Conditional Assertion in Commitment Spaces

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1. Introduction

(1) *If Fred was at the party, the party was fun.*

(2) Two approaches to conditional sentences:
  a. Conditional proposition (CP), e.g. Stalnaker, Lewis, Kratzer; Adams
     'Fred was at the party > the party was fun'
     p('party was fun' | 'Fred was there')
     conditional sentence has a truth value, or a probability
  b. Conditional assertions (CA), e.g. Edgington, Vanderveken, Starr
     Under the condition that Fred was at the party it is asserted that the party was fun

(3) Arguments for CP:
  a. Explains embedding conditionals, as propositions can be embedded
  b. Established proposals for truth conditions, e.g. Stalnaker 1968:
     'if φ then ψ' = [φ > ψ] = λi[ψ(ms(i, φ))],
     where ms(i, φ) the maximally similar index to i at which φ(i).

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(4) Arguments for CA:
   a. Different speech acts in apodosis:
      If Fred was at the party, was the party fun? / tell me more about it!

   b. Plausibility of Peirce / Ramsey analysis:
      Protases as provisional assumptions, explains presupposition projection

   c. *no* as affirming negative antecedents:
      S_1: *If Kelly dates John, she will not marry Bill.*
      S_2: *No, she won't.* (i.e., if Kelly dates John, she will not marry Bill).

(5) Stalnaker 2009 on CA:
   "While there are some complex constructions with indicative conditionals as constituents, the embedding possibilities seem, intuitively, to be highly constrained. For example, simple disjunctions of indicative conditionals with different antecedents, and conditionals with conditional antecedents are difficult to make sense of. The proponent of a non-truth-conditional [CA] account needs to explain what embeddings there are, but the proponent of a truth-conditional [CP] account must explain why embedded conditionals don't seem to be interpretable in full generality."

(6) Our goals:
   a. Develop a framework for CA, develop arguments for it;
      this is done within Commitment Space Semantics (Krifka 2015).
   b. Explain (restrictions of) embeddings of conditional clauses
   c. Propose a unifying account for indicative and counterfactual conditionals

2. Commitment States and their Updates

(7) Commitment states are sets propositions, the propositions that the participants of a conversation consider to be shared at the current point in conversation.

(8) Commitment states should be **consistent**, non-contradictory sets of propositions:
   a. c is inconsistent (contradictory) iff $c \vDash \varphi$ and $c \vDash \neg\varphi$, for some proposition φ
   b. c is consistent iff c it is not inconsistent.

(9) Update of commitment states, cf. Figure 1.
   a. Update of commitment state c with proposition φ: $c + \varphi = c \cup \{\varphi\}$
   b. Consistent update: $c + \varphi = c \cup \{\varphi\}$, if consistent, else undefined

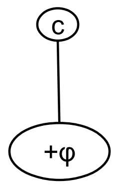

Figure 1: Update of commitment state with f(φ)

(10) Update as a function:
   $c + f(\varphi) = f(\varphi)(c) = \lambda c'[c' \cup \{\varphi\}](c) = c \cup \{\varphi\}$

(11) Assertion as expressing commitments by the speaker (Krifka 2015):
   $c + S_1$ to S_2: $[_{\text{ForceP}}$. $[_{\text{CommitP}} \vdash [_{\text{TP}}$ *I love you*]]]
   = $f(S_1 \vdash$ 'S_1 loves S_2')(c)
   = $c + S_1 \vdash$ 'S_1 loves S_2' where '$S_1 \vdash \varphi$': S_1 vouches for the truth of φ, with social consequences if φ turns out to be false

(12) The proposition φ enters the commitment state as conversational implicature that can be cancelled:
   Believe it or not, Fred was at the party.

3. Commitment Spaces and their Updates

(13) Commitment spaces (CS) as commitment states with possible future development
Cohen & Krifka, 2014, Krifka, 2015

(14) A **single-rooted commitment space** is a non-empty set of commitment states C with ∩C ∈ C.
∩C, written √C, the **root** of the commitment space C.
For all c∈C, it holds that √C ⊆ c.

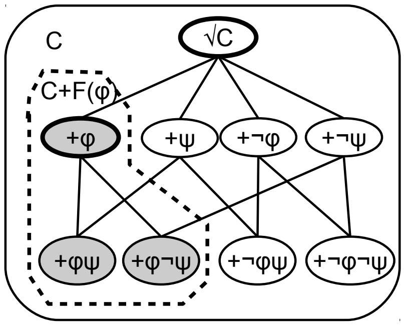

Figure 2: Update of commitment space with F(φ)

(15) Update with a proposition φ, cf. Figure 2:
F(φ) = λC{c∈C | √C + f(φ) ⊆ c}

(16) C + F(φ) = F(φ)(C) = {c∈C | √C + f(φ) ⊆ c},
undefined if f(φ)(√C) is undefined
(in case this is contradictory)

(17) Denegation of speech acts, cf. Figure 3
(cf. Searle 1969, Hare 1970, Dummett 1973)
a. *I don't promise to come.*
b. *I don't claim that Fred spoiled the party.*

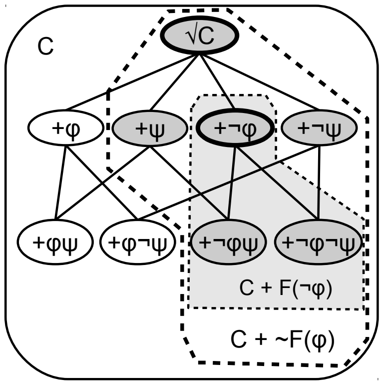

Figure 3: Update with ~F(φ) vs. F(¬φ)

(18) Formal representation of denegation
a. C + ~𝔄 = C – [C + 𝔄]
b. ~𝔄 = λC′[C′ – 𝔄(C′)]

(19) Speech acts that do not change the root:
meta speech acts (cf. Cohen & Krifka 2014).

(20) **Revisionary** update rules
if regular update (16) is not defined:
a. C + F(φ) = c + f(φ) c ∈C
b. C + F(φ) = {compatible(c, φ) + f(φ) | c ∈C],
where compatible(c, φ) = the maximal c′⊆c such that +f(φ) can be performed.

