Dynamic updates and the semantics of ‘otherwise’

Josh Phillips                  Hadas Kotek
Yale University               New York University
joshua.phillips@yale.edu      hadas.kotek@nyu.edu
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1 Introduction

• Intuitively, otherwise targets a set of worlds in which some anaphoric proposition does not hold:

(1) Some basic examples to get us started:
   a. You should eat, otherwise you won’t grow.
   b. He always told Mary everything: he’d call, otherwise he’d write.
      (Flament-Boistrancourt, 2011, 131)
   c. Every person selling “The Big Issue” might otherwise be asking for spare change.
      (Webber et al., 2001, 7)

• Roughly, otherwise establishes a relation between two propositions, p and q—providing an answer to the question, what would happen if ¬p?
   We call p the antecedent and q the consequent.

(2) Intuition: Otherwise signals nonimplication between p, q

\[ \text{otherwise}^w = \lambda p(\cdot, \cdot) \cdot \lambda q(\cdot, \cdot) \cdot \neg p(w) \rightarrow q(w) \]

(To be revised and refined later in the talk!)

2 Background and data

(3) Students must attend the lecture, otherwise...

a. ...they’ll fail the class.        \( \approx \) if \( \neg \) attend...
   b. ...it’ll be completely empty.  \( \approx \) if \( \neg \) \( \Box \) attend...

(4) If the light is red, stop. Otherwise...

   a. ...go straight on.          \( \approx \) if \( \neg \) red...
   b. ...you’ll get a ticket.      \( \approx \) if red \( \land \neg \) stop...

   (Webber et al., 2001, 7)

• In each sentence pair above (3-4), the antecedent of otherwise is a different proposition.

• The choice of antecedent is not directly encoded.

| The puzzle: How is the antecedent determined? |
| The intuition: The correct antecedent appears to be ‘accommodated’ by reference to world knowledge and linguistic context. |

Some uses of otherwise that we will not discuss today (but feel free to ask us about them):

(5) ‘Intraclausal’ adverbial usage:

a. Otherwise what’s been happening with you?  
   (Flament-Boistrancourt, 2011, 131)
   b. For all the Russians I’ve met, the one thing I’ve found to be particularly distinctive is their love for the drink. Otherwise they’re just like anyone else.  
   (Inkova-Manzotti, 2002, 121)

(6) Adjectival usage:

   a. The income they earn from it is likely to be their only source of cash to supplement their otherwise subsistence economy.
   b. A: ‘Frances, I’m sorry I’m late.’
      B: ‘When were you ever otherwise?’  
      (OED, otherwise c1, c2)

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3 Proposal

- Dynamic approaches to semantics have been fruitful in accounting for anaphor resolution (e.g. Heim 1982; Kamp 1981; Nouwen 2003; Roberts 1989).
- The meaning of an utterance is its context-change potential, accounting for the role of intersentential dependencies for interpretation.
- If-clauses induce a temporary update of the common ground with the antecedent proposition, hypothetically restricting the context set. They make an assertion that the consequent holds in all these worlds. In other words, “if p then q” represents an instruction to eliminate all the $p \land \neg q$ worlds from the context set.

- In (4a), otherwise targets the set of worlds in which the light is not red, and asserts that in those worlds, you should go straight.
- In (4b), otherwise targets that set of worlds where the light is red but you do not stop. It asserts that in those worlds, you’ll get a ticket.

3.1 A dynamic semantic account

- **Modal subordination:** (Roberts 1989, extending Kamp’s 1981 Discourse Representation Theory, DRT)

  A phenomenon wherein the interpretation of clause $\alpha$ is taken to involve a modal operator whose force is relativised to some set $\beta$ of contextually given propositions. (718)

- Roberts (1989, 712ff) shows how such subordination relations can be formalised using Kamp’s DRT (rather complicated, details omitted).

- **Proposal:** A $\circ$ relation is employed in the DRS schemata below to represent an ‘otherwise’ condition.
  - This $\circ$ can be defined as a temporary (conditional) update with (\neg antecedent)—antecedents in thick boxes—followed by update with the consequent.
  - Modeled on Roberts’s (1996) approach to modals and conditionals.

