Appendix C

The Semantics of DRT

For convenience, we repeat here the semantics of DRT; the semantics of rhetorical relations that are given in Appendix D extend the semantics given here.

The definition of models was first introduced in Section 2.3.2:

The models M are five-tuples $\langle A_M, W_M, *_M, R_\Box, I_M \rangle$, where

- A_M is a set of individuals;
- W_M is a set of possible worlds;
- $R_\Box$ is a binary relation on W: it defines all the possible worlds relative to a world w.
- $*_M$ maps a world and proposition (i.e., a relation between world-assignment pairs) to a proposition; it captures the notion of *normality* and it's used to define the modal connective $>$;
- I_M is a function which assigns an n-ary predicate P_n at a world w a set of n-tuples of A_M (which we refer to as $I_M(P_n)(w)$).

The Relational Semantics of DRSs

The semantics of the basic fragment of DRT was first introduced in Definition 4 in Section 2.3.2; the semantics of interrogative clauses (see clause (ix) below) was introduced in Section 2.3.3 and the semantics of imperative clauses and formulae involving action terms (see clauses (x–xiv) below) was introduced in Section 2.3.4.

(i) $(w, f)[\![\langle U, \emptyset \rangle]\!]_M(w', g)$ iff
$w = w' \wedge f \subseteq g \wedge dom(g) = dom(f) \cup U$

(ii) $(w, f)[\![R(x_1, \cdots, x_n]\!]_M(w', g)$ iff
$(w, f) = (w', g) \wedge$
$\langle f(x_1), \cdots, f(x_n) \rangle \in I_M(R)(w)$

(iii) $(w, f)[\![\neg K]\!]_M(w', g)$ iff
$(w, f) = (w', g) \wedge$
$\neg \exists w'' \exists h (w, f)[\![K]\!]_M(w'', h)$

(iv) $(w, f)[\![K \Rightarrow K']\!]_M(w', g)$ iff
$(w, f) = (w', g) \wedge$
$\forall h \forall w''(w, f)[\![K]\!](w'', h) \rightarrow \exists k \exists w'''(w'', h)[\![K']\!](w''', k)$

(v) $(w, f)[\![K \vee K']\!]_M(w', g)$ iff
$(w, f) = (w', g) \wedge$
$(\exists h(w, f)[\![K]\!]_M(w', h) \vee \exists k(w, f)[\![K']\!]_M(w', k))$

(vi) $(w, f)[\![K > K']\!]_M(w', g)$ iff
$(w, f) = (w', g) \wedge$
$\forall w'' \forall h(w, f)[*(w, [\![K]\!]_M)](w'', h) \rightarrow \exists k \exists w'''(w'', h)[\![K']\!]_M(w''', k)$

(vii) $(w, f)[\![\Box K]\!]_M(w', g)$ iff
$(w, f) = (w, g) \wedge$
$\forall w''(wR_\Box w'' \rightarrow$
$\exists h \exists w'''(w', g)[\![K]\!]_M(w''', h)$

(viii) $(w, f)[\![K^\frown \gamma]\!]_M(w', g)$ iff
$\exists w'' \exists h(w, f)[\![K]\!](w'', h) \wedge (w'', h)[\![\gamma]\!]_M(w', g)$

(ix) $(w, f)[\![?]\!]_M([\![\lambda x_1 \ldots \lambda x_n P(x_1, \ldots, x_n)]\!]_M) =$
$\{[\![p]\!]_M :$ (a) $\exists [\![\alpha_1]\!]_M \ldots [\![\alpha_n]\!]_M$ such that
$[\![p]\!]_M =$
$[\![\alpha_1]\!]_M \ldots [\![\alpha_n]\!]_M([\![\lambda x_1 \ldots \lambda x_n P(x_1, \ldots, x_n)]\!]_M) \wedge$
(b) $\exists w' \exists g(w, f)[\![{}^\vee p]\!]_M(w', g) \wedge$
(c) $(w, f)[\![\exists x_1, \ldots, x_n \Box({}^\vee p \Rightarrow P(x_1, \ldots, x_n))]\!](w, f) \vee$
$(w, f)[\![\Box({}^\vee p \Rightarrow \neg \exists x_1 \ldots x_n P(x_1, \ldots, x_n)))]\!]_M(w, f)\}$