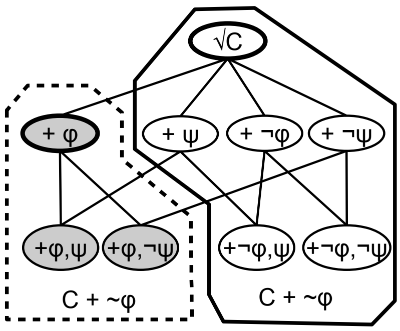

Figure 4: Revisioninary update
[C + ~F(φ)] + F(φ)

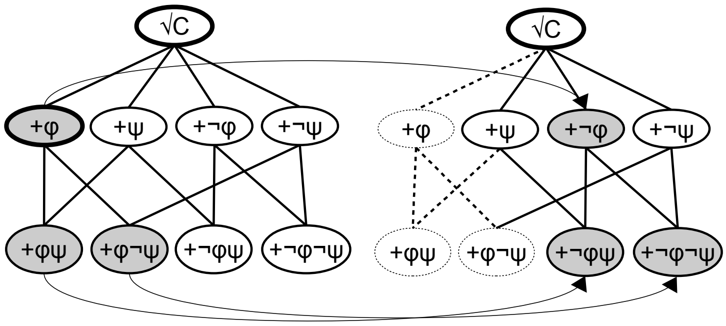

Figure 5: Revisionary update
C + F(φ) + F(¬φ)

(21) Dynamic conjunction
[𝔄 ; 𝔅] = λC[𝔅(𝔄(C))] (functional composition)

(22) Boolean conjunction and disjunction
a. [𝔄 & 𝔅] = λC′[𝔄(C′) ∩ 𝔅(C′)]
b. [𝔄 V 𝔅] = λC′[𝔄(C′) ∪ 𝔅(C′)]

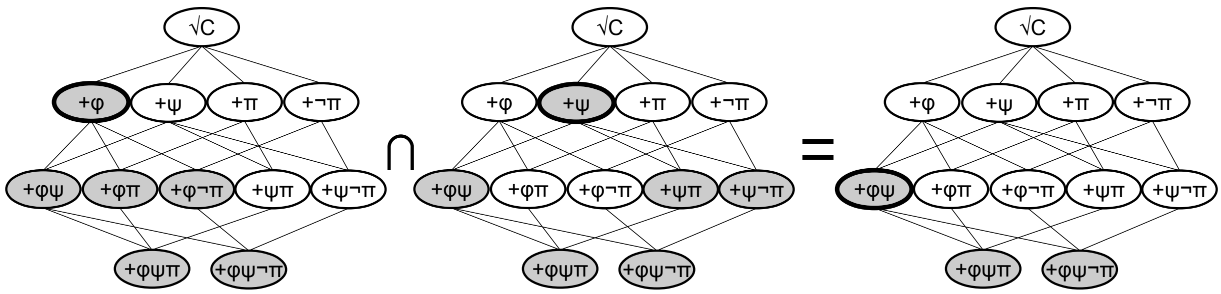

Figure 6: Conjunction $C + [F(\varphi) \,\&\, F(\psi)] = [C + F(\varphi)] \cap [C + F(\psi)]$

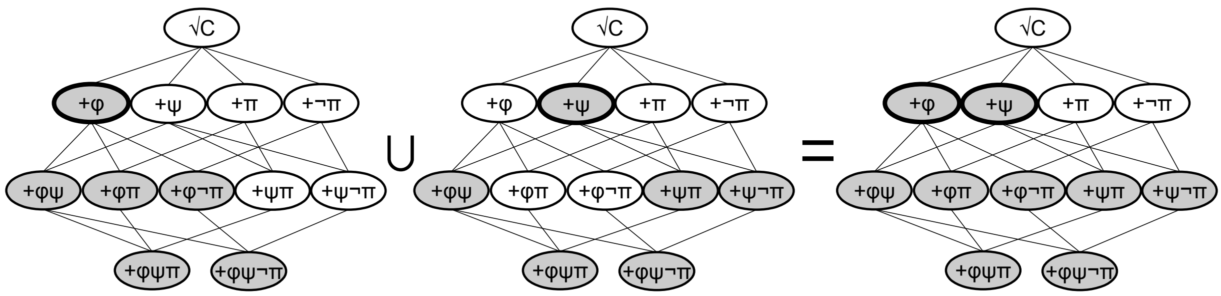

Figure 7: Disjunction $C + [F(\varphi) \vee F(\psi)] = [C + F(\varphi)] \cup [C + F(\psi)]$

(23) Disjunction of two regular speech acts does not result in single-rooted CS, problem of disjunction as speech acts, Dummett, 1973, Gärtner & Michaelis, 2010

(24) Proposal: Commitment spaces do not need to have a single root
a. A **commitment space** is a non-empty set of commitment states C.
b. $c \in C$ is a **root** of C iff there is no c' with $c' \subset c$ such that $c' \in C$
c. $\surd C = \{c \in C \mid \neg\exists c' \in C[c' \subset c]\}$ is the **set of roots** of C.

(25) Update affects all roots of a commitment space:
$F(\varphi) = \lambda C\ c \in C\ \exists c' \in \surd C[c' + f(\varphi) = c]$

