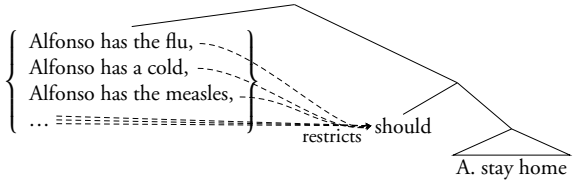
(110) Where $[\![\alpha]\!]^h \subseteq D_{\langle st\rangle}$,
$[\![\forall\ \alpha]\!]^h = \{\lambda w_s\,.\,\forall p_{\langle st\rangle} \in [\![\alpha]\!]^h : p(w) = 1\}$ (Kratzer and Shimoyama 2002 §3)

6.4 Constituent unconditionals

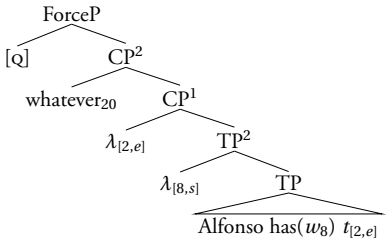
(111) No matter what Alfonso has, he should stay home from school.

(112) Whatever Alfonso has, he should stay home from school.

(113)



(114) Whatever$_{20}$ Alfonso has,



- "wh"-items with domain restriction:

(115) $[\![\textbf{who}_i]\!]^h = [\![\textbf{whoever}_i]\!]^h = \{x \in D_e \mid x \text{ is human} \wedge x \in h(i)\}$
defined for h only if $h(i) \in D_{\langle et\rangle}$

(116) $[\![\textbf{what}_i]\!]^h = [\![\textbf{whatever}_i]\!]^h = \{x \in D_e \mid x \text{ is non-human} \wedge x \in h(i)\}$
defined for h only if $h(i) \in D_{\langle et\rangle}$

(117) $[\![\textbf{TP}^2]\!]^h = \{\lambda w_s\,.\,\text{Alfonso has}_{\text{disease}}\ h(2)\ \text{in}\ w\}$

(118) $[\![\textbf{CP}^1]\!]^h = \{\lambda x_e\,.\,\lambda w_s\,.\,\text{Alfonso has}_{\text{disease}}\ x\ \text{in}\ w\}$

(119) $[\![\textbf{CP}^2]\!]^h = \{p \in D_{\langle st\rangle} \mid \exists x \in D_e : x \text{ is non-human} \wedge x \in h(20) \wedge p = \lambda w_s\,.\,\text{Alfonso has}_{\text{disease}}\ x\ \text{in}\ w\}$

(120) $[\![\textbf{ForceP}]\!]^{c,h} = [\![\textbf{CP}^2]\!]^{c,h}$
defined only if:
(i) $\forall w \in cs_c : \exists p \in [\![\textbf{CP}^2]\!]^{c,h} : p(w) = 1$ (exhaustivity)
(ii) $\forall p, p' \in [\![\textbf{CP}^2]\!]^{c,h} : (p \neq p') \rightarrow \neg\exists w \in cs_c : (p(w) \wedge p'(w))$ (mutual exclusivity)

- Presuppositions force alignment of domain restriction with context set.
- Composes with main clause via PFA as expected:

(121) Whatever Alfonso has, λ_{19} he should$(mb_5 \cap p_{19}, os_8)$ stay home from school.

(122) $[\![(\textbf{121})]\!]^{c,h} =$

$$\forall \left\{ p_{\langle st\rangle} \;\middle|\; \begin{array}{l} \exists p' \in [\![\textbf{CP}^2]\!]^{c,h} : p = \lambda w^{@} \text{ s.t. } \underline{\textsc{Max}_{\textbf{os}_8(w^{@})}(\bigcap[\textbf{mb}_5(w^{@})] \cap p') \neq \emptyset\,.} \\ \qquad\qquad \forall w \in \textsc{Max}_{\textbf{os}_8(w^{@})}(\bigcap[\textbf{mb}_5(w^{@})] \cap p') : \\ \qquad\qquad\qquad \text{A. stays home from school in } w \end{array} \right\}$$

defined for c, h only if (presuppositions on $\textbf{os}_5, \textbf{mb}_8$ omitted, see earlier)
(i) $\forall w \in cs_c : \exists p \in [\![\textbf{CP}^2]\!]^{c,h} : p(w) = 1$ (exhaustivity)
(ii) $\forall p, p' \in [\![\textbf{CP}^2]\!]^{c,h} : (p \neq p') \rightarrow \neg\exists w \in cs_c : (p(w) \wedge p'(w))$ (mutual exclusivity)