(x) $(w, f)[\![\delta K]\!]_M(w', g)$ iff $(w', f)[\![K]\!]_M(w', g)$

(xi) $[\![a_1; a_2]\!]_M = [\![a_1]\!]_M \circ [\![a_2]\!]_M$

(xii) $[\![a_1 + a_2]\!]_M = [\![a_1]\!]_M \cup [\![a_2]\!]_M$

(xiii) $(w, f)[\![K \Rightarrow a]\!]_M(w', g)$ iff
for all h such that $(w, f)[\![K]\!]_M(w, h)$
there is a k such that $h \subseteq k$ and $(w, k)[\![a]\!]_M(w', g)$

(xiv) $(w, f)[\![[a]K]\!]_M(w', g)$ iff
$(w, f) = (w', g)$ and
for every h and w'' such that $(w, f)[\![a]\!]_M(w'', h)$
there exists w''' and k such that
$(w'', h)(K)_M(w''', k)$.

Appendix D

Glossary of Discourse Relations

D.1 Introduction

We now give a glossary of all the rhetorical relations (or, equivalently, the speech act types) that we used in the book. For ease of reference, we have included here the name of the relation, an informal description of its semantics, and its more formal definition. This includes the meaning postulates on rhetorical relations. We have also occasionally given simple English discourses to illustrate the relation. Subordinating relations are marked as such; the others are not subordinating relations. We have included Section numbers for where the semantics of these relations were introduced.

Veridical relations all satisfy the following Satisfaction Schema (see Chapter 4 Section 4.8):

- `Satisfaction Schema for Veridical Rhetorical Relations:`
  $(w, f)[\![R(\pi_1, \pi_2)]\!]_M(w', g)$ iff

  $$(w, f)[\![K_{\pi_1} \wedge K_{\pi_2} \wedge \phi_{R(\pi_1,\pi_2)}]\!]_M(w', g)$$

  where '$\wedge$' is dynamic conjunction and $\phi_{R(\pi_1,\pi_2)}$ are the special constraints pertinent to the particular discourse relation $R(\pi_1, \pi_2)$ holding.

This Satisfaction Schema is the starting point for defining the semantics of many of the discourse relations in this book. We will highlight here those relations that satisfy this schema and those that don't.

D.2 Content-Level Relations

These are relations whose semantics are defined entirely in terms of the events and individuals that are introduced in the constituents (cf. informational level relations in Moore and Pollack (1992)). The speech act *Explanation*(α, β) may well have been uttered for a particular purpose (e.g., the speaker believes that the hearer will not believe K_α unless he provides support for it in the form of the explanation K_β). Hence cognitive states determine *why* the agent performed a particular speech act. But such intentions don't affect the content conveyed by the logical forms which feature content-level relations like *Explanation*.

D.2.1 Content-Level Relations for Indicatives

$\Downarrow(\alpha, \beta)$**:** Section 4.7 (page 146)

Semantics: This is a 'topic' relation and it's *subordinating*. More formally:

- It's veridical;[1]
- $K_\alpha \mid\!\sim K_\beta$ and $K_\beta \not\mid\!\sim K_\alpha$.

Alternation(α, β)**:** Section 4.8.5 (page 169)

Semantics: This is the rhetorical relation equivalent to *or* (or more technically, dynamic $\vee$):

- $(w, f)[\![Alternation(\alpha, \beta)]\!]_M(w', g)$ iff $(w, f)[\![K_\alpha \vee K_\beta]\!]_M(w', g)$ (and hence $(w, f) = (w', g)$)

Examples:

(1) Either there is no bathroom, or it is in a funny place.

(2) Mary has brown hair or Max has green eyes.

Background(α, β)**:** Section 4.8.3 (page 165)

Semantics: This relation holds whenever one constituent provides information about the surrounding state of affairs in which the eventuality mentioned in the other constituent occurred.

- It's veridical, and so satisfies the Satisfaction Schema.
- `Temporal Consequence of Background:` $\phi_{Background(\alpha,\beta)} \Rightarrow overlap(e_\beta, e_\alpha)$
- If the SDRS contains $\pi' : Background_1(\pi_2, \pi_1)$, then it also contains $\pi : K_\pi$ where K_π 'repeats' the contents of K_{π_1} and K_{π_2} and $\pi'' : FBP(\pi, \pi')$.