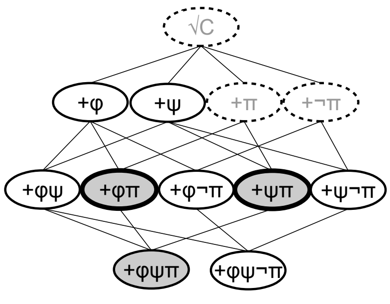

Figure 8:
$C + [F(\varphi) \vee F(\psi)] + F(\pi)$

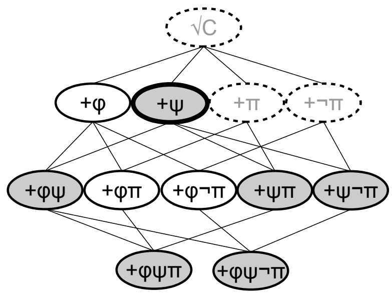

Figure 9:
$C + [F(\varphi) \vee F(\psi)] + F(\psi)$

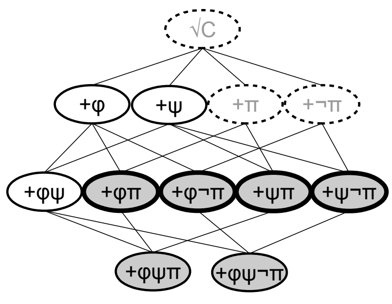

Figure 10:
$C + [F(\varphi) \vee F(\psi)] + [F(\pi) \vee F(\neg\pi)]$

(26) Boolean laws, e.g. double negation, excluded middle, de Morgan
a. $C + {\sim}{\sim}\mathfrak{A} = C - [C + {\sim}\mathfrak{A}] = C - [C - [C + \mathfrak{A}]] = C + \mathfrak{A}$
b. $C + [\mathfrak{A} \vee \neg\mathfrak{A}] = [C + \mathfrak{A}] \cup [C - [C + \mathfrak{A}]] = C$
c. $C + {\sim}[\mathfrak{A} \vee \mathfrak{B}] = [C - [[C + \mathfrak{A}] \cup [C + \mathfrak{B}]]$
$= [C - [C + \mathfrak{A}]] \cap [C - [C + \mathfrak{B}]] \quad = C + [{\sim}\mathfrak{A} \,\&\, {\sim}\mathfrak{B}]$

(27) Questions as metalinguistic speech acts (Krifka 2015):
a. C + ?(φ) = √C ∪ C + F(φ)
b. Question by S_1 to S_2 whether φ: C + ?(S_2⊢φ)

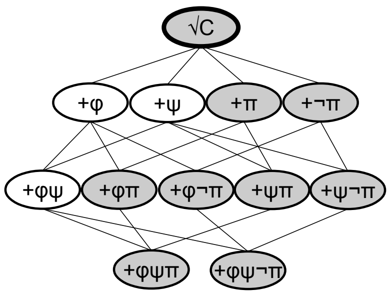

Figure 11: Question whether π or ¬π,
C + [?(π) ∨ ?(¬π)]

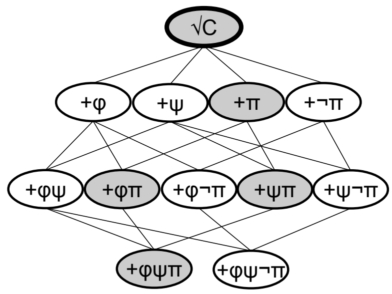

Figure 12: Monopolar question whether π
C + ?(π)

4. Conditional Assertions

4.1 Representation of conditional sentences

(28) First proposal for conditionals: [φ ⇒ ψ] = λC c∈C φ∈c → ψ∈c (to be revised)

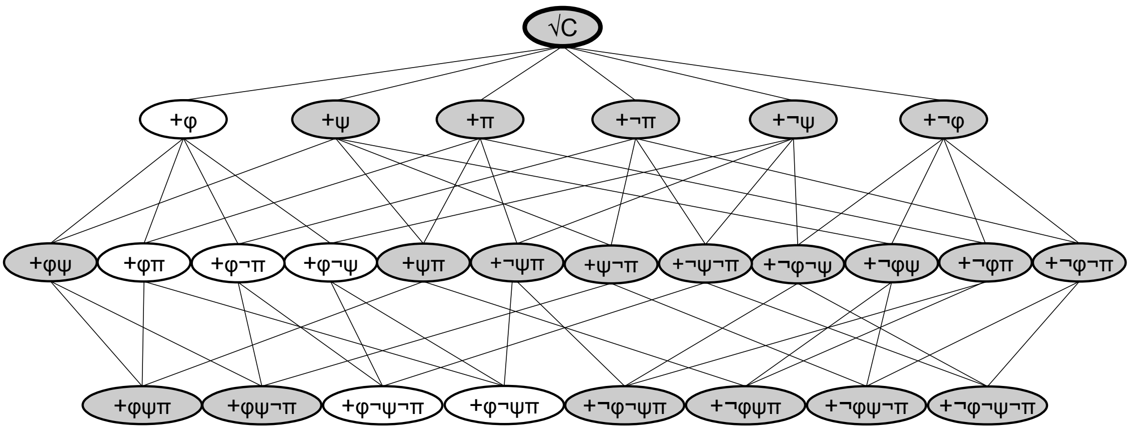

Figure 13: C + [φ ⇒ ψ] = {c∈C | φ∈C → ψ∈C}
C + [F(φ) ⇒ F(ψ)] = C + [[F(φ) ; F(ψ)] ∨ ~F(φ)] = C + [~F(φ) ∨ F(ψ)]

(29) Conditionals in terms of updates:
C + [𝔄 ⇒ 𝔅] = {c∈C | c∈C+A → c∈C+A+B}

(30) Equivalent to Peirce / Ramsey condition:
a. [𝔄 ⇒ 𝔅] = [[𝔄 ; 𝔅] ∨ ~𝔄]
b. [𝔄 ⇒ 𝔅] = [~𝔄 ∨ 𝔅] (condition: no anaphoric bindings between 𝔄 and B)

(31) Protasis is not a speech act; *if/wenn* updates without commitment
a. *Wenn Paul getanzt hat, dann hat auch Paula getanzt.*
'If Paul danced, then Paula presumably danced as well.'
b. **Wenn Paul hat getanzt, dann hat auch Paula getanzt.*

(32) *if/wenn* takes a proposition, turns it into an update function
⟦$[_{\text{ForceP}}$ $[_{\text{CP}}$ *if φ*] [*then* $[_{\text{ForceP}}$. $[_{\text{CommitP}}$ ⊢ $[_{\text{TP}}$ *ψ*]]]]⟧ = [F(φ) ⇒ S⊢ψ]

(33) Conditional assertion analysis of conditionals:
C + S: *if φ then ASSERT ψ* = C + [[F(φ) ; F(S⊢ψ)] V ~F(φ)]

(34) Pragmatic requirements: Grice 1988, Warmbröd 1983, Veltman 1985, cf. (30)(a)
a. Update of C with $\mathfrak{A}$ must be pragmatically possible i.e. informative and
b. Update of C + $\mathfrak{A}$ + B must be pragmatically possible not excluced

