

Living the Life Aquatic

Does Presupposition Accommodation Mandate Dynamic Semantics?

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1. Proposition Lost

1.1. PROGRAMMATIC OPENING REMARKS

~~I come to bury the proposition, not to praise it.~~

~~I come to exhume the proposition, not to bury it.~~

I'll settle for holding a mirror up to the mouth of the proposition to see if the thing's alive or not.

What should a semantic theory for a language tell us? A traditional answer goes back at least to Frege and Russell:

- **The Static Conception of Semantics (Preliminary Version):** A semantic theory should assign a proposition, conceived of as some carrier of meaning that can play the role of truth condition determination, to each (or at least each declarative) sentence.

A competing answer has emerged from a multiplicity of pressures from work in formal semantics over the last thirty-odd years:

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- **The Dynamic Conception of Semantics (Preliminary Version):** A semantic theory should explain how each utterance in a discourse modifies some feature of the communicative situation. Semantic values are thus relational rather than monadic, and the mode of modification is not expected to be generally identifiable with a truth-condition-determining propositional content. (Thus, for example, Veltman (1996)'s claim that "sentences of the form 'might Φ ' are not persistent; they do not express a proposition.")

Like many philosophers, I have a nostalgic attraction to the Static Conception, and find difficult the process of relinquishing the truth-condition-determining proposition. I am thus generally interested in the state of play between the two conceptions – both in determining how exhaustively (and exclusively) the two characterize the options, and in how compelling the pressures toward the Dynamic Conception end up being.

In this paper I focus on:

- **The Question (First Draft):** Does presupposition accommodation provides an argument for the Dynamic Conception over the Static Conception?

The use of dynamics is a common-place in treatments of presupposition projection:

All the major contemporary theories of presupposition projection are in one way or another dynamic theories, making crucial use of the way in which the epistemic state of an agent changes as the interpretation process proceeds. (Beaver (1997), 30)

I will take, following especially theories of presupposition projection like van der Sandt (1992) that take presupposition to be a form of anaphora on discourse referents and accommodation to the the manifestation of (uncancelled) unbound anaphors, the treatment of presupposition accommodation to be a further manifestation of the problems of presupposition projection, further complicated by the admixture of broadly pragmatic mechanisms for dealing with unbound anaphors. Presupposition accommodation thus inherits any impetus toward the Dynamic Conception already found in presupposition projection, and potentially adds further such momentum. The thought that presupposition accommodation is fundamentally dynamic again is commonplace in the literature:

Theories which utilize a mechanism of accommodation, are not classical *static* theories of meaning, but rather theories about the dynamics of the interpretation process. (Beaver (1997), 976)

Since I am interested in determining whether the Static Conception *must* be abandoned, and whether I need to learn to live in a post-propositional world, I will set aside arguments that suggest that presupposition accommodation is most easily, naturally, or elegantly treated in a dynamic framework. My focus will be on arguments that accommodation can *only* be treated with dynamics.

In the remainder of this section, I first set out a more expansive list of the points at issue between the Static and Dynamic Conceptions, and second briefly sketch standard formal criteria for drawing the final distinction to be adjudicated. In the remainder of the paper, I discuss

three anti-Static arguments that can be extracted from the phenomena of presupposition accommodation.

1.2. AN ECOLOGY OF CONTENT

Perhaps the most thorough-going staticism about semantics would be:

- **Ice-Age Semantics:** Understanding a language consists merely of mastering a (procedure for a) once-and-for-all assignment of propositional content to each sentence. There are no upstream impacts of context on propositions, and no downstream impact of propositions on context. While there certainly are consequences of the propositions expressed in discourse for the future direction of the discourse and the future cognitive states of the discourse participants, such consequences are insufficiently regular and structured for it to be the responsibility of a semantic theory to account for them.

In an Ice-Age Semantics, propositions are solitary mammoths wandering the frozen discourse landscape, and the task of speakers is to drive them off cliffs and feast on their abundant content. The implausibility of Ice-Age Semantics need hardly be stressed; it is unclear that anyone has every held the view. A somewhat more plausible position acknowledges systematic linguistic phenomena beyond the semantically-provided proposition:

- **Permafrost Semantics:** Understanding a language requires mastering a propositional content assignment procedure, as in Ice-Age Semantics. It also requires mastering a procedure for tracking

various effects of linguistic utterances other than the introduction of their propositional content. However, the two procedures are wholly disjoint.

Permafrost Semantics recognizes that there is movement above the ice-locked ground, but holds that such movement is a separate (albeit systematic, and linguistic) phenomenon. The proposition remains immobile and locked in ice.

Permafrost Semantics rests crucially on a linguistic division of labour between semantics and pragmatics (a particularly crude such division, in this case). Since I do not have a principled way of drawing the semantics/pragmatics divide, and since I can see no reason why the status of the proposition in linguistic theory should be restricted to its role on the semantic side of this divide, I will here avoid views which make the same dividing move that Permafrost Semantics does. That is not to say that I reject the semantics/pragmatics division, but rather to say that an adequate theory of *linguistic interpretation* must cover both semantics and pragmatics, and the fate of the proposition thus depends on both sides of the tracks. That is also not to say that there cannot be (as Permafrost Semantics would have it) additional “above ground” linguistic forces beyond the proposition expressed, but the fan of the Static Conception should be attentive to the worry that the proposition becomes marginalized in linguistic interpretation. The following principle is a desirable part of a useful static picture of linguistic interpretation:

- **Propositional Determination of Pragmatic Effects (PDPE):** The pragmatic effects of an utterance in a given context supervene on, or at least are highly constrained by, the propositional content of the utterance.

A semantics can be static even without the PDPE, but the *interest* of the statics decrease as violations of the PDPE increase. The ideal Static picture would have additional forces flowing from the proposition expressed.

As a result of the desire for the PDPE and the rejection of Permafrost-style semantics, I will set aside in the subsequent discussion the dispute between pragmatic and semantic treatments of presupposition. Presuppositions must be dealt with *somewhere* in the overall theory of linguistic interpretation; the question is whether propositions survive that dealing.

If a linguistic ecology richer than the Ice-Age is to be acknowledged, and if propositions are not to be locked in the Permafrost, there must be interaction between proposition and broader linguistic context. The most obvious such interaction is upstream – from context to proposition. Thus we have:

- **Marshland Semantics:** Linguistic interpretation involves procedures which assign propositional content (partly) on the basis of the prior discourse context. Propositions expressed impact the cognitive states of discourse participants, but have no downstream effects on subsequent propositional assignments.

(Note that henceforth “semantics” is a misnomer; I should more accurately speak of “theories of linguistic interpretation”. But I will frequently retain the term “semantics” for brevity.) Marshland Semantics continues to recognize stable propositional points, but the location of these points is now subject to the shifting waters of the discourse. A move to Marshland Semantics raises a question about whether the impact of prior context is on the determination of which of many propositions is expressed by a given sentence, or on the determination of the nature (the truth-conditions, for example) of a single proposition. I return briefly to this question in the next subsection.

A Marshland Semantics is motivated by phenomena of context-sensitive expressions such as indexicals. Anaphoric phenomena can then motivate a picture of linguistic interpretation with downstream interaction, as prior propositions provide the discourse context with antecedents that license the production of particular posterior propositions. Thus we have:

- **Riverbed Semantics:** Linguistic interpretation involves procedures which assign (in a context-independent manner) propositional contents, which can then have downstream effects on subsequent propositional assignments.

In a Riverbed Semantics, propositions provide a stable conduit directing the flow of context evolution throughout a discourse.

Combining Marshland and Riverbed Semantics yields:

- **Coral Reef Semantics:** Linguistic interpretation proceeds, in the face of an utterance, by first determining the propositional content expressed by that utterance in the prior context, and then by updating the context with that proposition to produce a posterior context.

Coral Reef Semantics thus recognizes both upstream and downstream context-proposition interactions. It presents a picture of linguistic interpretations that incorporates what Stalnaker calls “some truisms about assertions”:

First, assertions have content: an act of assertion is, among other things, the expression of a proposition – something that represents the world as being a certain way. Second, assertions are made in a context – a situation that includes a speaker with certain beliefs and intentions, and some people with their own beliefs and intentions to whom the assertion is addressed. Third, sometimes the content of the assertion is dependent on the context in which it is made, for example, on who is speaking or when the assertion takes place. Fourth, acts of assertion affect, and are intended to affect, the context, in particular the attitudes of the participants in the situation, how the assertion affects the context will depend on its content. (Stalnaker (1979), 315)

Coral Reef Semantics present the proposition fully submerged in a sea of contextual interactions, but the stable rock is still there, in keeping with Stalnaker’s first truism. We thus do not yet see:

the emergence of a *dynamic perspective* on natural language semantics, where the center of the stage, occupied so long by the concept

of truth with respect to appropriate models, has been replaced by context change conditions, with truth conditions defined in terms of those. (van Eijck and Kamp (1997), 181)

The fan of the Static Picture, then, should be satisfied even if the thaw from the Ice Age proceeds as far as the Coral Reef.

The line from Static to Dynamic Picture is crossed when we move from Coral Reef to:

- **Aquatic Semantics:** Linguistic interpretation proceeds by assigning to utterances relations between prior and posterior contexts, relations which need not be mediated or governed by truth-condition-determining propositional contents.