Example:

(3) Max opened the door. The room was pitch dark.

Consequence(α, β)**:** Section 4.8.5 (page 169)

Semantics: This is corresponds to dynamic $\Rightarrow$:

- $(w, f)[\![Consequence(\alpha, \beta)]\!]_M(w', g)$ iff $(w, f)[\![K_\alpha \Rightarrow K_\beta]\!]_M(w', g)$ (and hence $(w, f) = (w', g)$)

[1] But in fact it doesn't quite satisfy the Satisfaction Schema as we have stated it; see Chapter 4 for details.

Since $\mid\!\sim$ is supraclassical, *Consequence*$(\alpha, \beta) \vdash$ *Def-Consequence*(α, β).

Examples:

(4) If there is a bathroom, then it's in a funny place.

(5) Suppose there's a bathroom. Then it's in a funny place.

Continuation(α, β)**:** Section 4.7 (page 146)

Semantics: Just like *Narration* (see below) save it lacks its spatio-temporal consequences:

- It's veridical (and so satisfies the Satisfaction Schema)
- *Continuation* is subject to the same topic constraint as *Narration* (see below)

Example: *Continuation*$(6b, 6c)$ and *Continuation*$(6c, 6d)$ (also *Parallel*$(6b, 6c)$ and *Parallel*$(6c, 6d)$):

(6) a. The teacher asked the students to look for the lost cat.
b. John looked under the table.
c. Mary looked in the garden.
d. Max searched all the cupboards.

Def-Consequence(α, β)**:** Section 4.8.5 (page 169)

Semantics: This stands for *defeasible consequence.*

- $(w, f)[\![\textit{Def-Consequence}(\alpha, \beta)]\!]_M(w', g)$ iff $(w, f)[\![K_\alpha > K_\beta]\!]_M(w', g)$ (and hence $(w, f) = (w', g)$)

Example: In (7), the content *Def-Consequence*(α, β_∂) is presupposed, where α labels *John dives* and β_∂ labels *John has a regulator*:

(7) If John scuba dives, he'll bring his regulator.

Elaboration(α, β)**:** Section 4.8.1 (page 159)

Semantics: This is a *subordinating* relation:

- It's veridical, but it satisfies a slightly modified version of the Satisfaction Schema (for reasons given in Chapter 4);
- *Elaboration*$(\alpha, \beta) \vdash \Downarrow (\alpha, \beta)$
- `Temporal Consequence of Elaboration:`
$\phi_{\textit{Elaboration}(\alpha,\beta)} \Rightarrow \textit{Part-of}(e_\beta, e_\alpha)$

Example:

(8) Max had a lovely meal last night. He ate lots of salmon.

Explanation(α, β)**:** Section 4.8.1 (page 159)

Semantics: This is a *subordinating* relation, and it's the 'dual' to *Result*:

- It's veridical, and so satisfies the Satisfaction Schema.
- `Temporal Consequence of Explanation:`
  (a) $\phi_{Explanation(\alpha,\beta)} \Rightarrow (\neg e_\alpha \prec e_\beta)$
  (b) $\phi_{Explanation(\alpha,\beta)} \Rightarrow (event(e_\beta) \Rightarrow e_\beta \prec e_\alpha)$

Example:

(9) Max fell. John pushed him.

FBP(α, β)**:** Section 4.8.3 (page 165)

Semantics: *FBP* stands for *Foreground Background Pair* and it's a subordinating relation. The following holds: $FBP(\alpha,\beta) \vdash \Downarrow (\alpha, \beta)$. We only use this relation to specify the semantics of *Background* (see above).

Narration(α, β)**:** Section 4.8.2 (page 162)

Semantics: Informally, this relation holds if the constituents express eventualities that occur in the sequence in which they were described. It can connect indicatives or requests. More formally:

- It's veridical, and so satisfies the above Satisfaction Schema.
- `Topic Constraint on Narration:` $\phi_{Narration(\alpha,\beta)} \Rightarrow \neg\Box(K_\alpha \sqcap K_\beta)$
  I.e., α and β share a contingent, common topic (and the more informative the topic, the better the narration).
- `Spatiotemporal Consequence of Narration:`
  $\phi_{Narration(\alpha,\beta)} \Rightarrow overlap(prestate(e_\beta), Adv_\beta(poststate(e_\alpha)))$
  I.e., where things are in space and time at the end of e_α is where they are at the beginning of e_β.

