CONDITIONALS AND DEFINITE DESCRIPTIONS

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2 heuristics for a semantics of conditionals:

(i) To determine whether *if F, G* is true, hypothetically add *F* to your beliefs; see whether *G* follows.

(ii) Consider *if F* as a referential term, denoting *the closest world in which F holds*; see whether that world satisfies *G* (Stalnaker 1968).

Goal: Push line (ii) (to the limit?) by arguing that *if-clauses are, quite literally, definite descriptions of possible worlds.*

1 The Non-Monotonicity of (Subjunctive) Conditionals

1.1 Monotonicity of Material and Strict Implications

-Material Implication: $\phi \Rightarrow \psi$ is true iff (not ϕ) or ψ

-Strict Implication:

$\models_w \Box(\phi \Rightarrow \psi)$ iff for all w' such that wRw' $\models_{w'} \phi \Rightarrow \psi$

Where $\phi \rightarrow \psi$ is either the strict or the material implication, the following hold:

Properties

[1] Strengthening of the Antecedent
If $\phi \rightarrow \psi$, then $(\phi \ \& \ \phi') \rightarrow \psi$

[2] Contraposition
If $\phi \rightarrow \psi$, then $\neg\psi \rightarrow \neg\phi$

[3] Transitivity
If $\phi \rightarrow \psi$ and $\psi \rightarrow \chi$, then $\phi \rightarrow \chi$

However none of the properties hold of natural language conditionals!

1.2 The Non-Monotonicity of Conditionals

[1] Failure of Strengthening of the Antecedent: If p, q but if p & p', not q

Stalnaker's and Lewis's examples [slightly modified]

(1) a. If the USA threw its weapons into the sea tomorrow, there would be war; but if the USA and the other nuclear powers all threw their weapons into the sea tomorrow, there would be peace.
b. If I strike this match, it will light; but I dip this match into water and strike it, it won't.

[2] Failure of Contraposition: If p, q doesn’t entail If not q, not p

(2) a. If it rained, it didn’t rain hard.
≠> If it rained hard, it didn’t rain [von Fintel’s (4a)]

b. (Even) if Goethe hadn’t died in 1832, he would still be dead now
≠>If Goethe were alive now, he would have died in 1832. [due to Kratzer; von Fintel’s (4b)]

[3] Failure of Transitivity: If p, q and If q, r do not entail: If p, r

(3) Failure of Transitivity: examples [von Fintel 1998]
If Brown wins the election, Smith will retire to private life.
If Smith dies before the election, Brown will win the election.
≠> If Smith dies before the election, Smith will retire to private life [Adams 1965, cited in von Fintel 1998]

1.3 Could Domain Restriction be the Culprit?

(4) The situation in our department has deteriorated. Every student is depressed. This isn't the case in competing departments. For instance, many Harvard students are perfectly happy. Competition will be tough.

(5) Lewis 1973: 'our problem is not a conflict between counterfactuals in different contexts, but rather between counterfactuals in a single context. It is for this reason that I put my examples in the form of a single run-on sentence, with the counterfactuals of different stages conjoined by semicolons and 'but'' (Lewis 1973 p. 13).

☞ 2 ways to go (within possible worlds approaches)

I. Traditional line: Domain Restriction doesn't suffice. The semantics of 'if' must be revised. This raises a question: *Why* does the word *if* have such a special semantics? Can it be related to other properties of the linguistic system? (Answer: yes. *if* can be analyzed - literally - as the word *the* applied to a definite description of worlds).

II. Von Fintel's line: Domain Restriction alone is the culprit. There are constraints on how domain restriction can change in discourse.

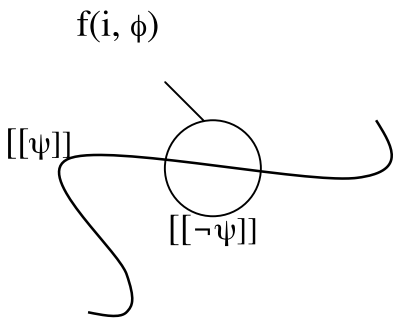
2 Three Semantic Analyses of Conditionals

1. Stalnaker's System: If p, q is analyzed as: **the closest p-world is a q-world**

2. Intermediate System: If p, q is analyzed as: **the closest p-worlds <u>are</u> q-worlds**

3. Lewis's System: (Further generalization of 2., based on systems of spheres)

- **Intermediate System = Lewis's System + Limit Assumption**
- **Stalnalnaker's System = Lewis's System + Limit Assumption + Uniqueness**