Solid rock slips away, and we move decisively from the Static to the Dynamic Picture. If the proposition is to show any life, we must not be forced to live the life Aquatic.

1.3. A PRECISE FORMULATION OF THE STATIC/DYNAMIC DIVIDE

The Question can now be preliminarily rephrased:

- **The Question (Second Draft):** What, if anything, about presupposition accommodation forces us to adopt an Aquatic, rather than a Coral Reef, semantics?

But the distinction between these two pictures of semantics rests on a thus-far elusive notion of propositions governing, or failing to govern, relations between contexts. In this section I will briefly sketch, and comment on, a standard formal differentiation between statics and

dynamics which will then guide the rest of my discussion.

I will adopt a general formal framework of the sort that typically lies behind work on meaning as context change potential (Heim (1983)) and on update semantics (Veltman (1996)). There is, of course, a danger that this framework will beg important questions about the dispute between the Static and Dynamic Conceptions, but I do not at this point see how to find a more acceptable neutral ground. Let \mathcal{P} be a collection of points. At least initially, I will be non-committal about the nature of points. Two desiderata, however, will be useful in guaranteeing that points can indeed support a classical notion of proposition-as-truth-condition-determiner:

- **Truth Out:** Given any point $i \in \mathcal{P}$ and any sentence η , i determines a truth value for η .¹
- **Truth In:** Given any distinct points $i, i' \in \mathcal{P}$, there is some sentence η such that i, i' determine distinct truth values for η .

Taking \mathcal{P} to be a collection of possible worlds (in the sense of truth-value assignments to atoms) and \mathcal{L} to be a straight propositional language, for example, satisfies both Truth In and Truth Out. Truth In is a small gesture toward ensuring that points are not loaded up with numerous “truth-irrelevant” features that play a significant role in the process of linguistic interpretation.

¹ A brief note on notation. Throughout, upper-case Greek letters are used as names of particular sentences, with Φ , Ψ , and Θ the preferred choices. Lower-case Greek letters early in the alphabet are used as metalanguage variables over sentences, with η and ζ the preferred choices. Lower-case Greek letters late in the alphabet are used as metalanguage variables over states, with σ and τ the preferred choices.

From the collection of points is built a collection of *states*, by letting states be sets of points and setting $C = \wp(\mathcal{P})$. Again, I will remain as neutral as possible on the interpretation of states – contexts, information states, etc. Each sentence η is then associated with a state change rule $[\eta] : C \mapsto C$. Associating sentences with state change rules does not in itself assure that the linguistic interpretation mechanism is deeply dynamic – that is, Aquatic – as the state change might simply be the result of updating a prior state with the static propositional content of η to produce an informationally-enriched posterior state $\sigma[\eta]$.

Given Truth Out, each sentence η can be associated as well with a set of points making it true. Call this set $\llbracket \eta \rrbracket$. Then we can characterize static linguistic interpretation as follows:

- **STATIC:** The linguistic interpretation mechanism of \mathcal{L} is static *if_{def}* for any sentence η and any state σ , $\sigma[\eta] = \sigma \cap \llbracket \eta \rrbracket$.

The condition STATIC is thus what the fan of the Static Conception wants to preserve (here, in the face of phenomena drawn from presupposition accommodation). One peculiarity of STATIC deserves special comment. Since STATIC envisions a single propositional content $\llbracket \eta \rrbracket$ which suffices for the updating of any context with an assertion of η , it might seem to retreat beyond even Marshland Semantics, by denying that prior context can determine what proposition a sentence expresses. However, this appearance is deceptive. The update rules dictate (from the static perspective) the impact of the *proposition*, not the *sentence*, on the context, so the role of context in determining what proposition a sentence expresses has already been played. (This is, in

turn, a way of saying that the update rules deal with the context of evaluation, not the context of utterance.) Two brief side thoughts on this point:

- Recent views of “truth relativism” (see, for example, MacFarlane (2005) or Egan et al. (2005)), in allowing the truth of a proposition to be judged relative to some novel parameter, such as a context of assessment, in essence allow for the update potential of a proposition to depend on the prior state (although the state will have to be identified with whatever novel parameter the particular relativism endorses). Allowing such backward dependence removes the argument for Continuity (see below) from the Static Conception (and hence the utility of STATIC in characterizing that conception). It would thus appear that there should be a certain formal resemblance between the expressive resources available to dynamic and truth-relativistic semantics, a resemblance that perhaps deserves further investigation.
- The Static Conception evinces a curious asymmetry here. Since it allows η to have an impact on the posterior state, it thereby allows the posterior state to constrain the truth-conditions of the proposition η . However, the Static Conception does not allow the prior state to constrain the truth-conditions of the proposition η , since *any* prior state is updated with the identical $\llbracket \eta \rrbracket$. It would be nice to have a justification for this asymmetry.

The target presented by STATIC can be further refined. A well-known result of van Benthem (1986) (see also Groenindijk and Stokhof (1990))

then shows that the following two conditions are necessary and sufficient for STATIC:

- **Continuity:** $[\cdot]$ is continuous *if_{def}* for any state σ and any sentence η ,

$$\sigma[\eta] = \bigcup_{i \in \sigma} i[\eta]$$

- **Introspection:** $[\cdot]$ is introspective *if_{def}* for any state σ and any sentence η ,

$$\sigma[\eta] \subseteq \sigma$$

That a static semantics entails both Continuity and Introspection is trivial. For the other direction, note that any sentence η can be associated with a binary relation $\eta^* \subseteq \mathcal{P} \times \mathcal{P}$ as follows:

$$\langle i, j \rangle \in \eta^* \Leftrightarrow j \in i[\eta]$$

Continuity then guarantees that updating a state with η is the same as taking the image of that state under η^* . Introspection adds the further information that if $\langle i, j \rangle \in \eta^*$, then $i = j$. Updating with η thus amounts to applying a test to each point in σ , and constructing a new state out of those points that pass the test. The resulting test can then be thought of as the static propositional content of η .

The Question was this: what, if anything, about presupposition accommodation forces us to adopt an Aquatic perspective on linguistic interpretation? It can now be rephrased as:

- **The Question (Final Draft):** What, if anything, about presupposition accommodation forces violation of either Continuity or Introspection in modelling linguistic interpretation?

The status of both of these two principles will hence be a central focus in what follows.

Before descending into detailed discussion of the status of Continuity and Introspection in the light of presupposition accommodation, some general comments about the the relation between the Static Conception and Continuity:

- A static semantics is committed to Continuity because I have construed the truth-conditional information provided by propositions as information about truth at a *point* (hence the imposition of Truth In and Truth Out on points). Were the proposition to provide instead (or in addition) truth conditions at *states*, a thorough-going staticism could dispense with Continuity. Thus the question of whether the semantic theory is static or dynamic should not be conflated with the question of whether the underlying notion of truth is pointwise or setwise. (A setwise notion of truth will immediately yield a pointwise notion by taking a proposition to be true at a point if it is true at the singleton set of that point.) I will, however, not pursue here defenses of the Static Conception that depend on a setwise truth property.

2. The Problem of Escapes

The first serious impetus toward a dynamic semantics comes from the behaviour of presupposition triggers under various embeddings. Consider first the following paradigm case:

- Φ : Saul regrets that his yacht is smaller than Bertie's yacht.
- $\Psi (= \neg\Phi)$: Saul does not regret that his yacht is smaller than Bertie's yacht.
- Θ : Saul's yacht is smaller than Bertie's yacht.²

Intuitively, the difficulty is this. Both Φ and Ψ imply Θ , because they both carry Θ as a presupposition, and Θ will (*ceteris parabis*) be accommodated if it is not already carried in the conversational context (or whatever state is relevant to the satisfaction of presuppositions of utterances). But what classical propositional content could Φ have such that both it and its negation could entail the same non-tautologous claim?

This, then, is the *Problem of Escapes*: how can the Static Conception describe a propositional content portions of which will properly "escape" from various embedded contexts? The paradigm case given above extends in two ways when the full range of accommodation behaviour is considered:

- The problem is not just a problem of negation. Presupposition triggers embedded in a vast array, although not all, constructions

² See Kripke (2006), 1021, for details on the determination of yacht size.

lead to portions of propositional content escaping from the embedding. My discussion will, for simplicity, focus almost exclusively on the case of negation, but in seeking a general solution one should remember that the phenomenon is ubiquitous. Thus, for example, any solution which depends crucially on *special* features of negation should be viewed with suspicion.

- The problem is further complicated by the complex empirical pattern of presupposition projection. A full account of escape must, of course, explain why presupposed content will escape varying distances in varying constructions and in varying contexts. I will optimistically assume that these complexities can be settled independently of the choice between statics and dynamics, and hence will disregard them.

On the static picture, the problem can be made more precise as follows. Each of Φ , Ψ , and Θ must receive classical propositional contents $\llbracket \Phi \rrbracket$, $\llbracket \Psi \rrbracket$, $\llbracket \Theta \rrbracket \subseteq \mathcal{P}$, and each of these contents must suffice for characterizing broadly semantic behaviour of each of the claims. On the classical picture of entailment as truth preservation, the fact that $\Phi \vDash \Theta$ just is the fact that $\llbracket \Phi \rrbracket \subseteq \llbracket \Theta \rrbracket$. Similarly, because $\Psi \vDash \Theta$, we have $\llbracket \Psi \rrbracket \subseteq \llbracket \Theta \rrbracket$. But since $\Psi = \neg\Phi$, $\llbracket \Psi \rrbracket = \llbracket \neg\Phi \rrbracket = \mathcal{P} - \llbracket \Phi \rrbracket$. But if $\llbracket \Phi \rrbracket \subseteq \llbracket \Theta \rrbracket$ and $\mathcal{P} - \llbracket \Phi \rrbracket \subseteq \llbracket \Theta \rrbracket$, it follows that $\mathcal{P} \subseteq \llbracket \Theta \rrbracket$, and Θ is a tautology. But Θ is not a tautology, so a contradiction has been reached.