(35) Allows for other speech acts, e.g. questions:
C + S_1 to S_2: *if φ then QUEST ψ* = C + [[F(φ); ?(S_2⊢ψ)] V ~F(φ)],
answer to question + F(S_2⊢) would entail that antecedent is true (exclusion of ~F(φ))

4.2 Conjunction of conditionals

(36) Conjunction of conditionals
$[[\mathfrak{A} \Rightarrow \mathfrak{B}] ; [\mathfrak{A}' \Rightarrow \mathfrak{B}']] = [\mathfrak{A} \Rightarrow \mathfrak{B}] \; \& \; [\mathfrak{A}' \Rightarrow \mathfrak{B}']$
$= [\mathfrak{A} \Rightarrow \mathfrak{B}] \cap [\mathfrak{A}' \Rightarrow \mathfrak{B}']$

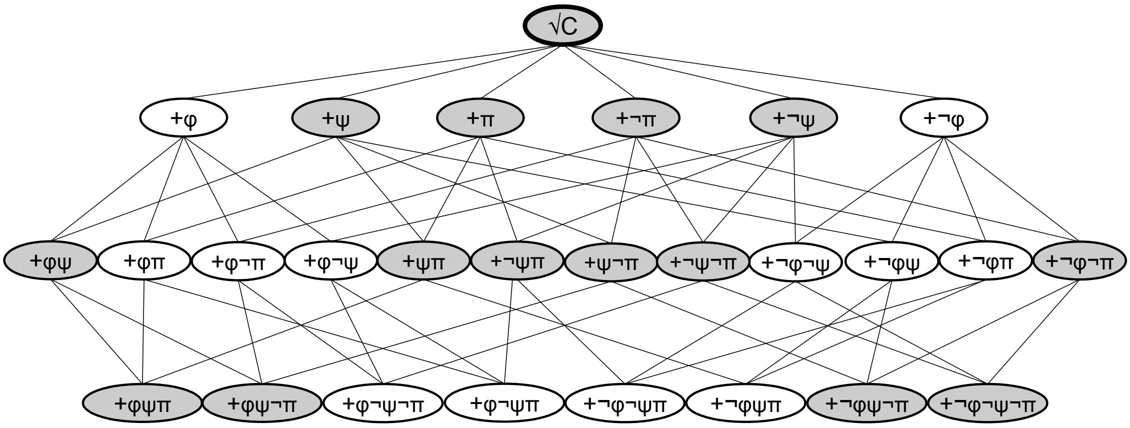

Figure 14: C + [[F(φ) ⇒ F(ψ)] & [F(¬φ) ⇒ F(¬π)]] = C + [F(φ) ⇒ F(ψ)] ∩ C + [F(¬φ) ⇒ F(¬π)]

(37) Conjunction of protases, by Boolean equivalences:
$[[\mathfrak{A} \Rightarrow \mathfrak{B}] \; \& \; [\mathfrak{A}' \Rightarrow \mathfrak{B}']] = [[\mathfrak{A} \; \& \; \mathfrak{A}'] \Rightarrow [\mathfrak{B} \; \& \; \mathfrak{B}']]$

(38) Restricted by pragmatics:
a. A & A′ must be a possible update:
If the number is even, we win, and if the number is odd, we loose.
≠ *If the number is even and it is odd, then we win and we loose.*
b. B & B′ might be excluded for logical reasons
If John is here, the party will be boring, and if Mary is here, it will be fun.
c. B & B′ might be excluded for reasons of world knowledge
If John comes, we open the red wine, and if Mary comes, we open the white wine.
cf. Veltman 1996 for a theory of default rules in dynamic semantics.

(39) For CP analysis, conjunction of antecedents needs stipulation for the ms relation:
a. $[\varphi > \psi] \wedge [\varphi' > \psi] = \lambda i[\psi(ms(i, \varphi)) \wedge \psi'(ms(i, \varphi'))]$
b. $[[\varphi \wedge \varphi'] > [\psi \wedge \psi']] = \lambda i[[\psi \wedge \psi'](ms(i,[\varphi \wedge \varphi'])]$
$= \lambda i[\psi(ms(i, [\varphi \wedge \varphi'])) \wedge \psi'(ms(i, [\varphi \wedge \varphi']))]$

4.3 Disjunction of conditionals

(40) Disjunction of conditionals often considered problematic (cf. Barker 1995, Edgington 1995, Abbott 2004, Stalnaker 2009).

(41) A good offer with which you only can gain, not loose?
If you open the green box, you'll get 10 euros,
or if you open the red box you'll have to pay 5 euros.

But we have the following equivalence (also for material implication)
a. $[[\mathfrak{A} \Rightarrow \mathfrak{B}] \vee [\mathfrak{A}' \Rightarrow \mathfrak{B}']] = [[\sim\mathfrak{A} \vee \mathfrak{B}] \vee [\sim\mathfrak{A}' \vee \mathfrak{B}']]$
$= [[\sim\mathfrak{A} \vee \mathfrak{B}'] \vee [\sim\mathfrak{A}' \vee \mathfrak{B}]] = [[\mathfrak{A} \Rightarrow \mathfrak{B}'] \vee [\mathfrak{A}' \Rightarrow \mathfrak{B}]]$
b. $= [[\sim\mathfrak{A} \vee \sim\mathfrak{A}'] \vee [\mathfrak{B} \vee \mathfrak{B}']] = [\sim[\mathfrak{A} \,\&\, \mathfrak{A}'] \vee [\mathfrak{B} \vee \mathfrak{B}']] = [[\mathfrak{A} \,\&\, \mathfrak{A}'] \Rightarrow [\mathfrak{B} \vee \mathfrak{B}']]$

Equivalent to: *If you open the* ***green*** *box, you'll pay five euros,*
or if you open the ***red*** *box, you'll get 10 euros.* (!)