Example: $Narration(10a, 10b)$ and $Narration(10b, 10c)$.

(10) a. Max came in the room.
b. He sat down.
c. He lit a cigarette.

Result(α, β)**:** Section 4.8 (page 155)

Semantics: *Result* connects a cause to its effect:

- It's veridical, and so satisfies the Satisfaction Schema.

- `Axiom on Result:` $\phi_{Result(\alpha,\beta)} \Rightarrow cause(e_\alpha, e_\beta)$

Example:

(11) John pushed Max. He fell.

D.2.2 Content-Level Relations Involving Interrogatives

Background$_q(\alpha,\beta)$**:** Section 7.6.4 (page 331)

Semantics: $Background_q(\alpha,\beta)$ iff K_α is a proposition and K_β is a question such that any possible answer to K_β satisfies the semantics of *Background* with K_α. It's a *subordinating* relation.

Example:

(12) a. A: Max arrived at the party at 8pm last night.
b. B: Who was there at the time?

Elaboration$_q(\alpha,\beta)$**:** Section 7.6.4 (page 331)

Semantics: Similar to the relation $Background_q$; it's a *subordinating* relation.

Example:

(13) a. A: Kluwer are accepting manuscripts at the moment.
b. B: What kind of manuscripts?

Narration$_q(\alpha,\beta)$**:** Section 7.6.4 (page 331)

Semantics: $Narration_q(\alpha,\beta)$ is similar to $Background_q$; it's a subordinating relation.

Example:

(14) a. A: John arrived at the party at 8pm last night.
b. B: And then what happened?

QAP(α,β)**:** Section 7.6.1 (page 313)

Semantics: *QAP* stands for *Question Answer Pair.* This is a *subordinating* relation; it holds if K_α is a question and K_β is a true direct answer to K_α, according to the compositional semantics of questions and answers:

- `Semantics for QAP`
$(w,f)[\![QAP(\alpha,\beta)]\!]_M(w',g)$ iff
$w = w'$ and $(w,f)[\![K_\beta]\!]_M(w',g)$ and $(w,f)[\![Answer(^\wedge K_\alpha, ^\wedge K_\beta)]\!]_M(w,f)$

Example:

(15) a. A: How can I get to the treasure?
b. B: By going to the secret valley and looking under the biggest tree.

Explanation$_q(\alpha, \beta)$: Section 7.6.4 (page 331)
Similar to *Elaboration*$_q$; *subordinating.*

Example:[2]

(16) a. A: I want to go to the party tonight.
b. B: Why?

Result$_q(\alpha, \beta)$: Section 7.6.4 (page 331)
Similar to *Elaboration*$_q$; *subordinating.*

D.2.3 Content-Level Relations Involving Imperatives

Indicatives and imperatives: *Narration*, *Elaboration* and *Background* can connect labels of requests as well as propositions (see Chapter 7 for details). These relations have the same semantics, regardless of whether K_α and K_β are propositions or action terms. So, since these relations are veridical, the requests that are arguments to them are commanded.

Examples: Discourse (17) is an example of *Narration* and (18) is an example of *Elaboration* (modified from Webber *et al.* (1995)):

(17) Go into John's office and get a red file folder.

(18) Go to John's office and take a red file folder with you.

Def-Consequence$_r$: Section 7.6.6 (page 336)
Semantics: *Def-Consequence*$_r(\alpha, \beta)$ means that K_α is an action term and doing the action K_α normally result in K_β being true:

- $(w, f)[\![Def\text{-}Consequence_r(\alpha, \beta)]\!]_M(w', g)$ iff $(w, f)[\![[K_\alpha]\top > K_\beta]\!]_M(w', g)$

It's a (non-veridical) subordinating relation.

Example:

(19) Smoke a packet of cigarettes a day and you will die before you're 50.

Result$_r$: Section 7.6.6 (page 336)
Semantics: *Result*$_r(\alpha, \beta)$ holds if K_α is a commanded request which normally results in K_β being true.