Beyond the essence of the static propositional picture and a bit of baby set theory, this argument makes only two assumptions:

1. **Classical Entailment:** Entailment is set-theoretic containment of the determinants of propositional content.
2. **Classical Negation:** The propositional content of the negation of a claim η is the set-theoretic complement of the determinants of the propositional content of η .

Dropping either of Classical Entailment or Classical Negation thus could, *prima facie*, salvage the Static Conception. However, things are not so simple, since each flows rather naturally from the Static Conception, which is thus not easily divested of either. A few brief comments on easy ways out which will not be pursued here:

- Classical Entailment might be replaced with a notion of *defeasible consequence*, such as that set out in Asher and Morreau (1995). Defeasible consequence can seem especially tempting when we consider the cancellability of presuppositional content in many situations (see Beaver (2002) for extensive data on cancellation), and treating accommodational content with defeasible consequence might serve as a way of capturing the status of such content as default rather than fact in discourse (see Mercer (1992)). However, the Asher-Morreau logic supports the principle they call the *Dudley Doorite*:

$$\bullet \quad p \vdash r, q \vdash r \Rightarrow (p \vee q) \vdash r$$

The Dudley Doorite comes close to allowing the move from $\Phi \vDash \Theta$ and $\neg\Phi \vDash \Theta$ to an objectionable status for Θ (here, as universal default) – the missing step is just the co-propositionality of $\Phi \vee \neg\Phi$ and \top . That co-propositionality will, surely, need to be resisted,

but the real work then devolves to the theory of propositional content, not the theory of defeasible entailment.

- The crudest method of replacing Classical Negation is with a noncompositional treatment of negation, which does not attempt to derive the content of $\neg\eta$ from the content of η . Without compositionality, the propositional content of η_ζ (following Beaver (1997)'s notation for indicating presuppositions via subscripts) can be taken to be $\llbracket\eta\rrbracket \cap \llbracket\zeta\rrbracket = \llbracket\eta \wedge \zeta\rrbracket$ without thereby committing to $\llbracket\neg\eta_\zeta\rrbracket = \llbracket\neg(\eta \wedge \zeta)\rrbracket$, which would not provide the desired escape. Because the Problem of Escape extends far beyond negation, the imputed noncompositional behaviour would have to extend to a wide swath of the language's embedding constructions. What to think of a widespread noncompositional semantics in response to the Problem of Escape depends on why one cares about compositionality. Since my own view is that compositionality is important in guaranteeing that lexical semantics faithfully represent the commitments (ontological, ideological, and so forth) that the linguistic practice undertakes (see Dever (2006) for a slightly more expansive discussion of this view), and since I care about propositions largely as tools for the presentation of such commitments, I take noncompositional solutions to the Problem of Escapes to undermine the interest of the Static Conception, and I will not further pursue such solutions here. There are subtle issues about the interaction between compositionality and dynamics that deserve further discussion.

- Finally, a more general point. Because the Problem of Escape rests on the way in which presuppositions of component parts of expressions re-emerge at higher levels of organization, one method of approaching the problem is to appeal to a *Deus ex Syntactica*, by endorsing a syntactic theory which locates the presupposition trigger outside the apparent embedding context (given the previous point about compositionality, this syntactic way out is to be expected in light of the fact that sufficient tinkering with the syntax can smooth away arbitrary *prima facie* noncompositional behaviour. See Janssen (1997), §9.3, and Dever (2006), §2.1). The use of scope mechanisms and a Russellian theory of definite descriptions, for example (see Kripke (2006) and Kripke (1989)), can use a wide-scoping of a description with respect to a negation to explain why the negation continues to entail the existence of the described object. As with all *dei*, accepting the way out means paying the theological price. I am not a syntactician, so I will not attempt to evaluate the requisite theodicies, other than to note that (a) as van der Sandt (1992) notes, scopal solutions become increasingly difficult as the complexity of the imbedding increases (as with conditionals), and especially so when it comes to cases in which accommodation occurs in both the global and local context, as in:

- Saul suspects that Bertie doubted that the prime minister could solve the problem.

which has a solution on which the audience, Saul, and Bertie are all committed to the existence of a prime minister, and (b)

the required *Deus ex syntactica* would appear to get even messier for presuppositions that are not triggered by determiner phrases, such as it-cleft presuppositions, lexically-specific presuppositions, or the presuppositions of factive and semi-factive verbs.

Dropping either Classical Entailment or Classical Negation *while retaining the Static Conception* thus looks unpromising, so here we see a first indication of how a dynamic perspective may be required for presupposition accommodation. But it should be emphasized that we are not there yet. So far what we have is a puzzle, showing that one path (the purely classical static path) is blocked. That does not yet show that the dynamic path is open.

2.1. PHASE 1: HEIM-STYLE TREATMENT WITHOUT ACCOMMODATION

Let us, then, introduce a simple dynamic system. My first draft dynamics will follow roughly the lead of Heim (1983), and begins with the minimally altering step of replacing classical entailment and classical negation with dynamic alternatives. Classical entailment is replaced with the *update-to-test* conception of consequence (see Veltman (1996), where this notion of consequence is called \Vdash_2):

- **UTC Consequence:** $\eta \Vdash_2 \zeta$ if_{def} for all states σ , $\sigma[\eta] = \sigma[\zeta]$.

In the same vein, a state σ makes true a sentence η if $\sigma[\eta] = \sigma$. As before, a notion of truth in a state immediately entails a notion of truth at a point.

Classical negation is replaced with dynamic negation:

- $\sigma[\neg\eta] = \sigma - \sigma[\eta]$

To update with a negation is to cast out from the current state any points that would survive updating with the unnegated matrix. Note that UTC consequence and dynamic negation have classical entailment and classical negation as special cases under the assumptions of Continuity and Introspection.

Now suppose Φ is treated as atomic, and is given the following update rule:

$$\sigma[\Phi] = \begin{cases} \llbracket\Phi\rrbracket \cap \sigma & \text{if } \sigma \subseteq \llbracket\Theta\rrbracket \\ \text{undefined} & \text{otherwise} \end{cases}$$

From this update rule it follows that:

- $\Phi \Vdash \Theta$, since either $\sigma \subseteq \llbracket\Theta\rrbracket$, in which case $\sigma[\Phi][\Theta] = \sigma \cap \llbracket\Phi\rrbracket \cap \llbracket\Theta\rrbracket = \sigma \cap \llbracket\Phi\rrbracket = \sigma[\Phi]$ (I assume here that Θ updates simply by intersection with the current state) or $\sigma \not\subseteq \llbracket\Theta\rrbracket$, in which case both $\sigma[\Phi]$ and $\sigma[\Phi][\Theta]$ are undefined.
- $\Psi \Vdash \Theta$, since $\sigma[\Psi] = \sigma - \sigma[\Phi]$, so either $\sigma \subseteq \llbracket\Theta\rrbracket$, in which case any subset of σ is also a subset of $\llbracket\Theta\rrbracket$, and updating $\sigma[\Psi]$ with Θ creates no further change, or $\sigma \not\subseteq \llbracket\Theta\rrbracket$, in which case $\sigma[\Phi]$, and hence both $\sigma[\Psi]$ and $\sigma[\Psi][\Theta]$, is undefined.

However, it is not the case that $\Vdash \Theta$ – there clearly can be states which do not support Θ . Thus the Problem of Escapes is evaded.

Note that *partiality* plays a crucial role here. It would not suffice to have $\sigma[\Phi]$ be \emptyset when $\sigma \not\subseteq \Theta$. That rule would not give $\Psi \Vdash \Theta$, since

when $\sigma \notin \Theta$, $\sigma[\Phi]$ would be \emptyset and $\sigma[\Psi] = \sigma - \sigma[\Phi]$ would be σ . It is not enough that introducing an utterance with a presupposition trigger into a discourse whose context does not support that trigger crashes the discourse in the weak sense of reducing the common ground to absurdity – it must crash it in the strong sense of simply making it impossible to find a way to update the common ground. The appeal to partiality is *prima facie* an anti-static move, since its formulation requires the relational conception of meaning that dynamics provides. There is no propositional content updating with which would provide the strong crash that partiality requires. However, the effects of partiality can be simulated statically if one retreats to the pre-interpretation utterance and holds that, in certain contexts, the utterance fails to express a proposition, making (statically) updating the context with that proposition impossible. Thus far, the dynamics offer nothing that the Static Conception cannot match.

2.2. PHASE 2: HEIM-STYLE TREATMENT WITH ACCOMMODATION

Issues of partiality become largely moot once accommodation enters the picture. If a defective context repairs to correct the defect, then the update need not be partial. This is a vast oversimplification, of course, both because accommodation can be blocked by an inhospitable context at every accessible level and because certain presupposition triggers (particles, most prominently (see the discussion in Zeevat (2006)) require anaphoric readings and will not permit the unbound/accommodational readings. But the simplification will suf-

for locating the central issues.