(42) Typically the two antecedents are mutually exclusive, then no change at all:
a. $[[\mathfrak{A} \Rightarrow \mathfrak{B}] \vee [\mathfrak{A}' \Rightarrow \mathfrak{B}']] = [[\sim\mathfrak{A} \vee \sim\mathfrak{A}'] \vee [\mathfrak{B} \vee \mathfrak{B}']]$
$= [\sim[\mathfrak{A} \,\&\, \mathfrak{A}'] \vee [\mathfrak{B} \vee \mathfrak{B}']] = [[\mathfrak{A} \,\&\, \mathfrak{A}'] \Rightarrow [\mathfrak{B} \vee \mathfrak{B}']]$
b. if $C + [\mathfrak{A} \,\&\, \mathfrak{A}'] = \emptyset$, this is pragmatically excluded, or results in tautology,
but antecedents of disjunctions are easily understood as mutually exclusive
c. Following Gajewski (2002), systematic tautology results in ungrammaticality.

(43) Johnson-Laird & Savary, 1999: (a) and (b) should entail (c)
a. *If there is a king in the hand then there is an ace in the hand,*
or else if there is a queen in the hand then there is an ace in the hand.
b. *There is a king in the hand.*
c. *There is an ace in the hand.*
But this does not hold for material implication or for the model here:
As $[\mathfrak{A} \Rightarrow \mathfrak{B}] \vee [\mathfrak{A}' \Rightarrow \mathfrak{B}] = [\sim\mathfrak{A} \vee \sim\mathfrak{A}' \vee \mathfrak{B}]$, denying $\mathfrak{A}$ gives us $[\sim\mathfrak{A}' \vee \mathfrak{B}]$,
hence from (a) and (b) we can just conclude:
d. *If there is a queen in the hand then there is an ace in the hand.*

(44) Jackson, 1979 for material implication, here adapted to commitment states:
$[[\mathfrak{A} \Rightarrow \mathfrak{B}] \vee [\mathfrak{B} \Rightarrow \mathfrak{C}]] = [\mathfrak{B} \vee \sim\mathfrak{B}] \vee [\sim\mathfrak{A} \vee \mathfrak{C}]$,
as $[\mathfrak{B} \vee \sim\mathfrak{B}]$ is a tautology, the formula itself is.

(45) For the CP theory, conditionals should not be difficult to disjoin;
$[\varphi > \psi] \vee [\varphi' > \psi']$ is not equivalent to $[\varphi > \psi'] \vee [\varphi' > \psi]$,
$[\varphi > \psi] \vee [\psi > \pi]$ is not a tautology.

(46) Some conditionals are easy to understand, cf. example by Barker (1995)
a. *Either the cheque will arrive today, if George has put it into the mail,*
or it will come with him tomorrow, if he hasn't.
b. Not: $[F(\varphi) \Rightarrow F(\psi)] \vee [F(\neg\varphi) \Rightarrow F(\pi)]$, as this is a tautology.
c. Parenthetical analyis:
The cheque will arrive today (if George has put it into the mail)
or will come with him tomorrow (if he hasn't).
d. $[\text{ASSERT}(\psi) \vee \text{ASSERT}(\pi)]$; $[F(\varphi) \Rightarrow \text{ASSERT}(\psi)]$; $[F(\neg\varphi) \Rightarrow \text{ASSERT}(\omega)]$
(conjunctive analysis of conditionals cf. Meyer 2015)
e. Implies that one of the apodoses is true, which is how (a) is understood.
f. No such implication from the CP theory.

4.4 Negation of conditionals

(47) As propositional negation cannot apply to updates, we discuss denegation:

a. $\sim[\mathfrak{A} \Rightarrow \mathfrak{B}] = \sim[\sim\mathfrak{A} \vee \mathfrak{B}] = [\mathfrak{A} \,\&\, \sim\mathfrak{B}]$

b. But the following clauses are not equivalent

(i) *I don't claim that if the glass dropped, it broke*.

(ii) *The glass dropped and/but I don't say that it broke*.

c. Reason: Pragmatics requires that A is informative, hence (i) implicates that it is not established that the glass broke, in contrast to (ii).

d. Another reason: (ii) establishes the proposition *the glass dropped* without any assertive commitment.

(48) How is negation interpreted? Example by Barker (1995):

a. *It's not the case that if God is dead, then everything is permitted*.
'The assumption that God is dead does not license the (assertion of) the proposition that everything is permitted.'

b. Barker suggests an analysis in terms of metalinguistic negation.

(49) Punčochář, 2015 suggests as negation of *if φ then ψ*:

a. *Possibly φ but not ψ*,
i.e. it might be the case that the protasis is true and the apodosis is false.

b. Worked out in a framework of dynamic interpretation.

(50) Implementation in Commitment State Semantics:

a. $C + \Diamond\mathfrak{A} =_{def} C$ iff $C + \mathfrak{A}$ is defined
(leads to a non-empty set of consistent commitment states).

b. Punčochář's weak negation corresponds to $\Diamond\sim$

c. S_1: *This number is prime.*
S_2: ***No**, there is no evidence for it. It might have very high prime factors.*

(51) Applied to conditionals:

a. $C + \Diamond\sim[\mathfrak{A} \Rightarrow \mathfrak{B}] = C$ iff $C + \sim[\mathfrak{A} \Rightarrow \mathfrak{B}]$ is defined
iff $C + [\mathfrak{A} \,\&\, \sim\mathfrak{B}]$ is defined
i.e. if it is possible that $\mathfrak{A}$ without $\mathfrak{B}$.

(52) Égré & Politzer, 2013 assume three readings of conditional sentences, leading to different negations.
However, it seems more plausible that there is only one reading and one negation, but different more specific cases from which this negated meaning follows.

4.5 Conditional Apodoses

(53) Conditional apodoses are easy to interpret, example: Barker (1995)

a. *If all Greeks are wise, then if Fred is Greek, he is wise*.

b. *If Fred broke the glass, then his girlfriend, if he has one, will explode*.