[2]Depending on the cognitive states of A and B, *Q-Elab*$(16a, 16b)$ may also hold.

- $[\![Result_r(\alpha,\beta)]\!]_M(w',g)$ iff $(w,f)[\![K_\alpha \wedge ([K_\alpha]\top > K_\beta)]\!]_M(w',g)$

Example: This relation typically holds when an indicative expresses content that normally holds if the action described in the imperative is carried out, and furthermore there is no *prima facie* reason for thinking that the outcome of the action is either desirable or undesirable:

(20) Turn left at the roundabout and you will see traffic lights.

D.3 Text Structuring Relations

Contrast(α,β)**:** Section 4.8.4 (page 168)

Semantics:

- *Contrast* is veridical, and so it satisfies the Satisfaction Schema.
- K_α and K_β must have similar *semantic structures.* That is, there is a partial isomorphism between the DRS-structure of K_α and that of K_β. All else being equal, the closer the mapping is to an isomorphism, the better the *Contrast* relation.
- There must be a contrasting theme between K_α and K_β. This is computed on the basis of the above partial isomorphism between the structures K_α and K_β. All else being equal, the more contrasting the theme, the better the *Contrast* relation. Degree of contrast is defined in terms of degree of difference between the propositions which mark the themes on the nodes of the semantic structure. The maximal difference is between propositions p and q such that $p \mid\!\sim \neg q$. I.e., one constituent negates a default consequence of the other. See Asher *et al.* (1997) for details.

Example: *Contrast*$(21a, 21b)$ and *Background*$(21a, 21b)$ hold:

(21) a. John loves sport.
b. But he hates football.

Parallel(α,β)**:** Section 4.8.4 (page 168)

Semantics:

- *Parallel* is veridical, and so satisfies the Satisfaction Schema.
- K_α and K_β must have similar *semantic structures* (see *Contrast* above).
- There must be a common theme between K_α and K_β. This is computed on the basis of the above partial isomorphism between the structures of K_α and K_β. The more informative the common theme, the better the *Parallel* relation. See Asher *et al.* (1997) for details.

Example: *Parallel*(22*a*, 22*b*) and *Background*(22*a*, 22*b*) hold:

(22) a. John loves sport.
b. Bill loves sport too.

D.4 Cognitive-Level Discourse Relations

All of the following relations have semantics which is specified, at least in part, in terms of the intentions and beliefs of the dialogue agents.

Acknowledgement(α, β): Section 8.4 (page 361)

Semantics: This is a subordinating relation, which holds when β entails that $S(\beta)$ has accepted or achieved $S(\alpha)$'s SARG of α.

Examples:

(23) a. A: Close the window.
b. B: OK

(24) a. A: The window is closed.
b. B: Yeah/OK.

IQAP(α, β): Section 7.6.1 (page 313)

Semantics: *IQAP* stands for *Indirect Question Answer Pair*. This is a *subordinating* relation. Informally, it's right veridical, and holds only if K_α is a question and K_β contains sufficient content such that when it's added to $S(\alpha)$'s beliefs, he can nonmonotonically compute a direct answer to his question α:

- $IQAP(\alpha, \beta) \rightarrow K_\beta$
- `Semantics for IQAP`:
  $(w, f)[\![IQAP(\alpha, \beta)]\!]_M(w', g)$ iff
  (a) $w = w'$, $(w, f)[\![K_\beta]\!]_M(w, g)$, and
  (b) there is a p such that:
    (i) $(w, f)[\![Answer(^\wedge K_\alpha, p)]\!](w, f)$,
    (ii) $(w, f)[\![^\vee p]\!]_M(w', g)$ and
    (iii) $(w, f)[\![\mathcal{B}_{S(\alpha)}(K_\beta >^\vee p))]\!]_M(w, f)$

Example:

(25) a. A: How can I get to the treasure?
b. B: It's at the secret valley, under the biggest tree.

IQAP$_r(\alpha,\beta)$**:** Section 7.6.1 (page 313)

Semantics: This is like *IQAP*, save that K_β is an *imperative* whose content is sufficient for the interpreter to infer an answer to the question K_α. It's a subordinating relation:

- `Axioms on IQAP`$_r$
  (a) $IQAP_r(\alpha,\beta) \Rightarrow \beta :!$
  (b) $(IQAP_r(\alpha,\beta) \wedge \beta : \delta K'_\beta) \Rightarrow$
  $\exists p(Answer(^\wedge K_\alpha, p) \wedge \mathcal{B}_{S(\alpha)}(K'_\beta >^\vee p))$

Example:

(26) a. A: How does one get to Princes Street?
b. B: Take the 33 bus.