- ☑ Interrogative syntax
- ☑ Semantics for alternative questions
- ☑ Semantics for *-ever* questions
- ☑ Semantics for conditionals
- ☑ A question meaning in a conditional adjunct
- ☑ Composition of adjunct with main clause
- ☑ Detailed implementation

7 Summary

Explanation of unconditional behavior

- Analysis directly realizes the intuition about paraphrase with multiple "if"-conditionals...with some twists.
- Consequences of the compositional interaction of pieces of an unconditional:
  - Exhaustivity presupposition – unconditionals interpreted against a domain where they exhaust all the possibilities.
  - Mutual exclusivity – unconditionals interpreted against a domain where no alternatives overlap.
  - Distribution presupposition – alternatives are distributed throughout the domain.
- Exhaustive conditional claims ⇒ consequent entailment.
- Exhaustive non-trivial conditional claims ⇒ relational indifference.
  - Formal realization of relational indifference: can prove that antecedent issue is *orthogonal* to main clause proposition relative to modal domain, in the sense of Lewis 1988: propisition cross-cuts each alternative.
  - Relational indifference = Lewis' orthogonality.
- Characteristic discourse effect:

(123) A: Alfonso is very intelligent.
B: Whether or not he's intelligent, he shouldn't get an A in this class.

- B's lack of commitment to Alfonso being very intelligent follows from analysis, as does the fact that the discourse moves forward.
  - Dialogues of this kind appear in larger discourses where the question under discussion (Roberts 1996, Büring 2003) is e.g. what grade he should get – question addressed independently of unconditional antecedent.

– Presupposes that each alternative is non-trivial – there are situations/worlds both where he is intelligent, and he isn't.
– Indifference claim is that this simply doesn't matter.
– Main clause – that he shouldn't get an A – is true either way.

Broader results

- Bring together a range of analyses of different phenomena (modals, conditionals, questions, free choice) and show how they can work together.
- Unconditionals and "if"-conditionals work the same way – differences follow from internals.
  – Because adjunct "if"-clauses don't have a question meaning, non-exhaustive (single-alternative) domain restriction.
  – Because adjunct interrogatives have a question meaning, exhaustive, multiple-alternative, domain restriction.
  – A *unified* account of unconditionals and "if"-conditionals. (Extension to other conditional-like structures.)
- **Conditional uniformity hypothesis**: differences among conditional adjuncts follow entirely from their contents.
  – Challenge: non-interrogative unconditionals.

(124) Llueva o brille el sol, saldremos.
rain:SUBJ or shine:SUBJ the sun, go.out:FUT:1PL
'Whether it rains or the sun shines, we'll go out' (Spanish; from Haspelmath and König 1998)

(125) Quien quiera que venga a Berlín, estaré contento.
who -ever that comes.SUBJ to Berlin will.be happy
'Whoever comes to Berlin, I'll be happy.' (Spanish; Quer and Vicente 2009 ex. 3)[10]

(126) jo-bhii laRkii vahaaN khaRii hai vo ravi-kii dost hai
which-ever girl there standing be-PR she Ravi-G friend be-PR
'Whichever girl is standing there, she is Ravi's friend.' (Hindi; Dayal 1996 ch. 6 ex. 39)

(127) Ó-ti ke an léi aftí, aftós méni pánda siopilós
REL-what also if says she, he stays always silent
'Whatever she says, he always remains silent.' (Greek; Haspelmath and König 1998 ex. 85)

- A more general hypothesis: **Clausal adjunct uniformity**
  – Small, fixed, universal inventory of features like Cond. Exx: Cause, Explain, Contrast – all instantiated at discourse level as well.
  – Differences among *all* clausal adjuncts follow from compositional interaction of contents with this fixed inventory of features.

[10] "Quiera" is a frozen form derived from "querer" 'to want'. Thanks to Luis Vicente (p.c.) for discussion of this data.

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