(54) $[\mathfrak{A} \Rightarrow [\mathfrak{B} \Rightarrow \mathfrak{C}]] = [\sim\mathfrak{A} \vee [\sim\mathfrak{B} \vee \mathfrak{C}]]$
$= [[\sim\mathfrak{A} \vee \sim\mathfrak{B}] \vee \mathfrak{C}]$
$= [\sim[\mathfrak{A} \,\&\, \mathfrak{B}] \vee \mathfrak{C}] = [[\mathfrak{A} \,\&\, \mathfrak{B}] \Rightarrow \mathfrak{C}]$

(55) CP analysis achieves this result under stipulation:

a. $[\varphi > [\psi > \pi]] = \lambda i[[\psi > \pi](ms(i, \varphi))]$
$= \lambda i[\lambda i'[\pi(ms(i', \psi)](ms(i, \varphi))]$
$= \lambda i[\pi(ms(ms(i, \varphi), \psi))]$

b. $[[\varphi \wedge \psi] > \pi] = \lambda i[\pi(ms(i, [\varphi \wedge \psi]))]$

Necessary assumption: $ms(ms(i, \varphi), \psi) = ms(i, [\varphi \wedge \psi])$

(56) Barker (1995) mentions a possible counterexample to the rule of conjoining protases in the case of conditional conditionals:

a. *If Fred is a millionaire, then even if if he* <u>*does*</u> *fail the entry requirement, we should (still) let him join the club*.

b. Obvious problem: scope of *even* cannot extend over conditional after conjunction of protases

4.6 Conditional Protases

(57) Conditional protases are difficult to interpret (cf. Edgington, 1995, Gibbard, 1981)
If Kripke was there if Strawson was there, then Anscombe was there.

(58) $[[\mathfrak{A} \Rightarrow \mathfrak{B}] \Rightarrow \mathfrak{C}] = [\sim[\mathfrak{A} \Rightarrow \mathfrak{B}] \vee \mathfrak{C}] = [\sim[\sim\mathfrak{A} \vee \mathfrak{B}] \vee \mathfrak{C}]$
$= [[\mathfrak{A} \,\&\, \sim\mathfrak{B}] \vee \mathfrak{C}] = [[\mathfrak{A} \vee \mathfrak{C}] \,\&\, [\sim\mathfrak{B} \vee \mathfrak{C}]]$
$= [[\mathfrak{A} \vee \mathfrak{C}] \,\&\, [\mathfrak{B} \Rightarrow \mathfrak{C}]]$
$= [[\mathfrak{A} \,\&\, [\mathfrak{B} \Rightarrow \mathfrak{C}]] \vee [\mathfrak{C} \,\&\, [\mathfrak{B} \Rightarrow \mathfrak{C}]]]$

a. 1st disjunct problematic, as antecedent $\mathfrak{A}$ introduces proposition without speaker commitment.

b. 2nd disjunct problematic, as it states consequent $\mathfrak{C}$ without conditionalization.

c. As *if* turns protasis φ in $F(\varphi)$, the protasis must be a proposition, not an update.

(59) Sometimes conditional protases appear fine (Gibbard):
If the glass broke if it was dropped, it was fragile.

a. Read with stress on *broke*, whereas *if it was dropped* is deaccented

b. Evidence for *if it was dropped* to be topic

c. Facilitates reading *If it was dropped, then if it broke, it was fragile*; this is a conditional protasis.

(60) For CP theorists, conditional protases should be fine:

a. $[[\varphi > \psi] > \pi] = \lambda i[\pi(ms(i, \lambda i'[\psi(ms(i', \varphi)))]$.

b. True at an index i when π is true at the index i′ that is maximally similar to i such that the proposition $[\varphi > \psi]$ is true.

c. Paraphrase of (57): *If it holds that if Strawson was there, then Kripke was there, then Anscombe was there.*

d. Paraphrase for (59): *If it holds that if the glass was dropped, then it broke, then the glass was fragile.*

e. The CP account does not explain why (57) is hard to understand, and why (59) require deaccenting of the embedded *if*-clause.

4.7 Conditionals as complements of propositional attitudes

(61) Conditionals occur as arguments of propositional attitudes:

a. *Bill thinks that if Mary applies, she will get the job.*

b. *Bill thinks if Mary applies, she will get the job.*

c. *Bill thinks Mary will get the job if she applies.*

(62) Dependent clause order in German is possible (a), main clause order preferred (b), possibly because sequence of two complementizers *dass wenn* is dispreferred, which can be avoided (cf. c, d).
a. (?) *Bill glaubt, dass wenn Mary sich bewirbt, sie den Job bekommen wird.*
b. *Bill glaubt, wenn Mary sich bewirbt, wird sie den Job bekommen.*
c. *Bill glaubt, dass Mary den Job bekommen wird, wenn sie sich bewirbt.*
d. *Bill glaubt, dass Mary, wenn sie sich bewirbt, den Job bekommen wird.*

(63) Structures like (62)(a,c,d) strongly suggest conditionals propositions (CP):
a. Verb final order of apodosis
b. *dass* most likely requires a proposition as complement.

(64) But: complements of *that* clauses embedded by certain verbs may carry speech-act related features, e.g. discourse particles (Coniglio 2011);
a. *Bill glaubt, dass Mary wohl den Job bekommen wird.*

(65) Assume: There is a way to construct contents of propositional attitudes that corresponds to the contents that would be conveyed in a contribution in conversation.

4.8 Conclusion

(66) There is a coherent account of conditionals for CA theorists.

(67) This account fares better in explaining which semantic operations can be applied to conditionals, and which cannot.

(68) Conditional clauses as complements of propositional attitude predicates remain to be a problem for the CA account.

5. Counterfactual Conditional Assertions and Generalized Commitment Spaces

(69) Indicative conditionals considered so far:
The protasis can be informatively added to the commitment space.
In particular, C + *if φ then ASSERT ψ* pragmatically implicates that $C + F(\varphi) \neq \emptyset$

(70) This is systematically violated with counterfactual conditionals:
The number turns out to be odd. If it were even, I would be a millionaire.

(71) Proposal:
a. The counterfactual conditional requires to "thin out" the commitment states at the root of the commitment space C so that the protasis F(φ) can be assumed.
b. This requires "going back" the hypothetical larger commitment space in which the actual commitment space is embedded.
c. This can be achieved with the notion of a generalized commitment space.