Stalnaker's System	**Intermediate System**	**Lewis's System**
Selection Function, **one** world $\mathbf{[[if\ \phi]] = f(i, \phi) \in W}$ $\mathbf{= j}$ *the closest p-world is a q-world*	Selection Function, **several** worlds $\mathbf{[[if\ \phi]] = f(i, \phi) \subseteq W}$ $\mathbf{= \{j_1, j_2, j_3, ...\}}$ *the closest p-world**s are** q-worlds*	**No** Selection Function. Spheres
"If ϕ, ψ" is true at world i iff either (1) No ϕ-world exists, or (2) $f(i, \phi) \in [[\psi]]$	"If ϕ, ψ" is true at world i iff either (1) No ϕ-world exists, or (2) $f(i, \phi) \subseteq [[\psi]]$	"If ϕ, ψ" is true at word i (according to the system of spheres \$), iff either (1) No ϕ-world belongs to any sphere S in $\$_i$, or (2) Some sphere S in $\$_i$ does contain at least one ϕ-world, and $\phi \Rightarrow \psi$ holds at every world in S
Conditional excluded middle $j \in [[\psi]] \vee j \in [[\neg\psi]]$	**No conditional excluded middle** It may be that neither $\{j_1, j_2, j_3, ...\} \subseteq [[\psi]]$ nor $\{j_1, j_2, j_3, ...\} \subseteq [[\neg\psi]]$ 	**No conditional excluded middle**
Limit Assumption satisfied => cannot handle infinite sequence of worlds each closer than the prev	**Limit Assumption satisfied** => cannot handle infinite sequence of worlds each closer than the prev	**Limit Assumption not satisfied** => **can** handle infinite sequence of worlds each closer than the prev
<u>No</u> easy extension to Generalized Quantification (a single world cannot restrict a GQ)	**Easy extension to Generalized Quantification** (a plural description **can** restrict a GQ)	**?**

2.1 Stalnaker's System vs. Lewis's System

2.1.1 Stalnaker

A > B is true in w iff B is true in f(A, w)
A > B is false in w if B is false in f(B, w)

Conditions

(1) For all antecedents A and base worlds w, A must be true in f(A, w)

(2) For all antecedents A and base worlds w, f(A, w)=λ only if there is no world possible with respect to w in which A is true

(3) For all base worlds w and all antecedents A, if A is true in w, then f(A, w)=w

(4) For all base worlds w and all antecedents E and E', if E is true in f(E', w) and E' is true in f(E, w), then f(E, w)=f(E', w)

(4') For all base worlds w and antecedents E and E', if E'$\subseteq$E and E' is true in f(d, E), then f(d, E')=f(d, E).

Note: When (1) is assumed, (4') is equivalent to (4).

Claim: Condition 4' and Condition 4 are equivalent given Condition 1.
Proof:
(i) Condition 4' $\Rightarrow$ Condition 4.
Suppose f(d, E')$\in$E and f(d, E)$\in$E'. By Condition 1, f(d, E')$\in$E$\cap$E' and f(d, E)$\in$E$\cap$E'. By Condition 4', f(d, E)=f(d, E$\cap$E')=f(d, E').
(ii) Condition 4 $\Rightarrow$ Condition 4'.
Suppose E'$\subseteq$E and f(d, E)$\in$E'. By Condition 1, f(d, E')$\in$E' and hence f(d, E')$\in$E since E'$\subseteq$E. By (i), f(d, E)=f(d, E').

2.1.2 From Stalnaker to Lewis: Excluded Middle and Limit Assumption

♦ Conditional Excluded Middle

(6) It is not the case that if Bizet and Verdi were compatriots, Bizet would be Italian; and it is not the case that if Bizet and Verdi were compatriots, Bizet would not be Italian; nevertheless, if Bizet and Verdi were compatriots, Bizet either would or would not be Italian.

(7) (if A, B) or (if A, not B)

♦ Limit Assumption

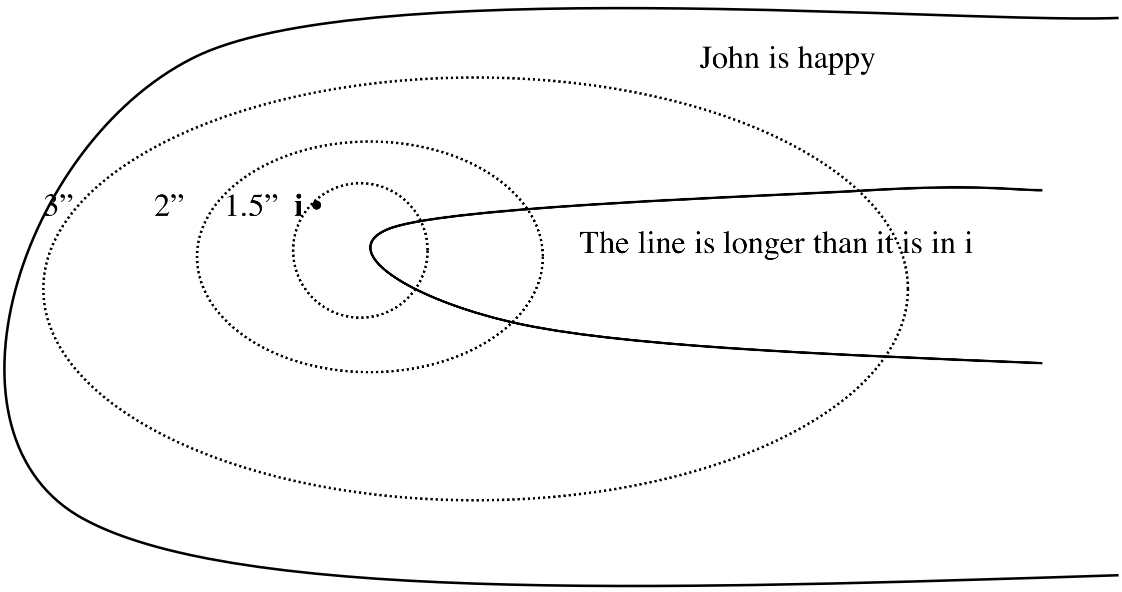
-Limit Assumption = There always is such a thing as 'the closest p-worlds'

