Updates & discourse anaphora: a dynamic approach to *otherwise*

Josh Phillips & Hadas Kotek
Yale University

The puzzle. The interpretation of the English adverb *otherwise* depends on preceding discourse, giving rise to different possible readings, as in (1a–b) from Webber *et al.* (2001:7):

(1)　　a.　If the light is red, stop. *Otherwise* go straight on.
$$\approx \text{If the light is } \underline{\text{not}} \text{ red...}$$
　　　b.　If the light is red, stop. *Otherwise* you'll get a ticket.
$$\approx \text{If the light is red and you } \underline{\text{don't}} \text{ stop...}$$

Proposal. We propose that *otherwise* refers to a set of worlds that have been *eliminated* from consideration in a previous discourse update. We formalize this in a dynamic semantics framework, borrowing insights from work on complement anaphora and modal subordination. Dynamic approaches to semantics have been fruitful in accounting for anaphora resolution (e.g. Kamp 1981, Heim 1982, Roberts 1987, Nouwen 2003). These approaches view meaning as the context-change potential of a given utterance (Nouwen *et al.* 2016), accounting for the role of inter-sentential dependencies for interpretation.

Following Kratzer (1981, 1986); Roberts (1989), a.o., we assume that *if*-clauses induce a temporary update of the common ground with the antecedent proposition, thereby restricting the context set. The consequent then further restricts this same set of worlds in the common ground. In other words, *"if p then q"* eliminates all the $p \wedge \neg q$ worlds from the context set (see also Meyer 2013).

> We propose that *otherwise* represents an instruction to the addressee to consider the **complement** of a set of worlds that has been established elsewhere in the discourse context.
> The prejacent of *otherwise* is interpreted as predicating of worlds in this complement set.

These relations can be instructively formalised with reference to the notion of "discourse subordination" as formulated in Roberts (1989:718), where 'accommodation of material from prior utterances serves the role of antecedent for the subordinated clause.'

The analysis of examples (1a–b) is illustrated below, where different prior discourse updates can be chosen to serve as the *antecedent* to the *otherwise* statement — that is, to be negated by *otherwise*. We introduce the notation ∘ to signify this negation of a prior discourse update.

In (1a), the antecedent of *'otherwise'* is the <u>antecedent of the conditional</u>. That is, *otherwise* targets the set of worlds in which the light is <u>not</u> red, and asserts that in those worlds, you should go straight. In (1b), the antecedent of *'otherwise'* is the <u>consequent of the conditional.</u> That is, *otherwise* targets the set of worlds where the light is red but you <u>do not</u> stop, and asserts that in those worlds, you get a ticket. Notice that both DRSs are subordinate to the first *if*-clause.

(a) DRS representation for (1a)　　　　　　(b) DRS representation for (1b)
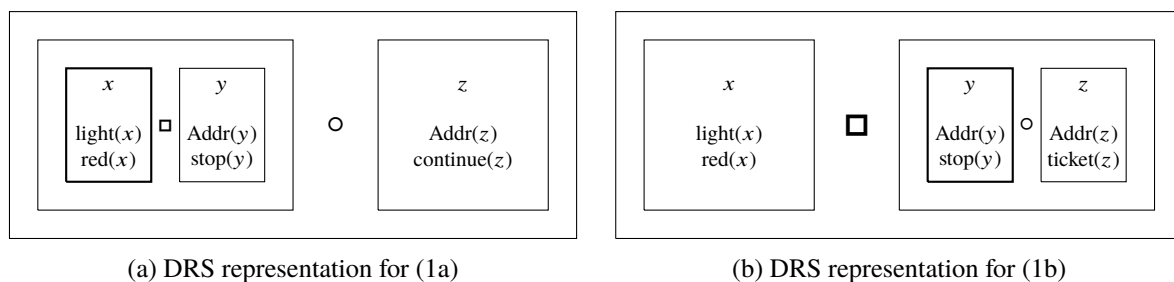
Our analysis furthermore allows for cases of E-type anaphora as in (2) below from Webber *et al.* (2001:7), by making discourse referents salient for quantification across dynamic updates. Here, *otherwise* selects the set of worlds where every (relevant) person is <u>not</u> selling "The Big Issue", and asserts that in those worlds, they might be begging.

(2) Every person selling "The Big Issue" might *otherwise* be asking for spare change.

Predictions. It follows from our proposal that *otherwise* is not well-defined when *no worlds* have been eliminated from consideration by prior updates. We thus correctly predict that root possibility modals are incompatible with *otherwise*, because they fail to reduce the context set.

(3) a. I have to go to school, *otherwise* I'll get in trouble.
b. $^{??}$ I can go to school, *otherwise* I'll get in trouble.

Moreover, if a sentence with a possibility modal is *strengthened*, *otherwise* becomes felicitous again. E.g., examples (4a–b) receive a similar interpretation, with <u>universal</u> rather than <u>existential</u> force. Specifically, the interpretation of the epistemic *might* in (4b) receives a (weak) necessity interpretation (*e.g.* von Fintel & Iatridou 2008), roughly: "there are no worlds I am considering where she isn't here and isn't sick (but I do not claim to have access to all relevant worlds)."

(4) a. She must be sick, *otherwise* she'd be here.
b. She might be sick, *otherwise* she'd be here.

Likewise, in examples with "may not," which is ambiguous between $\neg > \Diamond_{\text{deontic}}$ and $\Diamond_{\text{epistemic}} > \neg$ readings, only $\neg > \Diamond_{\text{deontic}}$ eliminates worlds and supports *otherwise*.

(5) <u>Context:</u> Ashley got horrible grades in college and is very clumsy.
a. She may not be a doctor. $\hfill \neg > \Diamond(\text{deontic})$
b. *Otherwise*, she might kill someone.
$\approx$ If she does become a doctor...

(6) <u>Context:</u> Ashley works at a hospital and wears a white coat, but I don't know what she actually does.
a. She may not be a doctor. $\hfill \Diamond(\text{epistemic}) > \neg$
b. $^{\#}$ *Otherwise*, she might be a surgeon.
Intended: $\approx$ If she's not not a doctor...

Implications. We further relate our analysis of *otherwise* to the dynamic analysis of complement anaphora in Nouwen (2003), (7): *otherwise* picks out a complement set of worlds; complement anaphora picks out a complement set of individuals. We show in the talk a parallel between *otherwise* and complement anaphora: both become degraded if there is intervening material between the (complement) antecedent and its referent (data omitted here).

(7) Few [congressmen]$_A$ [admire Kennedy]$_B$. $\hfill$ (Evans 1980)
a. *They* are (all) very junior. $\hfill$ REFERENCE SET $A \cap B$
b. *They* think he's incompetent. $\hfill$ COMPLEMENT SET $A \setminus B$

From a broader perspective, we argue that properly accounting for the semantics of *otherwise* requires appeal to a level of discourse representation that intermediates between LF and interpretation. This provides further evidence of the desirability of dynamic approaches to semantics.

Selected references. Evans (1980). Pronouns. *LI 11* • **von Fintel & Iatridou** (2008). How to say *ought* in foreign. In *Time and Modality*. Springer • **Meyer** (2013). Generalized Free Choice and Missing Alternatives. *JoS 33* • **Nouwen** (2003). Complement anaphora and interpretation. *JoS 20* • **Roberts** (1989) Modal Subordination & Pronominal Anaphora in Discourse. *L&P 12* • **Webber *et al*** (2001). *Anaphora and Discourse Semantics*. IRCS reports.