(72) A **generalized commitment space** is a pair of commitment states $\langle C_b, C_a \rangle$, where
a. $C_a \subseteq C_b$
b. $\neg\exists c \in C_b\, [C_a < c]$, where $C_a < c$ iff $c \notin C_a$ and $\exists c' \in C_b\, [c' \subset c]$
c. Notice that C_a is a "bottom" part.

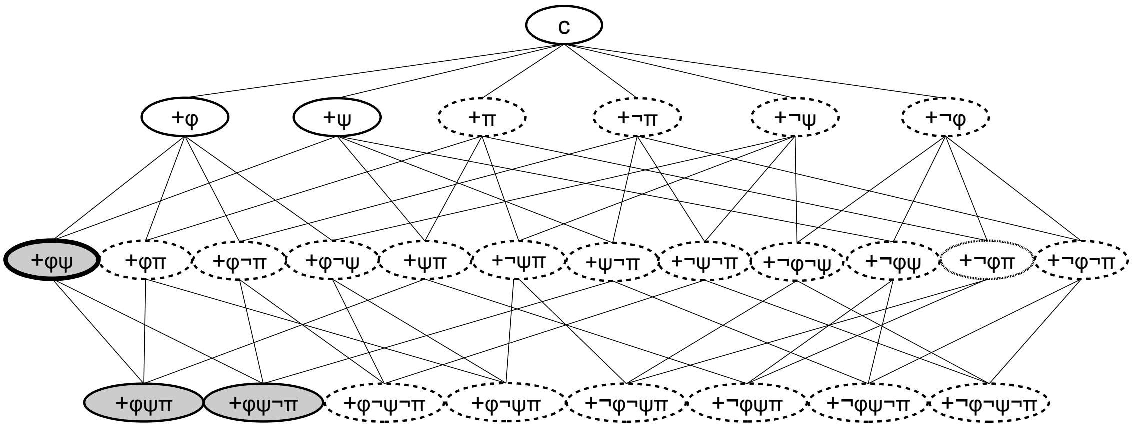

Figure 15: Generalized Commitment Space ⟨C, C + F(φ) + F(ψ)⟩
with root (fat border), actual commitment space (grey area),
commitment states above the actual (solid border) and commitment states beside the root (dotted border)

(73) Regular update of a general commitment space:
$\langle C_b, C_a\rangle + A = \langle c\in Cb \neg [Ca + A] < c, [C_a + A]\rangle$

(74) Update with denegation "prunes" the background commitment space C_b:

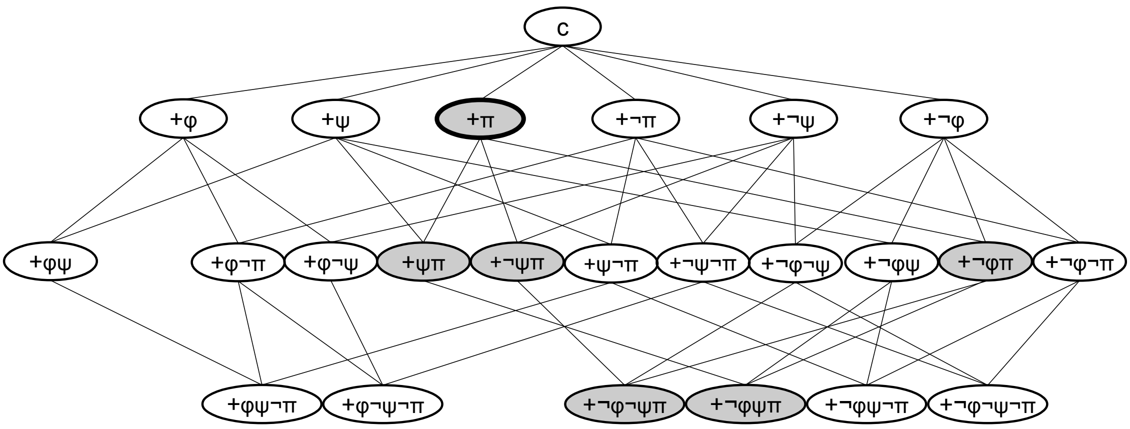

Figure 16: Update of ⟨C, C + F(π)⟩ with ~F(φ)

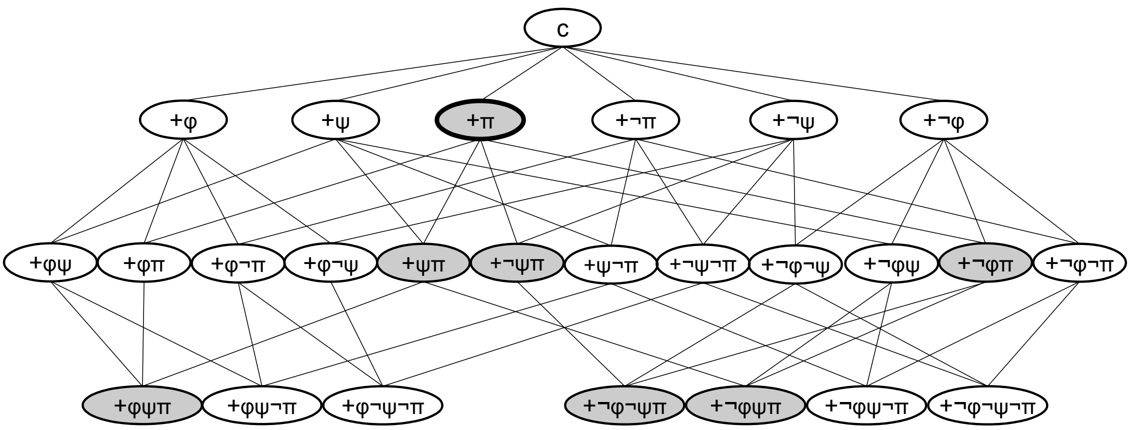

Figure 17: Update of ⟨C, C + F(π)⟩ with [F(φ) ⇒ F(ψ)], i.e. with [~F(φ) V F(ψ)]

(76) Counterfactual conditionals:
a. Go back / up from the actual root(s) to the next commitment state(s) at which the antecedent can be performed.
b. Update the commitment states under these roots.
c. This leads to pruning of the background commitment space only.