-Argument against the Limit Assumption: Suppose we entertain the counterfactual supposition that at this point __________ there appears a line more than an inch long. (Actually it is just under an inch.) There are worlds with a line 2" long; worlds presumably closer to ours with a line 1.5" long; worlds presumably still closer to ours with a line 1.25" long; worlds presumably still closer... But how long is the line in the *closest* worlds with a line more than an inch long?

-Solution: Drop Limit Assumption

If ϕ, ψ is true at world i (according to the system of spheres \$) if and only if either
(1) No ϕ-world belongs to any sphere S in $\$_i$, or
(2) Some sphere S in $\$_i$ does contain at least one ϕ-world, and $\phi \Rightarrow \psi$ holds at every world in S

(18)If this line were longer than it is, John would (still) be happy



(19)**Problem:** If this line were longer than it is, it would be less than 2”

2.1.3 Lewis's Analysis

- Variably Strict Conditionals

Let \$ be an assignment to each possible world i of a set $\$_i$ of sets of possible worlds. Then \$ is called a *(centered) system of spheres*, and the members of each $\$_i$ are called *spheres* around i, if and only if, for each world i, the following conditions hold.

(C) $\$_i$ is *centered on i;* that is, the set {i} having i as its only member belongs to $\$_i$.

(1) $\$_i$ is *nested;* that is, whenever S and T belong to $\$_i$, either S is included in T or T is included in S.

(2) $\$_i$ is *closed under unions;* that is, whenever S is a subset of $\$_i$ and $\cup$S is the set of all worlds j such that j belongs to some member of S, $\cup$S belongs to $\$_{i.}$

(3) $\$_i$ is *closed under (nonempty) intersections;* that is, whenever S is a subset of $\$_i$ and $\cap$S is the set of all worlds j such that j belongs to every member of S, $\cap$S belongs to $\$_{i.}$

Definition

$\phi \square\!\!\rightarrow \psi$ is true at world i (according to the system of spheres \$) if and only if either (1) No ϕ-world belongs to any sphere S in $\$_i$, or (2) Some sphere S in $\$_i$ does contain at least one ϕ-world, and $\phi \Rightarrow \psi$ holds at every world in S

3 Conditionals as Definite Descriptions I: Non-Monotonicity

3.1 The Non-Monotonicity of Definite Descriptions

3.1.1 'Monotonicity' of Strawsonian Definite Descriptions

A Strawsonian account predicts that the patterns in (8) should hold of definite descriptions when *if* is replaced with *the*, at least when all the definite description(s) involved can be used felicitously (i.e. when their presuppositions are satisfied):

(8) a. If *The* ϕ, ψ, then *The* ϕ & ϕ', ψ
b. If *The* ϕ, ψ, then *The* $\neg\psi$, $\neg\phi$
c. If *The* ϕ, ψ and *The* ψ, χ, then *The* ϕ, χ

Ad a. If *The* ϕ can be used felicitously, there is exactly one ϕ-individual in the domain of discourse. Hence if *The* ϕ & ϕ' can also be used felicitously, it must denote the same individual, and therefore the entailment should hold.
Ad b.: If both *The* ϕ and *The* $\neg\psi$ can be used felicitously, there is exactly one ϕ-individual and one $\neg\psi$-individual in the domain of discourse. If the former has property ψ, then it must be distinct from the second, which thus couldn't have property ϕ (or else there would be two ϕ-individuals in the domain, contrary to assumption).
Ad c.: if *The* ϕ and *The* ψ can both be used felicitously, then there is there is exactly one ϕ-individual and one ψ-individual in the domain of discourse. Thus if the first one has property ψ, it must be identical to the second one, hence the entailment.