NEI(α,β)**:** Section 7.6.1 (page 313)

Semantics: *NEI* stands for *Not Enough Information.* It's a *subordinating* relation, which holds just in case K_β implies that $S(\beta)$ doesn't know an answer to the question K_α:

- `Semantics for NEI:`
  $(w,f)[\![NEI(\alpha,\beta)]\!]_M(w',g)$ iff
  $w = w'$,
  $(w,f)[\![K_\beta > \neg\exists p(\mathcal{B}_{S(\beta)}(p) \wedge Answer(^\wedge K_\alpha, p))]\!]_M(w,f)$ and
  $(w,f)[\![K_\beta]\!]_M(w',g)$

Example:

(27) a. A: Who's coming to the party?
b. B: I don't know.

Plan-Correction(α,β)**:** Section 7.6.2 (page 320)

Semantics: This is a subordinating relation, which holds just in case β entails that $S(\beta)$ doesn't accept or is unable to help achieve $S(\alpha)$'s SARG of α.

Examples:

(28) a. A: Close the window.
b. B: I'm afraid I can't do that.

(29) a. A: Has Max got a girlfriend?
b. B: Did you see the Giants?

(30) a. A: Let's meet next Saturday.
b. B: I'm afraid I'm busy then.

Plan-Elab(α, β): Section 7.6.2 (page 320)

Semantics: *Plan-Elab* stands for *Plan Elaboration*. It's a *subordinating* veridical relation (and so it satisfies the Satisfaction Schema), which holds just in case K_β provides information which elaborates a plan for achieving the SARG of α.

- `Axiom on Plan-Elab:`

$$(\textit{Plan-Elab}(\alpha, \beta) \wedge \text{SARG}(\alpha, p)) \Rightarrow$$
$$\text{(a)} \quad \exists a((p, KB_{\mathcal{T},S(\alpha)}, {}^\wedge K_\beta, KB_{\mathcal{T},S(\alpha),S(\beta)}) >> a$$
$$\text{(b)} \quad \wedge \textit{Executable}(a) \wedge \neg({}^\vee p > \textit{Done}(a))).$$

Example:

(31) a. A: I want to catch the 10.20 train.
b. B: It's leaving from platform 1.

PQAP(α, β): Section 7.6.1 (page 313)

Semantics: *PQAP* stands for *Partial Question Answer Pair*. This is a *subordinating* relation. It holds just in case K_α is a question and when $S(\alpha)$'s beliefs are augmented with K_β, he can nonmonotonically infer that at least one possible direct answer to K_α is false; however, he cannot compute a true direct answer.

Example: $PQAP(32a, 32b)$ holds if A cannot compute any true extensions to his question from the knowledge that Mary didn't come.

(32) a. A: Who's coming to the party?
b. B: Well, I know Mary isn't coming.

Q-Elab(α, β): Section 7.6.2 (page 320)

Semantics: *Q-Elab* stands for question elaboration. It's a *subordinating* relation. The semantics of this relation is like *Plan-Elab*, save that K_β is a question:

- `Axiom on Q-Elab:`

$$(\textit{Q-Elab}(\alpha, \beta) \wedge \text{SARG}(\alpha, p) \wedge \textit{Answer}({}^\wedge K_\beta, p')) \Rightarrow$$
$$\text{(a)} \quad \exists a((p, KB_{\mathcal{T},S(\alpha)}, p', KB_{\mathcal{T},S(\alpha),S(\beta)}) >> a$$
$$\text{(b)} \quad \wedge \textit{Executable}(a) \wedge \neg({}^\vee p > \textit{Done}(a)))$$

Examples:

(33) a. A: Can we meet next weekend?
b. B: How about Saturday?

In addition, clarification questions are a particular kind of *Q-Elab*; they are often also a particular kind of $\textit{Elaboration}_q$.