Suppose a generally “crash-oriented” presupposition update rule:

$$\mathbf{CRASH:} \quad \sigma[\eta\zeta] = \begin{cases} \sigma[\eta] & \text{if } \sigma \Vdash \zeta \\ \text{undefined} & \text{otherwise} \end{cases}$$

is replaced with an “accommodation-oriented” rule:

$$\mathbf{ACCOMMODATE:} \quad \sigma[\eta\zeta] = \sigma[\zeta][\eta]$$

The thought is that in the resulting system we will have both $\sigma[\Phi] \Vdash \Theta$ and $\sigma[\Psi] \Vdash \Theta$. How can we achieve this without having $\sigma \Vdash \Theta$?

Perhaps we cannot. Thus consider:

- **First Triviality Argument:**

$\sigma[\Phi] \Vdash \Theta$	Given
$\sigma[\Phi][\Theta] = \sigma[\Phi]$	Def. of \Vdash
$\sigma[\Psi] \Vdash \Theta$	Given
$\sigma[\Psi][\Theta] = \sigma[\Psi]$	Def. of \Vdash
$\sigma[\Psi] = \sigma[\neg\Phi] = \sigma - \sigma[\Phi]$	Def. of dynamic \neg
$(\sigma - \sigma[\Phi])[\Theta] = \sigma - \sigma[\Phi]$	Def. of dynamic \neg
$(\sigma - \sigma[\Phi])[\Theta] = \sigma[\Theta] - \sigma[\Phi][\Theta]$?
$\sigma[\Theta] - \sigma[\Phi][\Theta] = \sigma - \sigma[\Phi]$	By substitution
$\sigma[\Theta] - \sigma[\Phi] = \sigma - \sigma[\Phi]$	By substitution
$\sigma[\Theta] \cup \sigma[\Phi] = \sigma$?
$\sigma[\Theta] \cup \sigma[\Phi][\Theta] = \sigma$	By substitution
$\sigma \subseteq \sigma[\Theta]$?
$\sigma = \sigma[\Theta]$?
$\sigma \Vdash \Theta$	Def. of \Vdash

The undesired consequence $\sigma \Vdash \Theta$ threatens to result from the starting assumptions that $\sigma[\Phi] \Vdash \Theta$ and $\sigma[\Psi] \Vdash \Theta$. There are, however, some lacunae in the First Triviality Argument as it currently stands. Consider what is necessary to fill them:

- The move from $(\sigma - \sigma[\Phi])[\Theta]$ to $\sigma[\Theta] - \sigma[\Phi][\Theta]$ follows from a distribution rule that is a consequence of **STATIC**. Testing each point in the difference set is equivalent to testing each point in the original set and then removing those survivors that also survive the update

of the subtrahend. Note that both Continuity and Introspection are necessary for deriving the distribution principle.³

- From $\sigma[\Theta] - \sigma[\Phi] = \sigma - \sigma[\Phi]$ it follows that $\sigma \ominus \sigma[\Theta]$, the symmetric difference of σ and $\sigma[\Theta]$, is a subset of $\sigma[\Phi]$. For the stronger conclusion that $\sigma[\Theta] \cup \sigma[\Phi] = \sigma$, we require that $\sigma \ominus \sigma[\Theta]$ be entirely contained in σ , which in turn requires $\sigma[\Theta] \subseteq \sigma$. This, of course, follows from Introspection alone. The same application of Introspection licenses the penultimate move from $\sigma \subseteq \sigma[\Theta]$ to $\sigma = \sigma[\Theta]$.
- To move from $\sigma[\Theta] \cup \sigma[\Phi][\Theta] = \sigma$ to $\sigma \subseteq \sigma[\Theta]$, we need that $\sigma[\Phi][\Theta] = \sigma[\Theta]$. On the classical picture, this result follows. In fact, all we need is that updating with Φ is Introspective and that updating with Θ is fully classical. Note that Introspection for each does not suffice.

So a home for the intervention of dynamics has been found: rejecting either of Continuity or Introspection suffices to block the Problem of Escapes.

The formal result, however, does little to help us understand *how* the dynamics are helping. And on inspection, they seem to me to be helping in questionable ways. To rest a defense crucially on a denial of Introspection for Θ , for example, is to rest on unstable ground, since Θ is, or can be made to be, a presupposition-free claim, on which

³ Suppose Continuity but not Introspection. Let $\sigma = \{i_1, i_2\}$, $\sigma[\Phi] = \{i_2\}$, and $\{i_1\}[\Theta] = \{i_2\}[\Theta] = \{i_1\}$. Then $(\sigma - \sigma[\Phi])[\Theta] = \{i_1\}$, but $\sigma[\Theta] - \sigma[\Phi][\Theta] = \emptyset$. Now suppose Introspection but not Continuity. Let $\sigma = \{i_1, i_2\}$, $\sigma[\Theta] = \{i_1, i_2\}$, $\sigma[\Phi] = \{i_2\}$, $\{i_1\}[\Theta] = \{i_1\}$, and $\{i_2\}[\Theta] = \emptyset$. Then $(\sigma - \sigma[\Phi])[\Theta] = \emptyset$, but $\sigma[\Theta] - \sigma[\Phi][\Theta] = \{i_1, i_2\}$.

there should be no need for non-classical behaviour. Here is a way of making the point. Suppose, then, we accept that updating with either of Φ or Ψ followed by Θ is a symmetric procedure. The assumption of symmetry is, of course, generally implausible for dynamic phenomena. It is further implausible when we are considering presupposition satisfaction without accommodation, since the presupposition triggers should be expected to update differently depending on whether the context supports their presuppositions. But the assumption of symmetry looks much better with accommodation, since both Φ and Ψ will themselves effect a restriction of context to Θ -supporting points. (One might worry here about a difference in the *status* of the restriction – as a default rather than as a fact, for example. Such worries strike me as well-founded, but they point away from the Problem of Escapes toward an expanded view of the nature of states as the point of interest. I will return to such expansions in the next section.)

We now reason as follows:

- **Second Triviality Argument (Crucial Excerpts):**

$\sigma[\Phi][\Theta] = \sigma[\Theta][\Phi]$	Symmetry
$\sigma[\Psi][\Theta] = \sigma[\Theta][\Psi]$	Symmetry
$\sigma[\Theta][\Psi] = \sigma[\Theta][\neg\Phi] = \sigma[\Theta] - \sigma[\Theta][\Phi]$	Def. of dynamic \neg
$\sigma[\Theta] - \sigma[\Theta][\Phi] = \sigma[\Theta] - \sigma[\Phi][\Theta]$	Substitution
$\sigma[\Theta] - \sigma[\Phi][\Theta] = \sigma[\Theta] - \sigma[\Phi]$	From $\sigma[\Phi] \Vdash \Theta$
$\sigma[\Psi][\Theta] = \sigma[\Theta]$	From $\sigma[\Psi] \Vdash \Theta$
$\sigma[\Psi] = \sigma[\neg\Phi] = \sigma - \sigma[\Phi]$	Def. of dynamic \neg
$\sigma - \sigma[\Phi] = \sigma[\Theta] - \sigma[\Phi]$	Substitution

The appeal to the distribution principle can thus be eliminated. Assuming Introspection for Θ , the only remaining step necessary is $\sigma[\Phi][\Theta] \subseteq \sigma[\Theta]$, or (by symmetry) $\sigma[\Theta][\Phi] \subseteq \sigma[\Theta]$, which then requires Introspection for updating with Φ .

Here then is a dynamic solution to the Problem of Escapes: reject Introspection for claims – like Φ – involving presupposition triggers. And it is a solution that seems to do something right. We want to have $\Psi \Vdash \Theta$, which means that Ψ , like Φ , needs to effect a contraction of the incoming state to only Θ -supporting points. But given the negation in Ψ ($=\neg\Phi$), the unnegated Φ must then effect an *expansion*, so that the negation, in removing the expansion, will properly contract. A violation of Introspection for Φ , then, amounts to the projection of an asserted propositional content out of the local context.

But the solution is the wrong solution. Two interacting worries show that this is not the way.

- First, a simple violation of Introspection is only a temporary defeat for the static proposition picture. State change, given this picture, is a monotone downward procedure only on the assumption that we always perform the same action (speech/epistemic/cognitive act) with the proposition provided by linguistic interpretation – that a discourse consists of a sequence of state *updates*. But, of course, this is not the case. A proposition can be advanced for purposes of *retraction*, in which case the state must be downdated, and hence expanded. Here Introspection is violated (better, made moot) without abandoning the proposition. The static picture will want to distinguish the proposition supplied from what is done with the supply. It is for this reason that the interaction of non-Introspective behaviour with imbedded contexts is of particular interest, because the embedding makes a speech-act solution difficult, at best. Thus the non-Introspectability of Dynamic Predicate Logic (Groenendijk and Stokhof (1991)), for example, is hard to construe merely as retraction behaviour, and points toward a genuinely dynamic understanding.
- Second, the embedding behaviour of the proposed solution is, in fact, very poor. The proposed solution requires that $\sigma[\Theta][\Phi]$ non-Introspectively contain points $i \notin \sigma[\Theta]$. But it cannot be that $i \Vdash \Theta$, because $\sigma[\Theta] = \sigma \cap \llbracket \Theta \rrbracket$. (Here I continue to assume full classicality for Θ , as well as assuming that updating with Φ does not expand beyond the original σ . This second assumption is dispensable.)

