Past facts and the semantics of counterfactuals: arguments for a *de re* analysis

Introduction. Past tense morphology is often found in *if*-clauses in counterfactual conditionals across languages (a.o.Palmer 2001, Iatridou 2000). However, past tense does not provide the temporal coordinates of the if-clause eventuality. Although if-clauses in counterfactuals bear past tense morphology (*Cambridge Grammar of the English Language*), the hypothesis may be located in the past, present or future (Dudman 1985). In this paper I propose a *de re* analysis of past tense in counterfactuals: **past** identifies the quantificational domain of the modal by referring to the situations (*facts*) the counterfactual is about. I present three arguments that favor of a 'local' *de re* resolution of similarity over a g(lobal)-analysis (as found in classical Lewis-Stalnaker semantics).

Analysis. Following Enc 1990 (a.o.), I claim that modals are responsible for shifting the reference time of the clause they c-command. Past tense morphology in the antecedent of counterfactuals is the morphological reflex (agreement) of a higher c-commanding past tense (if-clauses are sequence of tense environment). I propose the (simplified, tripartite) structure in (1):

(1) $\mathbf{past_i}$ [**would** [if-clause…. $\varnothing_{\mathbf{j\ past}}$….] [consequent clause ……..]]

The modal combines with the antecedent and consequent clause propositions, and then with past:

(2)[[**would**]] (p)(q)([[$\mathbf{past_i}$]]) = 1 iff {w: [[$\mathbf{past_i}$]] < w & p(w) = 1} ⊆ {w: q(w) = 1}

$\mathbf{past_i}$ is interpreted as referring to a past situation in the actual world (a 'chunky' version of a tense pronoun analysis). Quantification must be restricted to law-like worlds, and a counterfactual will be true iff all lawlike worlds that contain a counterpart of the *res* situation (i.e. [[p$\mathbf{ast_i}$]]) in which the antecedent is true are also worlds in which the consequent is true.

Some intuitive motivation for a *de re* analysis can be found in a characterization of counterfactuals as conditionals that exhibit a 'reduced' dependency on facts. Consider the Adam's-examples in (3), where we standardly judge (3a) true and (3b) false:

(3) a. If Oswald didn't kill Kennedy, somebody else did.
b. If Oswald hadn't killed Kennedy, somebody else would have.

One explanation is that in (3a) we cannot 'set aside' the fact that Kennedy has been killed. In terms of worlds, we would say that in (1a) the worlds quantified over have to fit what we know about the actual world (where Kennedy has been killed). In (3b), we are allowed to set aside the fact that Kennedy has been killed and look at worlds that differ from the actual world in that Kennedy is not dead. The conditional in (3b) shows a *reduced dependency* on facts: only some of the actual world facts are found in the worlds quantified over. By appealing to situations (parts of worlds) we can give an account of the partial dependency of (3b) on the actual world facts.

Sophisticated g-similarity vs. particular situations. A *de re* analysis predicts similarity with respect to the *res* situation. A sophisticated version of the g-(obal)similarity analysis predicts that the worlds quantified over will be worlds that maximize spatio-temporal match with the actual world (Lewis 1979). I present three arguments to differentiate between the two analysis.

Argument 1: *Counterfactuals are about past situations*. Embedding counterfactuals under *know* provides insights into their semantics. Kratzer (2002) has defended an analysis of *know* based on facts (situations that exemplify propositions) according to which *S knows p* only if (i) there is a fact *f* that exemplifies *p,* and (ii) S believes *p de re* of *f*. We can use our intuitions about knowledge attribution to identify the situations (facts) counterfactuals are about. Consider Fine's well-known example (Fine 1975), embedded under *know,* in a Gettier-style scenario:

(4) Smith knows that *if Nixon had pushed the button, there would have been a nuclear holocaust*.

Imagine that at some point in the past the button had been connected to an A-set of missiles and that Smith was aware of this. Later, the button was disconnected and connected to a B-set of

missiles. Smith never found out. Even though the counterfactual is true, and Smith believes it, we wouldn't claim that he knew it. Following Kratzer, (4) is false because Smith is not acquainted with the facts that exemplify the counterfactual. In order to judge (4) true we would want Smith to be acquainted with facts pertaining to the history of the button (that it had been attached to the B-set of missiles). A *de re* analysis explains our intuitions: the counterfactual is true when [[**past]]** corresponds to the situation that exemplifies the counterfactual.

Argument 2: *Two-counterpart worlds.* Imagine a world in which there are two Nixons and two buttons connected to nuclear missiles (there are two counterparts of the actual world facts). Imagine that one Nixon pushes one button, and the missiles go off. The other Nixon pushes the other button, and nothing happens. Such a world would make us doubt the truth of *If Nixon had pushed the button, there would have been a nuclear holocaust.* A g-similarity analysis does not predict this: this world would either be excluded from the domain of quantification (too different) or would satisfy both antecedent and consequent. A *de re* analysis like (3), with modifications to allow us to access each counterpart, would make correct predictions:

(5) [[**would**]] (p)(q)([[**past**$_i$]]) = 1 iff {s: [[**past**$_i$]] < s & p(s) = 1} ⊆ {s: ∃s': s<s' & q(s') = 1}

A counterfactual is true iff all (law-like) situations that include a counterpart of [[**past**$_i$**]]** in which the antecedent clause is true can be extended to situations in which the consequent is true. By quantifying over all situations that contain [[**past**$_i$]], all counterparts of past are considered.

Argument 3: *'Distributivity' under quantified subjects.* Embedding counterfactuals under *know* with quantified subjects tells us more about how facts are introduced at LF. Consider (6):

(6) John and Jack both contemplated marrying Alice, and would have been happy, but for different reasons: John values Alice's money, but Jack likes her generous nature. If John had married Alice, he would have been happy, because she is very rich and if Jack had married Alice, he would have been happy, because she is wonderful. Self-aware, the following sentence is true:

a. Both men know that if they had married Alice, they would have been happy.

Accused of greediness, John would have agreed, but Jack wouldn't. The same g-similarity relation can have problems with examples like this (*the most similar worlds in which John marries Alice are worlds in which she is rich, but the most similar worlds in which Jack marries Alice include worlds in which she is rich and she is poor - the prediction is that the similarity relation is weighed in the same way in both cases*). The facts can be captured in a *de re* analysis if tense in the scope of *believe*-verbs is existentially closed, resulting in a proposition like (7), where there is existential quantification over past situations:

(7)[[**would**]](p)(q)([[**P**]]) = 1 iff ∃s: past(s) &{s': s < s' & p(s') = 1} ⊆ {s': ∃s": s'<s" & q(s") = 1}

Given (7), (6a) will be true iff for each man there is a past situation s (he is acquainted with) such that all situations that include a counterpart of s in which the antecedent is true can be extended to situations in which the consequent is true.

Solving old puzzles. A *de re* analysis can also provide insights into older problems about the resolution of similarity (Slote's observations that maximizing spatio-temporal match blindly makes mistaken predictions and Tichy's observations about the relevance of particular facts).

Conclusion. The *de re* analysis is designed to capture the intuition that counterfactual conditionals can successfully be paraphrased as '*given these facts, if p, would q'*. Similarity is calculated (locally) only with respect to the situation corresponding to the interpretation of **past** (the *res* situation). Both a *de re* analysis and a g-similarity analysis invoke similarity, but I have shown that the views can be differentiated, and that local similarity makes better predictions.