

Non-deictic tenses in conditionals

The English tenses are often claimed to be deictic, i.e. to make reference to the utterance time and localize some state of affairs relative to it. For instance, the simple past is proposed to convey that the eventuality described in its scope took place at some contextually given time in the past of the utterance time. Let us call the time with respect to which the tenses locate their eventuality the *anchor* of the tense. It is well-known that this approach has difficulties to account for the interpretation of tenses in intensional contexts (Abusch 1997). In this paper we will focus on one particular intensional context in which a deictic theory of tenses turns out to be problematic: conditional sentences.

A deictic theory of tense cannot account for examples like (1) that can obtain an interpretation according to which the interview takes place before Peter comes out smiling, but in the future of the utterance time. In this case the anchor of the past tense in the consequent is the event time of the antecedent. The observation is not bound to past tensed consequents, but occurs with consequents in the present tense as well. We do not observe an analogous past-shift of the anchor in case the antecedent is about the past.

- (1) If Peter comes out smiling, the interview went well.

Future shifted anchors in conditional contexts have not received a lot of attention in the literature yet. An important exception is Crouch (1993). However, his proposal is problematic in that it uses the intuitively questionable notion of a verification time of assertions. The verification time constitutes a second temporal deictic center that tenses can use as anchor. Other approaches (Kaufmann 2005, Dowty 1982) have empirical problems.¹ The proposal we will present in the talk intends to improve on these approaches.

We assume a dynamic perspective on semantics: the meaning of a sentence is described as a context change function. Contexts c are sets of possibilities. A possibility p is a tuple $\langle w_p, t_p \rangle$, where w_p , the *world-parameter* of the possibility, is an interpretation function for proposition letters at times, and t_p , the *temporal perspective* of p , is the time that is according to p the *now*. In order to account for the future shifted anchor times in conditional sentences we make three claims.

1. Non-deictic tenses. Following Abusch (1997) we claim that tenses are not in a strict sense deictic. Their anchor is set by the temporal perspective of the context in which they are interpreted. In most cases the temporal perspective is the utterance time, however, in intensional contexts the temporal perspective can be shifted.

2. Formalizing historical necessity. We need to formalize the intuition that while the past and the present are determined the future is still undecided. This is standardly done by describing the future as a set of possible worlds that agree with respect to the past and the present, but can differ with respect to the future. In consequence, all statements about the future become modal statements. This is insofar problematic, as one can use the (on surface modal-free) simple present to refer to the future as well. To improve on this point, we model the undecidedness of the future by

¹For instance, these two approaches predict – contra to intuitions – similar future readings of the past in the antecedent of conditionals.

taking the interpretation function w_p of possibilities p to be undefined for the future.² We say that some tuple $\langle w_p, t_p \rangle$ is a proper possibility, if its world parameter w_p is completely defined for all times before and including t_p , but undefined thereafter.

3. The semantics of conditionals. The final original part of this approach lies in the semantics it proposes for conditional sentences. We follow others in describing the update of a context with a conditional as a test. The test is successful (and the context returned unchanged), if the consequent does not change the hypothetical context introduced by the antecedent. The difference of our proposal is that we do not describe the hypothetical context introduced by the antecedent as the subset of c where the antecedent is simply true. Given that the future is (far-going) undefined, such an approach has problems to account for the ease with which we can formulate conditional sentences about the future. Instead, we propose that the antecedent itself fixes the future hypothetically - but only to the point where the truth of the antecedent becomes defined. This can be formalized using the classical similarity approach of Stalnaker and Lewis, just adding a specification of the similarity relation. For indicative conditionals the relevant definitions look roughly as follows. We define the possible futures $Fut(p)$ of possibility p as the set $\{p' \mid w_p \subseteq w_{p'}\}$. Then we introduce the following order between possibilities: for $p_1, p_2 \in Fut(p)$: $p_1 \leq_p p_2$ iff $w_{p_1} \subseteq w_{p_2}$.³ Now we can describe the hypothetical update with the antecedent as the following set of \leq -minimal possibilities: $c[IF \ \psi] = \bigcup_{p \in c} Min(\leq_p, \{p' \in Fut(p) \mid p' \models \psi\})$.⁴

These assumptions are sufficient to account for the observations under discussion. In case the antecedent of a conditional is about the future, it introduces a hypothetical context that fixes the future up to the point where the antecedent becomes determined. But because the temporal perspective of a possibility has to be the point where determination of the interpretation function ends and indetermination starts, fixing the future means shifting the temporal perspective of the possibilities in this hypothetical context to the future - more particularly, to the point at which the truth of the antecedent becomes determined. The tense in the consequent is interpreted in this hypothetical context. Because we propose that its anchor is not the utterance time but the temporal perspective of its interpretation context, we predict the future shift of the anchor observed in (1). This theory also predicts correctly, that if the antecedent is about the past and the present, the anchor of the consequent is not shifted. The theory can be extended to similar observations in the scope of modals.

References: D. Abusch, 1998. Sequence of tense and temporal de re. *Linguistics and Philosophy*, **20**: 1-50.***R. Crouch, 1993. *The temporal properties of English conditionals and modals*. Ph.D. thesis. University of Cambridge.***D. Dowty, 1982. Tense, time adverbs and compositional semantic theory. *Linguistics and Philosophy*, **5**: 23-55.***S. Kaufmann, 2005. Conditional truth and future reference. *Journal of Semantics*, **22**: 231 - 280.

²The future can be determined if this predetermination follows from undefeasible laws and facts of the past and the future (for instance, time tables). We will ignore this complication in the abstract. However, the theory we have developed does respect it.

³Given that functions are relations, it makes sense to define set-inclusion between functions. The relation \subseteq is non-trivial in this case, because the world parameter w_p of possibilities p is a partially defined function.

⁴ $Min(\leq, A) = \{a \in A \mid \neg \exists a' \in A : a' \leq a \ \& \ a \not\leq a'\}$. The definitions get more complicated if one takes the observation described in footnote 2 into account.