R-Elab(α, β)**:** Section 7.6.2 (page 320)

Semantics: Like *Q-Elab* and *Plan-Elab*, save that K_β is a request. It's a subordinating relation, which holds just in case K_β is an action that forms part of an executable plan to achieve the SARG of α:

- `Axiom on R-Elab:`
  $(R\text{-}Elab(\alpha, \beta) \wedge \text{SARG}(\alpha, p)) \Rightarrow$
  (a) $(\exists a((Done(a) \Rightarrow Done(K_\beta)) \wedge executable(a) \wedge (Done(a) >^\vee p))$
  (b) $\wedge \neg\exists a'(KB_{\mathcal{T},S(\alpha),S(\beta)} > (Done(a') >^\vee p)))$

Example:

(34) a. I want to catch the 10.20 train to London.
b. Go to platform 1.

D.5 Divergent Relations

Correction(α, β)**:** Section 8.3 (page 345)

Semantics: This is a subordinating relation which holds just in case (a) K_α is incompatible with K_β; (b) $\neg K_\alpha$ and K_β hold (and so it is divergent and right-veridical); (c) there is a bijection between the focus/background structure of K_β and parts of K_α such that when you replace the background of K_β with the part of K_α that this maps to, the result is defeasibly equivalent to K_β (and so this part of K_α isn't denied):

- `Meaning Postulate (MP) on Correction:`
  $Correction(\alpha, \beta)$ only if
  1. K_β is inconsistent with K_α
  2. there is a bijection ζ from the focus background structure of K_β onto the logical forms of subclausal constituents of K_α, such that: $K_\alpha \mid\!\sim Apply[\zeta(Focus(K_\beta)), Bg(K_\beta)]$; and $Apply[\zeta(Focus(K_\beta)), Bg(K_\beta)] \mid\!\sim K_\alpha$
- $(w, f)[\![Correction(\alpha, \beta)]\!]_M(w', g)$ iff
  - K_α and K_β obey the constraints in `MP on Correction`;
  - There exists a variable assignment function h such that:

$$(w', h)[\![\neg K_\alpha \wedge \zeta(Bg(K_\beta))[\top] \wedge K_\beta]\!]_M(w', g)$$

In addition, discourse update ensures that when *Correction* is inferred, certain veridical relations in the context get replaced with their disputed counterparts (see Chapter 8 and Appendix E).

Examples:

(35) a. A: John distributed the copies.
b. B: No, it was Sue who distributed the copies.

(36) a. A: John went to jail. He was caught embezzling funds from the pension plan.
b. B: No! John was caught embezzling funds, but he went to jail because he was convicted of tax evasion.

Counterevidence(α, β)**:** Section 8.2 (page 343)
Semantics: This relation is a subordinating relation which is like *Correction* save that K_β *defeasibly* entails K_α is false, or less believable.

Examples:

(37) a. A: John doesn't have a girlfriend.
b. B: He's been going to New York a lot lately.

Dis$(R)(\alpha, \beta)$**:** Section 8.3.1 (page 350)
Semantics: *Dis*$(R)(\alpha, \beta)$ means that $R(\alpha, \beta)$, which was part of the discourse context, is now in dispute.

- `Dis`: *Dis*$(R)(\alpha, \beta)$ holds iff $S(\beta)$ believes $R(\alpha, \beta)$, but $\neg R(\alpha, \beta)$ is in fact entailed by the discourse.

D.6 Metatalk Relations

Consequence*(α, β)**:** Section 7.6.5 (page 333)
Semantics: If α is true then $S(\beta)$ has the SARG of β.

Example:

(38) If you you failed the test, then don't tell anyone.

Explanation*(α, β) Section 7.6.5 (page 333)
Semantics: It's a subordinating veridical relation; K_β explains why $S(\alpha)$ has α's SARG.

Example:

(39) Close the window. I'm cold.

Explanation*$_q(\alpha, \beta)$**:** Section 7.6.5 (page 333)
Semantics: It's a subordinating relation; and K_β is a question such that any answer to it explains why $S(\alpha)$ has α's SARG.

Example:

(40) a. A: It's getting late.
b. B: Aren't you enjoying yourself?

Result*(α, β)**:** Section 7.6.5 (page 333)

Semantics: e_α caused $S(\alpha)$ to utter β.

Example:

(41) It's getting late. Can we leave now?