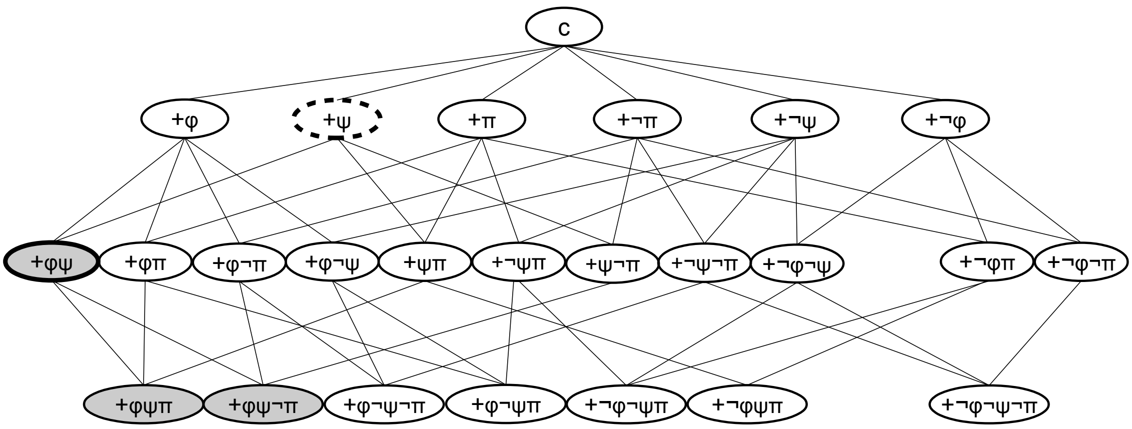

Figure 18: Counterfactual update:
⟨C, C + F(ψ) + F(φ)⟩ + [F(¬φ) ⇒ F(π)], involving interpretation at the next compatible root C + F(ψ)

(77) Counterfactual conditional informs about hypothetical commitment states, but this may have an effect under revisionary update, cf. (20)

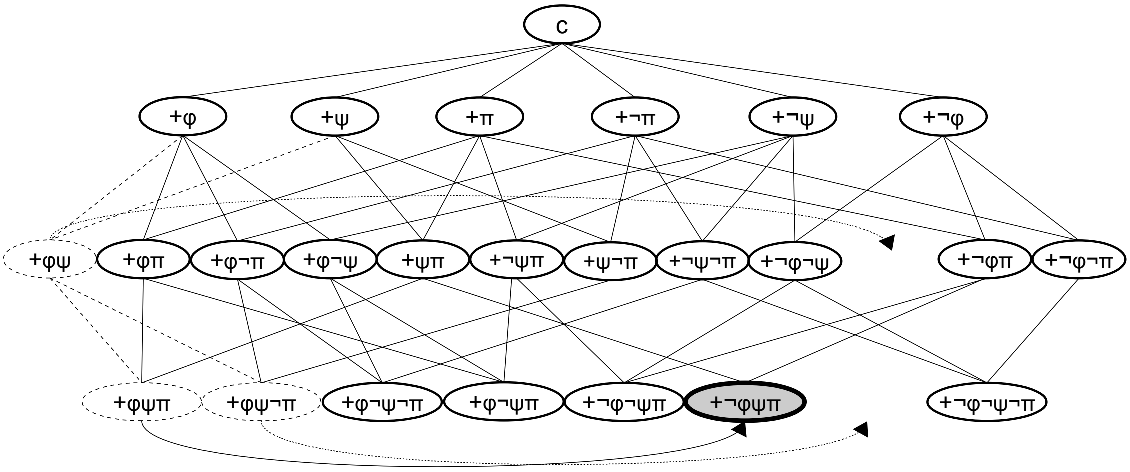

Figure 19: Revisionary update of generalized commitment space of Figure 18 with +F(¬φ) leading to new commitment space that respects the counterfactually added information.

(78) Explaining of "fake past tense" in counterfactual conditionals (cf. Dudman, 1984, Iatridou, 2000, Ritter & Wiltschko 2014, Karawani, 2014, Romero, 2014).
a. Past tense shifts commitment space from actual to a "past" commitment space.
b. As conversation happens in time, leading to increasing commitments, this is a natural transfer from the temporal to the conversational dimension.

(79) Other instances of temporal talk applied to common grounds:
a. *Let's think. The number had five digits. It probably is a zip code.*
b. *What was your name again?* (cf. Sauerland & Yatsushiro, 2014.

6. Conclusion

(80) The paper developed a framework for conditional clauses as conditional assertions (to be extended to other conditional speech acts)

(81) This was done within the framework of Commitment Spaces, which contain explicit information about the possible future developments of the common ground in conversation.

(82) It was argued that this explains better the limited semantic combinations of conditional sentences than the analysis as conditional propositions.

(83) The analysis was extended to counterfactual conditionals, where past tense indicates a shift from the current or actual commitment space to a concrete or hypothetical past commitment space.

(84) Conditionalization is seen as a phenomenon of conversation (if φ is the case, then I assert ψ), not as a phenomenon of truth-conditional semantic content (I assert the proposition 'if φ then ψ').

(85) Conjunction and disjunction can also be seen as a phenomenon of conversation:
a. Commitments after $F([\varphi \wedge \psi])$ and $F(\varphi)$ & $F(\psi)]$ are the same
b. Commitments after $F([\varphi \vee \psi])$ and $F(\varphi)$ V $F(\psi)$ are the same,
but note that $F([\varphi \vee \psi])$ is single-rooted.
c. Commitments after $F(\neg\varphi)$ are stronger than commitments after $\sim F(\varphi)$

(86) Treatment of conditional sentences:
a. CP: Select from the current index the closest one(s) at which protasis is true;
apply to them the apodosis.
b. CA: Select from the current root(s) the closest commitment states
for which the protasis holds,
apply the apodosis to them.
c. Hence: Commitments after $F(\varphi > \psi)$ and $[F(\varphi) \Rightarrow F(\psi)]$ are comparable,
if ms(φ, i) and

(87) Operations on commitments like &, V, ~, $\Rightarrow$
are mirrored by corresponding operators on propositions like $\wedge, \vee, \neg, >$

(88) Primacy of operations on commitment?

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