Note: The same predictions are made for plural descriptions if these are analyzed in terms of maximality operators. For if *The* ϕ denotes the maximal ϕ-set in the domain of discourse, and it is included in a ψ-set, then: (i) *a fortiori* the same holds for the maximal $\phi\&\phi'$-set, which derives a; (ii) the maximal $\neg\psi$-set cannot contain any ϕ-elements (or else the maximal ϕ-set would contain these elements too, and would thus fail to be included in a ψ-set); this, in turn, derives b. c is derived in similar fashion: if the maximal ϕ-set s_1 is included in a ψ-set s_2 and the maximal ψ-set (which must include s_2) is contained in a χ-set s_3, then of course s_1 must be included in s_3.

3.1.2 Behavior of Natural Language Descriptions

(9) Invalid inferences
a. The dog is barking, therefore the neighbors' dog is barking.
a'. The pig is grunting, therefore the pig with floppy ears is grunting
a". The students are happy, therefore the students in Kabul are happy
b. The professor is not Dean, therefore the Dean is not a professor
c. The students are vocal. The undergraduates in Beijing are students. Therefore the undergraduates in Beijing are vocal.

(10) Non-contradictory statements
a. The dog is barking, but the neighbors' dog is not barking.
a'. The pig is grunting, but the pig with floppy ears is not grunting [Lewis 1973]
b. The professor is not Dean, but of course the Dean is a professor.
c. The students are vocal, and of course the undergraduates in Beijing are students, but the undergraduates in Beijing are certainly not vocal at the moment.

Why should that be? Intuitively, Lewis's suggestion is that 'the pig' doesn't mean 'the one and only pig in the domain of discourse', but rather: 'the most salient pig in the domain of discourse'. Thus the most salient *pig* need not be the same individual as the most salient *pig with floppy ears*, hence the consistency of a'. By the same reasoning, we could add that 'the students' need not denote the maximal set of students in the domain of discourse, but may denote the most salient students only, hence the consistency of a".

3.1.3 Is a Russellian analysis better off?

Superficially it would seem that Russell fares slightly better than Strawson, since on a Russellian analysis b do *not* come out as valid. This is because one of Strawson's definedness conditions could be violated in the consequent, which on Russell's analysis leads to falsity rather than undefinedness. Here are the relevant abstract examples:

(11) a. Refutation of a: Suppose that $[[\phi]]=[[\psi]]=\{d\}$, $[[\phi \,\&\, \phi']]=\emptyset$
b. Refutation of b: Suppose that $[[\phi]]=[[\psi]]=\{d\}$, $[[\neg\psi]]=\emptyset$

By contrast, the pattern in c *is* predicted to be valid by Russell, and in this respect he fares no better than Strawson:

(12) Proof of c: From *The* ϕ, ψ, we obtain: $|[[\phi]]|=1$ and $[[\phi]]\subseteq[[\psi]]$. From *The* ψ, χ, we obtain: $|[[\psi]]|=1$ and $[[\psi]]\subseteq[[\chi]]$. Taken together, these conditions entail: $|[[\phi]]|=1$ and $[[\phi]]\subseteq[[\chi]]$

But even for a' and b', where it would superficially appear to work, Russell's analysis is utterly implausible because it saves the coherence of the sentences only by giving the negation *wide* scope in the clause where it appears. By contrast, giving the negation *narrow* scope would immediately yield falsehoods:

(13) <u>Situation</u>: there is one (salient) pig without floppy ears and one (less salient) pig with floppy ears in the domain of discourse.
a. The pig is grunting, but the pig with floppy ears is not grunting [Lewis 1973]
b. [The P] G & ¬[the (P& F)] G (can be true in this situation)
c. [The P] G & [the (P& F)] ¬G (cannot be true in this situation)

(14) <u>Situation</u>: there is one (salient) professor who isn't a Dean and one (less salient) professor who is Dean in the domain of discourse.
a. The professor is not Dean, but of course the Dean is a professor.
b. ¬[the P] D & [the D] P (can be true in this situation)
c. [The P] G & [the (P& F)] ¬G (cannot be true in this situation)

Unfortunately for the Russellian, these sentences may remain intuitively true even when negation has clearly narrow scope:

(15) a. The pig is grunting, but the pig with floppy ears is doing something other than grunting
b. The professor is something other than Dean, but of course the Dean is a professor

The Russellian's advantage is only apparent, and that on closer inspection Lewis's examples are as problematic for Russell as they are for Strawson.

3.2 Controls

3.2.1 The Problem

(16) The situation in our department has deteriorated. Every student is depressed. This isn't the case in competing departments. For instance, many Harvard students are perfectly happy. Competition will be tough.

(17) [*Situation:* A committee must select some applicants. Some of the applicants are Italian, and there are also Italians on the committee, though of course they are not the same.]
Every Italian voted for every Italian

The intended reading is that every Italian *on the committee* voted for every Italian *among the applicants*.

3.2.2 Attempt at a solution

(18) a. Every dog is barking, therefore the neighbors' dog is barking
(similarly for: '... therefore every dog that the neighbors have is barking')
b. Every pig is grunting, therefore the pig with floppy ears is grunting
(similarly for: '... therefore every pig with floppy ears is grunting')
c. Every student is happy, therefore every student in Kabul is happy.