Neither, however, can it be that $i \not\models \Theta$, because updating with Φ should leave only Θ -supporting points, in order to secure $\Phi \Vdash \Theta$.

2.3. PHASE 3: ZEEVAT'S UPDATE SEMANTICS FOR ACCOMMODATION

As a final attempt to extract an argument for dynamics from the Problem of Escapes, I turn to considering a dynamic system which does produce the right empirical results, and attempt to discern what aspect of the dynamics allows this success. The update semantics of Zeevat (1992) utilizes stacks of states, in order to allow accommodation both globally and locally. I give a simplified version of Zeevat's semantics, stripped down to just those features which are relevant to the immediate problem. (In particular, I have removed the discourse referent apparatus from the system, reducing it to a modal propositional language. Propositional anaphora will play no role, since all triggers will be unbound and hence globally accommodated, so there will be no need for event or propositional referents.)

All sentential atoms will update classically, so we have:

$$\Sigma[\eta] = \langle \Sigma_0 \cap \llbracket \eta \rrbracket, \Sigma_1 \rangle$$

(Here Σ_0 refers to the head of the stack Σ , and Σ_1 refers to the tail (that is, the entire stack except for the head state. '1' subscripts can be used iteratively to pick out smaller terminal substrings.) Negation will be

essentially as in the Heim system, adapted to the stack structure:

$$\Sigma[-\eta] = \langle \langle \Sigma_0.\Sigma \rangle [\eta]_{10} - \langle \Sigma_0.\Sigma \rangle [\eta]_0 \rangle. \langle \Sigma_0.\Sigma \rangle [\eta]_{11} \rangle$$

Attitude contexts are handled by having each point map objects to states (representing cognitive states). Thus $ix \subseteq \mathcal{P}$ for any $i \in \mathcal{P}, x \in \mathcal{D}$.

We then introduce two update operations:

$$\mathbf{belin}_x \Sigma = \langle \bigcup_{i \in \Sigma_0} ix \rangle.\Sigma \rangle$$

$$\mathbf{belout}_x \Sigma = \langle \{i \in \Sigma_{10} : ix \subseteq \Sigma_0\}.\Sigma_{11} \rangle$$

Belin thus creates a local state consisting of all points compatible with some view extant in the current state about what x believes. **Belout**, given a stack with a local belief state on top, returns all “global” contexts which have x believing everything the local state says he does. Updating with a belief report then amounts to creating the local state with **belin**, adding the reported belief to it, and then “discharging” the local state via **belout** to create a modified “global” state:

$$\Sigma[B_x\eta] = \mathbf{belout}_x [\eta] \mathbf{belin}_x \Sigma$$

(For readability, I revert here to prefix notation for functional application, as opposed to the more usual postfix notation in update semantics.) The final piece of the puzzle is an update rule for presuppositional content. Here I again simplify Zeevat’s presentation, and include only the rule for complete global accommodation. The rule implements a recursive procedure, enforcing the trigger content down

the stack, and hence along the accessibility path. We have:

$$\mathbf{pres} \Sigma = \langle \Sigma_0 \cap \Sigma_{10} \cdot \mathbf{pres} \langle \Sigma_0 \cdot \Sigma_{11} \rangle \rangle$$

The effect is to add the content restrictions encoded in the state Σ_0 to each state down the stack (Zeevat's full system would check both for local binding opportunities and for local consistency and informativeness at each point in the recursion.)

Now suppose the update function of "regret(s, Θ)" is:

$$\mathbf{belout}_s [\text{sad-}\Theta] \mathbf{pres} [\Theta] \langle \mathcal{P} \cdot \mathbf{belin}_s \Sigma \rangle$$

Consider how the update proceeds in the following simple situation:

- **Sample Application:**

- $\mathcal{P} = \{i_1, i_2, i_3, i_4, i_5\}$
- $i_1s = \{i_1\}, i_2s = \{i_1, i_2, i_4\}, i_3s = \{i_2, i_3\}, i_4s = i_5s = \emptyset$
- $i_1, i_2, i_4 \Vdash \Theta, i_3, i_5 \not\Vdash \Theta$
- $i_1, i_4 \Vdash \text{sad-}\Theta, i_2, i_3, i_5 \not\Vdash \text{sad-}\Theta$

Let $\Sigma = \langle \{i_1, i_2, i_3\} \rangle$. We then have:

1. $\mathbf{belin}_s \Sigma = \langle \{i_1, i_2, i_3, i_4\} \cdot \Sigma \rangle$
2. $\langle \mathcal{P} \cdot \mathbf{belin}_s \Sigma \rangle = \langle \{i_1, i_2, i_3, i_4, i_5\} \cdot \{i_1, i_2, i_3, i_4\} \cdot \Sigma \rangle$
3. $[\Theta] \langle \mathcal{P} \cdot \mathbf{belin}_s \Sigma \rangle = \langle \{i_1, i_2, i_3, i_4, i_5\} \cap \{i_1, i_2, i_4\} \cdot \{i_1, i_2, i_3, i_4\} \cdot \Sigma \rangle = \langle \{i_1, i_2, i_4\} \cdot \{i_1, i_2, i_3, i_4\} \cdot \Sigma \rangle$
4. $\mathbf{pres} [\Theta] \langle \mathcal{P} \cdot \mathbf{belin}_s \Sigma \rangle = \langle \{i_1, i_2, i_4\} \cap \{i_1, i_2, i_3, i_4\} \cdot \mathbf{pres} \langle \{i_1, i_2, i_4\} \cdot \Sigma \rangle \rangle$

$$\begin{aligned}
& = \langle \{i_1, i_2, i_4\}. \mathbf{pres} \langle \{i_1, i_2, i_4\}. \Sigma \rangle \rangle \\
& = \langle \{i_1, i_2, i_4\}. \{i_1, i_2, i_4\} \cap \{i_1, i_2, i_3\} \rangle \\
& = \langle \{i_1, i_2, i_4\}. \{i_1, i_2\} \rangle
\end{aligned}$$

$$5. [\text{sad-}\Theta] \mathbf{pres} [\Theta] \langle \mathcal{P}. \mathbf{belin}_s \Sigma \rangle = \langle \{i_1, i_4\}, \{i_1, i_2\} \rangle$$

$$6. \mathbf{belout}_s [\text{sad-}\Theta] \mathbf{pres} [\Theta] \langle \mathcal{P}. \mathbf{belin}_s \Sigma \rangle = \langle \{i_1\} \rangle$$

Note that $i_1 \Vdash \Theta$, so we obtain, as desired, that $\text{regret}(s, \Theta) \Vdash \Phi$.

Updating with $\Psi = \neg \text{regret}(s, \Theta)$ yields:

- $\langle (\langle \Sigma. \Sigma \rangle [\text{regret}(s, \Theta)]_{10} - \langle \Sigma. \Sigma \rangle [\text{regret}(s, \Theta)]_0). \langle \Sigma. \Sigma \rangle [\text{regret}(s, \Theta)]_{11} \rangle$
- $= \langle \{i_1, i_2\} - \{i_1\}. \emptyset \rangle$
- $= \{i_2\}$

so we have $\neg \text{regret}(s, \Theta) \Vdash \Theta$. However, we do not have $\Sigma \Vdash \Theta$, since $\sigma[\Theta] = \{i_1, i_2\} \neq \Sigma$.

The key to the successful treatment of accommodation and resolution of the Problem of Escapes is, of course, the utilization of stacks of states, and the concomitant recursive propagation of the trigger constraints down the stack. The shift to stacks makes less straightforward the separation of the dynamic from the static picture. However, given some reasonably uncontroversial standards for identifying stack elements across stack developments, it should be clear that the proposed update rules are entirely Introspective. *Newly added* stack elements can be supersets of previous elements (as will the addition of \mathcal{P} to the stack in assessing the update of presupposed contents, or as with \mathbf{belin}_x),

but existing elements only contract. It is less immediately obvious, but the update procedure also satisfies Continuity. (This is not quite right, because Zeevat's non-pointwise treatment of **belin**_x and **belout**_x allows for disContinuous behaviour. However, such disContinuities do not (for example) show up in the example worked through above, and seem to belong to the separate question of the disContinuous behaviour of modals in update semantics, rather than to the question of presupposition accommodation.)

So static semantics are rescued from the Problem of Escapes, via a stack-based theory that is Continuous and Introspective. But victory may seem to have come too easily here, and a bit of reflection can refine that thought. The use of stacks can, in fact, produce the *effect* of arbitrary non-Introspective and disContinuous behaviour while in fact adhering to both of these principles. Violation of Continuity is straightforward. If we want updating with Φ to transition from state σ to state $\tau \not\subseteq \sigma$, we need only successively add τ as a new stack element, and then discard the stack tail. (This is not to say, of course, that there is a *natural* or *elegant* theory which will produce this result.) For Continuity, consider a simple case. Suppose $[\Phi]$ is desired to disContinuously map $\{i_1\}$ to \emptyset , $\{i_2\}$ to \emptyset , and $\{i_1, i_2\}$ to $\{i_1, i_2\}$. The stack-based update procedure could (for example) create a stack off the incoming state by stacking its subsets in order of decreasing size:

$$\langle \{i_1, i_2\}, \{i_1\}, \{i_2\}, \emptyset \rangle$$

and then compressing the stack to a single state by unioning all states in the stack tail. Variations on this procedure can violate, at the final output, Continuity in arbitrary ways by using the stack as a “history” of the incoming state, suitably distinguishing it from the union of its elements’ singletons, while preserving local Continuity of the update. The crucial fact is that the history of the union is not identical to the union of the history.