3.2 An implementation

**Figure 1.** The accommodation of different antecedents in (3a–b).

**Figure 2.** In (4a), the antecedent of otherwise is the antecedent of the conditional.

**Figure 3.** In (4b), the antecedent of otherwise is the consequent of the conditional, both subordinate to the temporary conditional update.

- Appealing to Roberts’ notion of modal subordination within DRT allows us to develop intuitions about the constraints on interclausal dependencies for the interpretation of the modal component of otherwise.
4 Finding the antecedent

- How, then, do we resolve potential ambiguities in the choice of antecedent when multiple preceding updates are available?

4.1 Complement anaphora

Quantifiers such as few, less than half, hardly any can allow reference to a 'complement set' (Moxey and Sanford 1986, Nouwen 2003 a.o.).

(7) Few congressmen admire Kennedy. (Nouwen 2003)
   a. They are (all) very junior. REFERENCE SET: A ∩ B
   b. They think he’s incompetent. COMPLEMENT SET: A \ B

- Proposal: Just as pronouns can refer to a complement set of individuals, following certain quantifiers, otherwise picks out a complement set of worlds.

- Prediction: Adopting an E-type anaphora analysis (e.g. Nouwen 2003), discourse referents can be made salient for reference in subordinate DRSs/ across dynamic updates:

(8) Every person selling “The Big Issue” might otherwise be asking for spare change. (Webber et al. 2001, p.7)

- Here, for every (relevant) person, otherwise picks the set of worlds where they are not selling “The Big Issue,” and asserts that in those worlds, they might be begging.

Note: similar effects in the temporal domain?

(9) Senators rarely vote their conscience. They do what the party tells them to.

4.2 Otherwise requires eliminated worlds

- Prediction: Otherwise is not well-defined in cases where no worlds have been eliminated from consideration by prior discourse updates.

Indeed, possibility modals do not support the use of otherwise.¹

(10) a. I have to go to school.
    b. otherwise I’ll get in trouble.  \(\approx\) if I don’t go...
    (i): All non-school worlds (temporarily) eliminated.
    (ii): For those worlds ‘eliminated’ in (i), I’ll get in trouble.

(11) ?? a. I can go to school,
    b. otherwise I’ll get in trouble. Intended: \(\approx\) if I don’t go...
    (i): The possibility modal asserts that the context set contains school worlds; it does not eliminate any worlds.
    (ii): Otherwise fails to identify previously eliminated worlds.

Consider examples with “may not,” which is ambiguous between \(\neg > \Diamond\text{(deontic)}\) and \(\Diamond\text{(epistemic)} > \neg\). Only \(\neg > \Diamond\text{(deontic)}\) eliminates worlds and supports otherwise.

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

(13) Context: 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. \(\Diamond\text{(epistemic)} > \neg\)
    b. \# Otherwise, she might be a surgeon. Intended: \(\approx\) if she’s not a doctor...

¹Of the Emptiness principle (Hendriks and de Hoop, 2001): “As the antecedent of an expression, do not choose a set which is potentially empty, except when this set is the reference set of a quantificational sentence”.
Consider the apparent counterexample in (14b) with *might*:

(14) a. She must be sick, otherwise she’d be here.
    b. She might be sick, otherwise she’d be here.

*Might* in (14b) receives a ‘weak necessity’ interpretation (see Rubinstein 2012). 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).”

5 Conclusion

1. *Otherwise* is a (sentential) operator relating two clauses, \( p \) and \( q \):
   if \( \neg p \), then \( q \).

2. The antecedent \( p \) is chosen from the preceding context, mediated by world knowledge.

3. An implementation building on *modal subordination* within DRT.

4. *Otherwise* is dependent on *preceding eliminated worlds* — parallel to complement anaphora to individuals.

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2Or, more formally, *might* is accompanied by some presupposition that the attitude holder’s doxastic state is restricting the quantificational domain of the modal. (This resembles the approach to weak necessity of Rubinstein 2012, von Fintel and Iatridou 2008.)

References