(19) (Due to P. Svenonius, p.c.)
[There are ten girls and ten boys in the class. Three girls raise their hands. Talking to the speaker, I say:]
a. Wait, the girls have a question!
b. Wait, the three girls have a question!
c. <?> Wait, the girls each have a question!
d. #Wait, every girl has a question!
e. #Wait, all girls have a question!
f. #Wait, all the girls have a question!
g. #Wait, each of the girls has a question!

4 Conditionals as Definite Descriptions II: Further Arguments

4.1 Topicalization of the *if*-clause, focalization of 'then'

The referential analysis of *if*-clauses can now be used to derive a number of interesting syntactic and semantic facts. First, it has been observed that *if*-clauses can appear in the position of sentence topics, in a left-dislocated position. This should now come as no surprise, since referential elements can quite generally be dislocated in this fashion. By contrast, quantifiers or simple restrictors may not be:

(20) a. *Every man, he is happy
b. *Man, every is happy

Bittner 2001, who develops similar ideas, gives a further argument from Warlpiri. Following Hale 1976, she observes that the following sentence is ambiguous:

(21) Maliki-rli *kaji*-ngki yarlki-rni nyuntu
[dog-ERG *ST*-3SG.2SG bite-NPST you]
ngula-ju kapi-rna luwa-rni ngajulu-rlu.
DEM-TOP FUT-1SG.3SG shoot-NPST me-ERG
a. Reading A. 'As for *the* dog that bites you, I'll shoot *it*.' (individual-centered)
b. Reading B. '*If* a dog bites you, *then* I'll shoot it.' (possibility-centered)

Bittner writes:

> The dependent clause of [(21)] — with the complementizer *kaji*, glossed 'ST' for 'same topic' — introduces a topical referent of some type. On reading (A) the topic is a contextually prominent individual, and on reading (B), a prominent possibility. In either case, the topical referent is picked up in the matrix comment by a topic-oriented anaphoric demonstrative *ngula-ju*, which is likewise type-neutral. So depending on the context, the topic of [(21)] may be either the most prominent dog which bites the addressee or the closest possibility that a dog may bite. The fact that one and the same sentence can have both of these readings suggests that they have essentially the same semantic representation, up to logical type.

-Bhatt & Pancheva 2001 and Schuh 2005: strong syntactic similarity between conditionals and correlative constructions, which 'involve a free relative clause adjoined to the matrix clause and coindexed with a proform inside it'.

(22) Free Relatives: Marathi (Pandharipande 1997)

a. (dzar) tyane abhyas kela tar to pa hoil
if he-ag studying do.Past.3MSg then he pass be.Fut.3S
'If he studies, he will pass (the exam)'.
b. dzo manus tudzhya sedzari rahto to manus lekhar ahe
which man your neighborhhod-in lives that man writer is
'The man who lives in your neighborhood is a writer'
(Lit. 'Which man lives in your neighborhood, that man is a writer').

(23) Definite Morphology (Schuh 2005)

	Clause type	Clause marking	Determiner source
Bole	'if/when' 'when'	bȁ...(**ye**) ...(**ye**)	Definite article: **tèmshi yê** 'the sheep' (same)
Ngamo (G)	'if/when' 'when'	**na**...(**-i**) (no marking)	Definite article: **tèmshis'è** 'the sheep' (cf. **–i** inYaya **tèmshì'i** 'the sheep')
Karekare	'if/when' 'when'	...**ye**/**ya** ...(**ma**)	Definite article: **lo-yi** 'the meat' Demonstrative: **kwàrà 'âm** 'that house' (cf. Kanakuru **gamī mè** 'this ram')
Ngizim	'if/when' 'when'	...**-n**/**nən** ...(**tənu**/**ngum**)	< Masculine proximal demonstrative: cf. Bade (G).: **kwàm-ȃni** 'that bull' "Known" demonstrative: **tlà tənu** 'that cow' Cf. Definite article: **sōnȍ-gu** 'the shoe'

-'Then' as a strong pronoun (Iatridou 1994, Izvorski 1996, Schlenker 2003)

(24) a. If you come, Mary will be happy.
b. If you come, then Mary will be happy.

(25) a. If you come, Mary will be happy. And if you don't come, Mary will also be happy.
b. #If you come, Mary will be happy. And if you don't come, then Mary will also be happy.

(26) If you come, Mary will be happy. And if you don't come, then too Mary will be happy.