Two competing morals might be drawn from these observations:

1. Static semantics are not so impoverished compared to dynamic semantics as one might initially suspect. By thinking about the impact of propositional content not just on a synchronic representation of the conversational state but on a diachronically developed such representation, we can produce arbitrary dynamic effects while preserving the core notion of truth-condition-oriented propositions.
2. The use of stacks (or of DRSs, or of devious applications of syntactic scope, or of other similar techniques) is just as much an abandonment of the static perspective and the commitment to the proposition as is dynamic semantics as characterized by update functions violating Continuity or Introspection.

It is not transparent to me which of these morals is correct. Two relevant considerations:

1. Van Benthem’s original presentation of Introspection and Continuity is illustrated by the case of adjectives. Intersective adjectives

satisfy both constraints, while non-intersective adjectives violate one or the other (typically Introspection, on the most natural treatment, although collectivizing adjectives like “cooperating” can also violate Continuity). Non-intersective adjectives thus bear a certain formal similarity to dynamic treatments at the sentential level. One standard method for treating non-intersective adjectives is to assign semantic values that are maps from argument \bar{N} denotations to resultant \bar{N} denotations, such as:

- $\llbracket \text{large } \bar{N} \rrbracket = \{x : x \text{ is larger than the average size of } \llbracket \bar{N} \rrbracket\}$.

(Alternatively, the denotation of departure can be contextually provided.) This is a dynamic treatment of adjective semantics. However, fans of the static picture seem to find *this* brand of dynamics less threatening than sentential dynamics. The reason, presumably, is that the dynamics are temporary – the NP, once the non-intersective adjective has mediated between \bar{N} 's, has a classical static semantic value, and we can *post facto* extract a classical adjectival value for the token occurrence of the non-intersective adjective. The standard sentential dynamics, on the other hand, removes the stable resting point. But this is not essential. We could recognize a higher organizational level (e.g., the discourse) at which resolution occurred and *post facto* propositional assignments became available. From the point of view of the fan of propositions, the question then becomes: does the semantic evaluation of the higher organizational level take a sufficiently propositional form, or depend suitably on the *post facto* propositional behaviour of the constituent sentences?

Non-intersective adjectives could also be modelled using “histories”, in a manner broadly analogous to Zeevat’s stacks. Suppose, for example, that an occurrence of “large” introduces a stack of (i) a generic noun complement, and (ii) the result of an application of a greater-than-average-size operation on that complement. Attachment of “large” to an \bar{N} could then first restrict the stack tail to the provided \bar{N} denotation, and then update the stack head accordingly. There is, of course, no significant difference between this and the dynamic picture – that is the point that a stack interpretation of update semantics brought to the fore. What the stack reading of the dynamic picture of non-intersective adjectives does emphasize, though, is that the particular dynamics involved here are easily understood as a (short) sequence of refined understandings of the adjectival semantic contribution, in light of further semantic information.

An appeal to something like a “history” picture of semantic processing is hidden within even the static classical picture. *Prima facie*, logical operations like negation and disjunction are non-Introspective – the state achieved via an application of negation, or via disjoining a further sentence, is not a subset of the incoming state. This fact is disguised via an appeal to a *Deus ex Syntactica* – a hierarchical syntax guarantees that updating with the negation or disjunction is built out of updating with the negated or disjoined sentences. But were the syntax read linearly, the non-Introspection would be made manifest. The point is most easily seen with disjunction. Reading linear, updating with “ η or ζ ” would require first

updating with η and then updating, non-Introspectively, with “or ζ ”. The need for the linear procedure can be felt when we consider the use of disjunctions across the sentential boundary:

- Yacht size measurements do not include pushpits. Or stem-head fittings.
2. One way of generalizing the moral of stack update semantics for presupposition accommodation is as pointing to a need for an enriched understanding of what a state, understood as an information structure, consists in. Taking states to be sequences of sets of points is one way to complicate the information structure, but not the only way. Another roughly equivalent way is to take states to be nested DRSs. Other enrichments of the information structure are available with some creativity, and various kinds of enrichments will surely serve the purpose of properly tracking the behaviour of accommodation under various sorts of embeddings. This yields a way of reconstruing the challenge posed by the Problem of Escapes: how far from the simple “possible worlds” conception of points and states do we need to move in order to model accommodation in embedded contexts?

Taken together, these considerations suggest to me the following moral:

- **First Moral:** The accommodation behaviour of presupposition triggers in embedded contexts can be modelled by shifting the semantic coin to a notion of information structure as a history of state changes. By then taking into account both the updating (assertion) and downdating (retraction) effects of propositional

content on states, the static propositional picture can adequately account for such histories. Thus the Problem of Escapes presents no insuperable challenge to the static picture.

3. The Problem of Gimcracks

The Problem of Escapes, from a sufficiently abstract perspective, can be thought of as a manifestation of sentence-internal dynamics. When updating a state with the negation of a presupposition-trigger-containing claim, like Ψ , the updating of the unnegated matrix needs not just to contribute a propositional content toward a final negation-inflected alteration of state, but to alter that state itself. A stack-based update system deals with the internal dynamics by constructing a history of states, each thought of as a collection of points adhering to Truth In and Truth Out, mirroring the syntactically-provided update history, and by modifying various parts of this stack at each point. As noted at the end of the previous section, the same general effect can be achieved by moving to a notion of states which drops the commitment to Truth In and Truth Out (especially to Truth In), adding to states additional information beyond truth-evaluation-relevant information which then assists in the internal dynamics.

The internal dynamics of negation, following this lead, could then be handled as follows. Let a state consist of one set of points representing the current epistemic/informational/discourse (EID) situation of the individual or discourse community and a second set of points

representing the the current “modal domain” – the collection of points which are regarded as possibilities that need to be taken seriously. The following rather crude picture of updating would then be available:

- Updating with non-accommodational atomic information updates the EID situation to include that information, but leaves the modal domain unchanged.
- Updating with accommodational atomic information updates the modal domain, but leaves the EID situation unchanged.
- Updating with a negation removes from the modal domain the EID of the state as updated with the matrix unnegated claim.
- A claim thus proposes alteration to both the EID and modal domain of a state; upon discourse acceptance of the claim, the state is resolved by setting both the EID and the modal domain to the intersection of the EID and modal domain of the proposed alteration.

The details here will certainly need further refinement, but already it should be obvious that there will emerge a structural similarity between this approach and the previously-discussed stack semantics. There is a conceptual reorganization here, as the lower elements of the stack are thought of not as representing speaker information states but rather as representing background constraints against which speaker information states evolve, and hence there is in a sense an expansion of the notion of state to include non-truth-representing components (the possibility of two states which agree in their EID situation but disagree in their modal domain suggests a violation of Truth In), but if the

enrichment of the notion of state is driven entirely by the requirements of modelling the internal dynamics, the results of the previous section suggest that the final result will be friendly to the Static Conception.

But there is a potential threat to the Static Conception in the neighborhood. Even if dealing with the relatively simple sentence-internal dynamics of negation via expanding the notion of state works out, there may be other accommodational phenomena which demand more elaborate additions to the notion of states. This is the *Problem of Gimcracks* – perhaps once we have dealt with the full array of accommodation cases, the states being used in updates will be so loaded down with beads and baubles beyond the Truth In and Truth Out supporting points that the Static Conception will be crushed under their weight. The Problem of Gimcracks poses two separate threats to the Static Conception. First, the fully-dressed states may have so many truth-irrelevant extras that there is no way for a truth-condition-determining proposition to govern the updating. Formally, this problem would allow updating to proceed according to STATIC, but only via associating with an utterance η a set of points $\llbracket \eta \rrbracket$ which are not mere truth-trackers. Second, the dressing of the fully-dressed states may influence their dynamics in such a way that either Continuity or Introspection is violated.

In this section, I will consider a sample type of accommodational phenomena that appears to call for an enriched notion of informational states, and extract what morals I can for the prospects of the Static Conception.

3.1. ADDING REFERENCE PEGS

Certain linguistic expressions have as one of their effects not a contribution to truth-conditions, but a making available of subsequent anaphoric connections. Thus, of course, the famous difference between:

- I dropped ten marbles and found all of them, except for one. It is probably under the sofa.
- I dropped ten marbles and found only nine of them. ?It is probably under the sofa. (Heim (1982))

Indefinite descriptions make available anaphoric connections in a non-accommodational manner, and hence the availability of anaphoric connections does not survive embedding under negation. Definite descriptions and proper names, on the other hand, appear to license the anaphoric connections accommodationally, and the licensing does survive embedding under negation. Thus:

- I didn't see a man walking in the park. *He was hiding behind a tree.
- I didn't see the man walking in the park. He was hiding behind a tree.
- I didn't see Gottlob. He was hiding behind a tree.

Dynamic predicate logic (Groenendijk and Stokhof (1991)) provides an update mechanism for dealing with the non-accommodational cases.

