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Appendix: Formal definitions

for a fragment of the attention-coherence approach

We have the following basic types in our language:

- individuals (type e)
- possible worlds (type s)
- truth values (type t)
- sequences of individuals and worlds (type c)

We reserve the symbol a for the actual world.

We use the following notation to describe operations on sequences:

- i_m
  If m is an integer, i_m is the mth element of i.
- $i_{m,n}$
  If m and n are integers, $i_{m,n}$ is a sequence containing the subsequence of elements of i in order from element number m up through the element that precedes n (if any).
- $i_{m\ldots}$
  If m is an integer, $i_{m\ldots}$ is the sequence containing the complete subsequence of elements of i in order beginning from element number m.
- $i + j$
  If i is a sequence and j is a sequence then $i + j$ is the sequence containing the elements of i in order followed by the elements of j in order.
  Note then that $i = i_{0,k} + i_{k\ldots}$
- u, i
  If u is an individual and i is a sequence, then u, i is the sequence that begins with u and continues with the elements of i in order.
- $w(i)$
  If i is a sequence then $w(i)$ is the first element of i that is of world type.

The language of formulas and its semantics is as follows:

- Individual expressions
    - if t is an individual constant, then t is an individual expression
      (represents the name of an individual)
    - the variable x_m is an individual expression
      (represents a discourse reference contributed by argument structure)
    - if p is a unary predicate then $@\,p$ is an individual expression
      (represents a syntactically unconstrained anaphor)
    - if p is a unary predicate and o is an individual expression then $@\,p^o$ is an individual expression
      (represents a syntactically constrained anaphor)

The interpretation of individual expressions at a sequence i and world u:

- $[\![t]\!]i, u = I(t)$ for interpretation function I.
  (Access constants from model.)

- $[\![x_m]\!]i, u = i_m$.
  (Look up values of variables. We need variables to manage argument structure, otherwise it will be very cumbersome to deal with the syntax–semantics interface for transitive and ditransitive verbs; we need to potentially distinguish the order in which arguments are introduced, how salient they are after the utterance, and what role they play in the described event. Having variables clears this all up. Basically, x_0 will correspond to the subject, x_1 to the direct object, x_2 to the indirect object, and so forth.)

- $[\![@\,p]\!]i, u = i_0$ if $i_0 \square I(p, w(i))$.
  $[\![@\,p]\!]i, u = [\![@\,p]\!]i_{1\ldots,}\,u$ otherwise.
  (Find most prominent referent that agrees with anaphor.)

- $[\![@\,p^t]\!]i, u = i_0$ if $i_0 \square I(p, w(i))$ and $i_0 \not\square [\![t]\!]i$.
  $[\![@\,p^t]\!]i, u = [\![@\,p^t]\!]i_{1\ldots,}\,u$ otherwise.
  (Find most prominent free referent that agrees with anaphor.)

The language and interpretation of conditions:

- If r is an n-place predicate symbol and t_1 through t_n are individual expressions, then $r(t_1, \ldots, t_n)$ is a condition.

- $[\![r(t_1, \ldots, t_n)]\!]i, u$ is true if and only if $([\![t_1]\!]i, u, \ldots [\![t_n]\!]i, u) \quad I$

- *H*

We ignore the difference between definiteness and indefiniteness in this example, since the important thing is the dynamics of the sequences of discourse referents and the uniqueness or familiarity condition associated with ‘the’ will not affect this.

- The city council denied the demonstrators a permit. They feared violence.

formula	gloss	output
$\square\alpha 0\square;[\mathbf{cc}(x_0)];$	“The city council (Subj)”	$(c, \ldots)$
$\square\alpha 1\square;[\mathbf{permit}(x_1)];$	“a permit (DO)”	$(c, p, d, \ldots)$
$\square\alpha 2\square;[\mathbf{demo}(x_2)];$	“the demonstrators (IO)”	$(c, p, d, \ldots)$
$[\mathbf{deny}(x_0, x_1, x_2)];$	“(Subj) denied (DO) to (IO)”	$(c, p, d, \ldots)$

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