(27) a. [Les étudiants]$_i$, ils$_i$ ont compris
[The students]$_i$, they$_i$-weak$_F$ have understood too
b. [Les étudiants]$_i$, eux$_i$ ont compris
[The students]$_i$, them$_i$-strong$_F$ have understood too

(28) Everybody understood. The professors understood, the staff understood, and...
a. [Les étudiants]$_i$, ils$_i$ ont compris aussi
[The students]$_i$, they$_i$-weak$_F$ have understood too
b. #[Les étudiants]$_i$, eux$_i$ ont compris aussi
[The students]$_i$, them$_i$-strong$_F$ have understood too

(29) [Les étudiants]$_i$, eux$_i$ aussi ont compris
[The students]$_i$, them$_i$-strong$_F$ too have understood

4.2 Condition C effects ?

Condition C of the Binding Theory states that a referential expression ('R-expression') may not be bound. Typically violations of the constraint are relatively mild (and cross-linguistically unstable) when an R-expression is co-indexed with another c-commanding R-expression. By contrast, the violations are very strong (and cross-linguistically stable) when an R-expression is c-commanded by a co-referring pronoun.

(30) a. $John_i$ likes [people who admire him_i]
b. *He_i likes [people who admire $John_i$]
c. [His_i mother] likes [people who admire $John_i$]

(31) a. [$R\text{-expression}_i$ [$_{VP}$ [$_{NP}$ ... $pronoun_i$ ...]]]
b. * [$pronoun_i$ [$_{VP}$ [$_{NP}$ ... $R\text{-expression}_i$ ...]]]
c. [[... $pronoun_i$ ...] [$_{VP}$ [$_{NP}$ ... $R\text{-expression}_i$ ...]]]

(32) a. [if it were sunny right now]$_i$ I would see [people who would $then_i$ be getting sunburned].
b. *I would $then_i$ see [people who would be getting sunburned [if it were sunny right now]$_i$].
c. Because I would $then_i$ hear lots of people playing on the beach, I would be unhappy [if it were sunny right now]$_i$

5 <u>*If*-clauses as Plural Descriptions</u>

5.1 Arguments for a plural analysis

-*If*-clauses as restrictors of generalized quantifiers

(33) a. Probably, if Mary comes, John will be happy.
b. If Mary comes, John will probably be happy.
a'. Most of the students are happy.
b'. As for the students, most of them are happy.
a". Most of the water is polluted.
b". As for the water, most of it is polluted.

-Having one's cake and eating it too

(i) Semantically, plurals don't give rise to a 'Conditional Excluded Middle'

(ii) But pragmatically, they might.

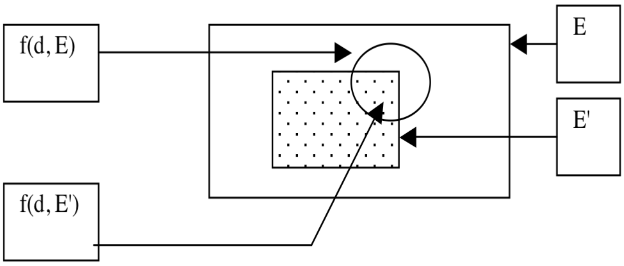
(34) a. TRUE: The children are playing.
b. FALSE: The children are not playing.
c. ?: The children are boys." (Fintel 1997, citing Löbner 1987).

If the same presupposition holds of *if*-clauses, as is suggested by Fintel 1997, the Conditional Excluded Middle will appear to hold of all sentences that can be uttered felicitously.

5.2 Modifying Stalnaker's Conditions

Condition 1*: For each element d and each non-empty set E of elements, f(d, E)≠# and f(d, E) ⊆E.

Condition 2*: For each element d, each set E and each set E', if E'⊆E and f(d, E)∩E'≠Ø, then f(d, E')=f(d, E)∩E'.



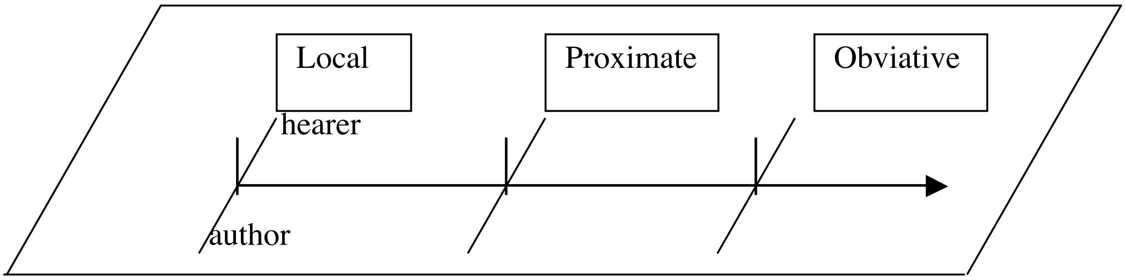
Condition 3* (=Condition 3): For each context c and each set E of elements of a given sortal domain, f(c, E)=# iff E=Ø.

When # is reinterpreted as the empty set, Condition 1*, Condition 2* and Condition 3* turn out to be equivalent to (Zimmermann, p.c.):

(TWF) There is a transitive well-founded relation $\leq_d$ such that f(d, E)={e⊆E | for all e'∈E: e$\leq_d$e'}.