The DPL semantics has, for current purposes, two key features:

1. The points from which states are built are no longer simple possible world conception that lay behind much of the discussion in the

previous section. States are instead assignment functions, mapping variables to objects from a given domain.

2. The update function is non-Introspective (although it is Continuous). The source of the non-Introspectivity is the treatment of the existential quantifier, which acts as a “value reset” on a variable. Thus:

- $\sigma[\exists x \eta(x)] = \{g : \exists h(h \sim_x f \wedge g \in \{h\}[\eta(x)])\}$ ⁴

For example, updating a state consisting of a single assignment function f on a tautological existential quantification $\exists x x = x$ will result in an enlarged state containing all x -variants of f .

It is the violation of Introspection that makes DPL a genuinely dynamic system. However, the violation of Introspection can appear, on examination, rather shallow. Introspection fails only for the existential quantifier, due to the value reset. The value reset occurs only as an artifact of the formal system, via the decision to make the *very same* variables available for anaphoric reuse. Were we instead to require that every quantifier, and hence every anaphoric sequence, had to be modelled by a novel variable, there would be no need for value resetting, and hence no need for non-Introspective behaviour. Each variable could, discourse initial, be associated with the maximal range of available assignments, and all update could proceed Introspectively.

But this proposal misses an important fact. The existentials are playing not just the semantic role of value resetting, but also the broadly prag-

⁴ Where $h \sim_x f$ if h, f are assignment functions which agree on all variables except possibly x .

matic role of providing a peg for discourse reference. If all variables begin maximally reset, then there is no remaining semantic function for the existential quantifier – any existential quantification of a variable would have to be the first occurrence of the variable, and the existential will simply reaffirm the maximally reset status of the variable. But if there is no semantic function for the existential, we lack DPL's semantic explanation of the role of existentials in licensing subsequent anaphora.

The following picture thus presents itself. The phenomena that DPL models can indeed be given an Introspective construal, but only at the cost of adding further complexity to the informational structure that discourse updating tracks. In addition to the truth-determining assignment functions, we need a dynamically developing collection of discourse reference pegs. The role of the existential then is not to reset (non-Introspectively) the assignments to a variable, but rather to expand the collection of pegs, and hence make available anaphoric connections. (The use of referent systems and pegs in Groenindijk et al. (1996), although put to a more elaborate purpose than this, could serve the present role.) Adherence to STATIC is bought at the price of richer informational structure.

The use of an independent track of discourse reference pegs in states then provides a tool for the treatment of presuppositional and accommodational behaviour of definite descriptions and proper names. It is standard at least since Strawson (1950), and arguably since Frege (1997), to treat definite descriptions and names as introducing existential presuppositions which then project out of embeddings. How-

ever, anaphoric linkage to definite descriptions and names is possible even in constructions in which the global context contains information which prevents the accommodation of the proposed existential presuppositions. Thus:

- According to Doyle, Sherlock Holmes was a detective living at 221B Baker Street. Supposedly, he was killed by Moriarty at Reichenbach Falls./But since there is no detective living there, he doesn't exist.
- The King of France isn't bald, because there is no king of France. But Frank thinks he is bald./So don't put him on the list of bald people.
- Alexander thinks he has been cursed by Coo-ee-oh, an evil witch, but of course there are no witches. Still, he worries that she'll curse me, too./So I'm safe from her.

In each instance, the initial embedded occurrence of the presupposition trigger is followed by a cancellation-mandating bit of information in the global context, and then two possible continuations: one with anaphoric reference to the trigger under a modal, and one with anaphoric reference to the trigger absent a modal. The modal-containing cases suggest an assimilation to the phenomenon of modal subordination, and hence (without worrying about the finer details) a story on which the existential presupposition persists in a modally-provided local context, even while being cancelled in the global context. But, although there are subtleties here, the appeal to local contexts is at least *prima facie* unavailable in the non-modal versions. However,

if states include discourse reference pegs, which do not in themselves give rise to existential commitments, then accommodation on definite descriptions and proper names could always add reference pegs to the global state, making anaphoric reference in principle possible. Of course, particular assertions involving the available anaphoric devices could still be infelicitous by way of contradicting the informational content of the global context. If the existential presupposition has been globally cancelled due to contradiction, then anaphoric connections to the prior definite or name will have to occur in claims which can be true without the existence of an object picked out by the anaphoric pronoun, which will restrict felicitous cases to a small class of unusual cases.

Suppose, then, that states contain collections of reference pegs in addition to collections of truth-determining points, and that accommodation can enlarge the collection of pegs as well as altering the collection of points. What are the consequences for the Static Conception? There are, I think, two issues for the fan of statics to deal with.

1. Since the accommodational effect of proper names and definite descriptions is to *add* reference pegs, there appears to be a violation of Introspection, which calls for states to contract under update. However, this worry fails to go very deep. States can simply be reconstrued as containing lists of *unavailable* reference pegs, which list is then *contracted* under update. Alternatively, a state could contain a set of possible lists of available reference pegs – with

anaphoric linkage available only to pegs that all the lists agree on – and update could eliminate elements of this set. Discourse would thus involve, *inter alia*, elimination of uncertainty about what there is to talk about. A deeper point emerges here: the choice between Introspective and non-Introspective update procedures is no real choice until it has been determined what the elements of states are to be, since absent such a decision, a non-Introspective update can always be made Introspective by reconceiving state elements.

2. The expansion of states that DPL proposes remains faithful to Truth In and Truth Out, since the assignment functions do play a consistent role in determining truth values of claims. The variable value reset performed by the existential quantifier thus has downstream consequences on the truth evaluation of subsequent sentences. But if we separate the dynamics as proposed above, so that existentials merely introduce new reference pegs whose assignments are then Introspectively updated via subsequent information, then the first component of the dynamics – the reference peg introduction – is not in itself truth-conditional. This is an instance of the first version of the Problem of Gimcracks. If the update function of the existential is not truth-conditional, how can updating with a truth-conditional propositional content account for this function? One response, of course, is to concede that it does not, and allow for extra-propositional components of the update. This is simply to concede the Problem. Perhaps that is the best response to this particular instance of the Problem, and perhaps making it does not overly weaken the PDPE and reduce the desired centrality of

the proposition. But the fan of the Static Conception presumably cannot *always* make this response. Another possibility is to pursue what I will call the Making It Explicit strategy:

- **Making It Explicit:** To account propositionally for a truth-conditionally irrelevant state update, take the proposition expressed to include the (truth-conditional) information that the state contains the desired truth-conditionally irrelevant features.

The Making It Explicit strategy could thus take the sentence “John is tall” to contribute not just the information that a specific individual is tall, but also the information that a certain discourse reference peg is available. The second piece of information, of course, must escape from embeddings in the usual ways, but this fact is just a repetition of the Problem of Escapes, and the lines of response explored in the previous section are still available.

3.2. ACCOMMODATION AND GIMCRACKERY

Why is the Problem of Gimcracks specifically a problem *about accommodation*? Various linguistic constructions have effects on the discourse state that extend beyond straight-forward truth-conditional contributions, and accounting for these effects is a general problem for the Static Conception. But do we have more here than a particular manifestation in presupposition accommodation cases of that general problem?

The general problem can, after all, always be lifted into an accommodation-related problem by taking constructions which trigger gimcrackery and then making those constructions the presuppositional content of triggers. Suppose, for example, that a claim of the form “*Might η* ” has the non-truth-conditional effect of expanding the current state to include η -supporting points. This effect is not accommodational (in the current sense, although both Lewis (1979) and Kratzer (1981) describe the effect with that term) because it does not survive embedding in negation. To assert “It is not the case that it might be raining” is not to introduce points at which it is raining into the current context. The non-truth-conditional impact of the existential epistemic modal can then be introduced via accommodation by imbedding the modal in a presupposition trigger, as in:

- Mary regrets that it might be raining.

(See the next section for further discussion of accommodation and epistemic modals.) There is a real challenge to the Static Conception here, but not obviously a peculiarly accommodational challenge.

But there is a specifically accommodational angle to the Problem of Gimcracks. I have suggested above that the proponent of the Static Conception can pursue what I called the Making It Explicit strategy, by taking the *prima facie* non-truth-conditional impact on context to be brought about by a propositional content component *that the desired context alteration occurs*. (Note that the apparent propositional content of existential epistemic modals looks very much like the desired context effect, making the strategy particularly tempting in this case. If

a state consists of not of a set of points, but of a set of sets of points (representing, as it were, possibilities about what the current set of points is), then “might η ” claims can update via the propositional content that there is an η point, thus removing the η -point-free sets from the updated state.) This strategy, however, founders on considerations about the nature of presupposed information. As Stalnaker (1972) observes:

Normally, presuppositions are at least *believed* to be true. That is one reason that we can often infer more about a person’s beliefs from his assertions than he says in them. But in some cases, presuppositions may be things we are unsure about, or even propositions believed or known to be untrue. This may happen in cases of deception: the speaker presupposes things that his audience believes but that he knows to be false in order to get them to believe further false things. More innocently, a speaker may presuppose what is untrue to facilitate communication, as when an anthropologist adopts the presuppositions of his informant in questioning him.