Condition 4*: For each element d and each subset E of the domain, if d∈E, then d∈f(d, E).

6 Present, Past and Pluperfect Conditionals



'In any one context, there is a distinction, among animate third persons, between proximate and obviative. Only one animate third person, be it singular or plural, is proximate; all others are in obviative form. The proximate third person represents the topic of discourse, the person nearest the speaker's point of view, or the person earlier spoken of and already known'. [Bloomfield 1962 p. 38]

6.1 Data

(35) a. If you play tomorrow, you will win
b. If you played tomorrow, you would win
c. If you had played tomorrow, you would have won (see Ippolito 2003).

All three sentences can be uttered felicitously, but not in the same contexts:

-(35)a is naturally uttered if I take it to be possible that my interlocutor will play tomorrow. For instance the sentence would be natural if one had just said: *I don't know whether you will play tomorrow. But ...*

-(35)b would among others be uttered felicitously in a situation in which I take it that the addressee will not play tomorrow: *I know you won't play. This is too bad - ...*

-(35)c involves what is morphologically a pluperfect, although it is clear from the content of the assertion that the resulting interpretation is purely modal, since the event which denoted is to take place 'tomorrow'. This conditional could be naturally asserted if the addressee is in his hospital room after an injury, and will thus clearly be unable to participate in tomorrow's competition. Saying simply *If you played tomorrow, you would win* results in a deviant or a false sentence. With the pluperfect, the sentence becomes entirely natural.

Solution 1 (Ippolito 2003): In modally interpreted pluperfects, one layer of past tense morphology is temporally interpreted and constrains the point of evaluation of an accessibility relation (intuition: the further one goes back in time, the more possibilities are open)

Solution 2 (Schlenker 2003): In modally interpreted pluperfects, both layers of past tense morphology are interpreted in a purely modal fashion. Following the intuition (though not the implementation) of Iatridou 2000, a modally interpreted past tense is taken to indicate modal remoteness.

6.2 An idea of an 'ontologically symmetric' solution

(36) a. It is raining [no features]
b. $rain(t_0, w_0)$

(37) a. It is raining [only tense features]
b. $rain(t_0 \{local(t_0)\}, w_0)$

(38) a. It rained [deictic reading, only tense features]
b. $rain(t_1 \{<local(t_1)\}, w_0)$

(39) a. It had rained [deictic reading, only tense features]
b. $rain(t_2 \{t_2 < t_1 \{<local(t_1)\}\}, w_0)$

(40) a. I am sick [only person features]
b. $be\text{-}sick\ (x_0 \{local(x_0)\}, t_{0,} w_0)$

(41) a. He is sick [only person features]
b. $be\text{-}sick\ (x_1 \{<local(x_1)\}, t_{0,} w_0)$

(42) a. He^{OBV} is sick [only person features]
b. $be\text{-}sick\ (x_2 \{x_2 < x_1 \{<local(x_1)\}\}, t_{0,} w_0)$

(43) a. The dog is barking
b. $barking(\iota x_1\, dog(x_1, t_0, w_0), t_0, w_0)$

(44) a. If it rains, it pours
b. $pour(t_0, \iota w_1\, rain(t_0, w_0) \{local(\iota w_1\, rain(t_0, w_0)\})$

(45) a. If it rained, it would pour
b. $pour(t_0, \iota w_1 \, rain(t_0, w_0) \, \{<local(\iota w_1 \, rain(t_0, w_0))\})$

(46) a. If it had rained (right now), it would have poured
b. $pour(t_0, \iota w_2 \, rain(t_0, w_0) \, \{\iota w_2 \, rain(t_0, w_0)<w_1\{<local(w_1)\}\})$

6.3 A Glitch

-Subjunctive conditionals can also be uttered felicitously in situations in which the conditional is not counterfactual, i.e. in situations in which it is not presupposed that the addressee won't play tomorrow. Part of the phenomenon appears to be related to the fact that this is a future conditional (Iatridou 2000 uses the term 'Future Less Vivid' to refer to 'subjunctive' conditionals of this sort). But part of the phenomenon applies to subjunctive conditionals quite generally. Stalnaker 1975 discusses the following example, due to Anderson, and uttered at the scene of a murder:

(47) If the butler had done it, we would have found just the clues which we in fact found.

As Stalnaker writes, 'here a conditional is presented as evidence for the truth of its antecedent. The conditional cannot be counterfactual, since it would be self-defeating to presuppose false what one is trying to show true.' In other words, we must accept that some subjunctive conditionals are not counterfactual.

-A related phenomenon with definite descriptions?

(48) Bulgarian hird person descriptions must be used if the speaker is unsure whether he/she falls under the description.
[Watching a scene in a mirror, the speaker says:]
a. Naj-visokite Zeni sme i naj-dobre obleCenite
most-tall-the women be-1pl and most-well dressed
'The tallest women are-1st pl. also the best-dressed.'
b. Naj-visokite Zeni sa i naj-dobre obleCenite
most-tall-the women be-3pl and most-well dressed
'The tallest women are-3rd pl. also the best-dressed.'
☞ If the speaker does not know whether she is among the tallest women (and may then add: Well, it seems that the tallest women include me!), only b. can be used.

Ordering Semantics vs. Premise Semantics

Lewis, D. (1981) 'Ordering Semantics and Premise Semantics for Counterfactuals', *Journal of Philosophical Logic* 10: 217-234

Note: We restrict attention to the case where the domain is finite. For the infinite case, see Lewis's paper.

♦ Ordering Frames

(49) Ordering Frame
An ordering frame is a function that assigns to any world i a strict partial ordering $<_i$ of a set S_i of worlds, satisfying:

(Centering) i belongs to S_i, and for each j in S_i, $i <_i j$ unless $i=j$

(Strict partial ordering of a set S = a transitive, asymmetric, binary relation having S as its field)

(50) (OF)

if A, C is true iff C holds at every closest A-world to i.

♦ Premise Frames

Definitions: An *A-consistent premise set* for i is a subset of H_i that is consistent with the proposition A. It is a *maximal A-consistent premise set* for i iff, in addition, it is not properly included in any larger A-consistent set for i.

(51) Premise Frame
A Premise frame H is a function that assigns to any world i a set H_i of propositions (premises for i) satisfying:

(Centering) $\cap H_i=\{i\}$

(52) (PF)
if A, C is true at i
iff $\forall J$ (J is a non-empty maximal A-consistent premise set for i $\Rightarrow$ $J\cup\{A\}$ entails C)

♦ Equivalence of Frames

- *From Premise Frames to Ordering Frames*

(53) Let H be a premise frame. An ordering frame < can be derived as follows:
For any world i, let S_i be the union of propositions in H_i. Define:

$j <_i k$ iff all propositions in H_i that hold at k also hold at j, but the converse isn't true.

We see that:

(i) < is an ordering frame
(ii) For any propositions A, C and world i: (PF) iff (OF)

Ad (ii): Let j be any A-world and let J be the set of all propositions in H_i that hold at j.
We show that (A) J is a non-empty maximal A-consistent premise set for i
iff (B) j is a closest A-world to i

It then follows that:
$\forall$J (J is a non-empty maximal A-consistent premise set for i $\Rightarrow$ J$\cup$\{A\} entails C)
iff
C holds at every closest A-world to i.

Proof
-If J is empty, (A) and (B) are false

-If J is non-empty:

(A) => (B): If (B) is false, for some $k \in A \cap S_i$ $k <_i j$. Let K be the set of propositions in H_i that hold at k. K is an A-consistent premise set for i and it properly includes J, so (A) is false.

(B) => (A): If not (A), J must be properly included in some larger A-consistent set for i, call it K. For any k in $A \cap (\cap K)$, $k <_i j$, so not (B).

<u>Note:</u> Two premise frames may give rise to the same ordering frame.

Example: H: $H_i = \{\{i\}, \{i, j, k\}\}$
H': $H_i = \{\{i, j\}, \{i, k\}\}$

Derived ordering in both cases: $S_i = \{i, j, k\}$
$i <_i j$, $i <_i k$, $j \approx k$

- *From Ordering Frames to Premise Frames*

Let < be an ordering frame. For each world i, define
$H_i = \{\{j: j <_i k \text{ or } j = k\}: k \in S_i\}$.

-Centering for H follows from Centering for <: i belongs to each member of H_i, and {i} belongs to H_i since $\{i\} = \{j: j < i \text{ or } j = i\}$. Thus $\cap H_i = \{i\}$. Hence H is a premise frame.

-H and < are equivalent:

$S_i = \cup H_i$

For any g, h in S_i, (A) $g <_i h$ iff (B) g belongs to all the members of H_i that h belongs to and more besides.

(A) => (B): Suppose that $g <_i h$. If h belongs to $\{j: j <_i k \text{ or } j = k\}$, so does g since $g <_i h$ and $h <_i k$ or $j = k$. In addition, g belongs to $\{j: j <_i g \text{ or } j = g\}$ and h does not, and g belongs to S_i

(B) => (A): Suppose that (B). Since h belongs to S_i and h belongs to $\{j: j <_i h \text{ or } j = h\}$, so does g. But $g \neq h$ since they do not belong to exactly the same sets, hence $g <_i h$.

(54) Gibbard's problem

M, at a peep-hole, is spying on three hit-men, Tom, Dick and Harry, and their boss. M hopes to discover who will receive the order to kill. M sees Tom leave the room. He then hears the boss give the order. M thinks (and could easily assert)

a. If he didn't tell Harry, he told Dick (not Tom)

Another spy, N, at a different peep-hole with a different view, saw Dick leave the room by a different door. He too heard the boss give the order. N thinks (and could easily assert)

b. If he didn't Harry, he told Tom (not Dick)

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