Suppose that accommodation has led to a reference peg being added to context, or to a novel epistemic possibility being licensed in context. The Making It Explicit strategy has it that these contextual effects are brought about via the accommodation of propositional information of the form “There is such-and-such a reference peg available” or “Such-and-such is a relevant possibility in this discourse.” If a discourse participant accommodates these propositions by allowing them into the common ground while taking them privately to be untrue, then the subsequent discourse effects will lack an explanation. If it is not actually

true that a reference peg is available, then the discourse participant cannot participate in certain anaphoric chains. But this is the wrong prediction. Regardless of one's skepticism about one's co-discussants' ontologies, for example, one can engage in anaphoric linkage to proper names they use. The context-modification propositions that the Making It Explicit strategy hypothesizes cannot, unlike accommodated information more generally, be taken into the common ground without being genuinely treated as true. The context effects those propositions describe *really occur*, so the propositions must be taken on board as true.

The Problem of Gimcracks thus yields the following moral:

- **Second Moral:** Non-truth-conditional state alterations via presupposition accommodation poses a dilemma for the Static Conception. Either the gimcrackery runs independent of the propositional content, in which case the PDPE is threatened and the interest of the Static Conception decreases, or it runs, following the Making It Explicit strategy, through procedural propositional content, in which case that content must receive a (so far *ad hoc*) special status of always being taken on as true. The choice of dilemma horn can, of course, vary from case to case. How severe the damage from the horns is requires a more thorough examination. While I don't think it's obvious that the Static Conception cannot escape alive, there is certainly real pressure placed on that conception from this Problem.

4. The Problem of Timing

It is time to take the “pre-” in presupposition seriously. When an utterance η_ζ is made in state σ and accommodation occurs, one natural thought (one found, for example, in Stalnaker (1998) and von Stechow (2000)) is that the incoming state is first *prepared* for the interpretation of η by updating with ζ , and then η is received in the modified state. On this picture, the accommodated content will typically serve to arrange the stage for the main content, making it possible for the main content properly to impose its state change but not actively participating in that work. Thus in:

- Saul regrets that his yacht is smaller than Bertie’s yacht.

the accommodated information sets the scene by restricting the state to points validating the appropriate size relations between yachts, but does none of the work – to be done by the main content – of updating the state to reflect an affective attitude toward those relations.

In other cases, the gap between stage-setting and the main action narrows a bit. In (unembedded) it-cleft constructions, the accommodated content is the existential generalization of the main content. Thus:

- It was Saul who noticed the hydra problem.

presupposes (and accommodates) that someone noticed the hydra problem, and then updates with the content that Saul noticed the hydra problem. One begins to feel that the stage hands are encroaching on the work of the actors. Were “might” claims truly presuppositional in

the current sense, the stage hands would be wholly running the show – once one “accommodates” on “might η ” by expanding the current state to include η -supporting points, there seems nothing left for the “might”-claim proper to do.

I begin by sketching a particularly sharp manifestation of the closing of the gap via accommodation behaviour with counterfactual conditionals. My sketch follows the line of argument presented by Gillies (2006), who takes the gap-closing phenomenon to present an argument for a dynamic treatment of counterfactual conditionals. I then indicate briefly how the gap-closing can manifest in other cases, and extract a final moral for the Static Conception.

4.1. CONDITIONAL DYNAMICS

Strengthening the antecedent of a counterfactual famously need not preserve their truth, a point brought out by what von Fintel (2001) calls *Lewis-Sobel sequences*:

- If the USA threw its weapons into the sea tomorrow, there would be war.
- But if all the nuclear powers threw their weapons into the sea tomorrow, there would be peace.

But Lewis-Sobel sequences become much less acceptable when their order is reversed (an observation von Fintel credits to Heim):

- If all the nuclear powers threw their weapons into the sea tomorrow, there would be peace.

- ?But if the USA threw its weapons into the sea tomorrow, there would be war.

A dynamic account can explain the failure of commutivity in Lewis-Sobel sequences by combining two thoughts:

1. Counterfactuals carry what Gillies calls a *presupposition of entertainability*, which causes them to bring about (accommodationally) a context shift when introduced into a discourse. A counterfactual $\eta \Box \rightarrow \zeta$ causes the current state to expand (if necessary, and only internally) so as to include some η -supporting points. Counterfactuals thus enforce the (internal) possibility of their antecedents.
2. A counterfactual is then a strict conditional on the contextually-given possibilities.

On the first ordering of the Lewis-Sobel sequence, we begin with a state σ containing no points supporting the proposition that all the nuclear powers throw their weapons into the sea (ξ). Thus all of the points in σ that support the proposition that the USA throws its weapons into the sea (ε) are (let us suppose) points that support that there is war. (Assume that there are such points, so that the presupposition of entertainability is inert in this update). When the second counterfactual is added to the discourse, the state must expand, via accommodation of the presupposition of entertainability, to include points supporting ξ , and all of those points support that there is peace. But on the second ordering of the Lewis-Sobel sequence, beginning with the same σ , the first counterfactual encountered triggers the state expansion to include points supporting ξ , and hence ε . The second counterfactual brings

about no further expansion, but since it acts as a strict conditional, the recently added points, which support that there peace, rather than that there is war, serve to falsify the counterfactual. Thus the order-dependence of the Lewis-Sobel sequences.

Somewhat more precisely, suppose that the collection \mathcal{P} comes equipped with a linear preordering \leq (and the corresponding asymmetric $<$ defined by $x < y$ if_{def} $x \leq y$ and $y \not\leq x$).⁵ Counterfactuals then introduce two state update rules, one (a state expansion rule) corresponding to the presupposition of entertainability, and one (a state test rule) corresponding to the main content:

- **EXPAND:** $\sigma|\eta \Box \rightarrow \zeta| = \sigma \cup \{i \in \mathcal{P} : \neg \exists j \exists k (j, k \in \llbracket \eta \rrbracket \wedge j < k \wedge j < i)\}$ ⁶
- **TEST:** $\sigma[\eta \Box \rightarrow \zeta] = \{i \in \sigma|\eta \Box \rightarrow \zeta| : \forall j \in \sigma|\eta \Box \rightarrow \zeta| \{j\}[\eta \rightarrow \zeta] = j\}$ ⁷

Gillies then raises the problem of what he calls *Hegel sequences*. Hegel sequences replace the second (strengthened) counterfactual in a Lewis-Sobel sequence with a “might” counterfactual, as in (using Gillies’ example):

- If Sophie had gone to the parade, she would have seen Pedro dance.

⁵ \leq then plays the role of what Kratzer (1981) calls the *ordering source*. The ordering source is, of course, another instance of gimcrackery. The case of anankastic conditionals (see von Fintel and Iatridou (2005)) then suggest that dynamics for this portion of the gimcrackery will be necessary.

⁶ If all of the σ -external η -supporting points occur at the same \leq level, this rule will not work properly. The required fix is trivial, but obfusatory.

⁷ I assume, for simplicity, throughout this discussion that η and ζ update according to STATIC.

- If Sophie had gone to the parade, she might have been stuck behind someone tall, and then she wouldn't have seen Pedro dance.

As with the initial ordering of the Lewis-Sobel sequences, this pair is acceptable. And as with the Lewis-Sobel sequences, acceptability vanishes when the order is reversed:

- If Sophie had gone to the parade, she might have been stuck behind someone tall, and then she wouldn't have seen Pedro dance.
- If Sophie had gone to the parade, she would have seen Pedro dance.

The rule EXPAND will not explain *this* failure of commutivity, because both "might" counterfactuals have the same antecedent ("Sophie went to the parade"), so both will, by EXPAND, trigger the same context expansion. Thus it should not matter in what order the updates are performed.

Gillies thus suggests a different entertainability presupposition for "might" counterfactuals. Rather than presupposing the (contextual) possibility of their antecedents, they presuppose the (contextual) possibility of the conjunction of their antecedent and consequent. Thus we have:

- **EXPAND** $\diamond: \sigma | \eta \diamond \rightarrow \zeta | = \sigma \cup \{i \in \mathcal{P} : \neg \exists j \exists k (j, k \in \llbracket \eta \rrbracket \cap \llbracket \zeta \rrbracket \wedge j < k \wedge j < i)\}$

Once the state is expanded, a “might” counterfactual then tests for the *existence* of points simultaneously supporting antecedent and consequent:

- **TEST** \diamond : $\sigma[\eta \diamond \zeta] = \{i \in \sigma | \eta \diamond \zeta | : \exists j \in \sigma | \eta \diamond \zeta | \{j\}[\eta \wedge \zeta] = j\}$

Gillies’ argument for a dynamic treatment can now be formulated. Suppose $\eta \diamond \zeta$ is chosen such that \mathcal{P} contains points supporting $\eta \wedge \zeta$. Let σ be an arbitrary initial state, containing both an arbitrary subset of \mathcal{P} and an arbitrary ordering source \leq . Then, via accommodation of the presupposition of entertainability, $\sigma | \eta \diamond \zeta |$ will contain points supporting $\eta \wedge \zeta$. Updating with the main content of $\eta \diamond \zeta$ then tests for the existence of points supporting $\eta \wedge \zeta$ in the expanded context. But because of the accommodation, that test will *always* be passed. Thus “might” counterfactuals will always (given very minimal assumptions about the background \mathcal{P}) be true. However, “might” counterfactuals cannot always come out true, in every state – in part, as Gillies notes, because we would then be required to explain, in some states, the simultaneous truth of $\eta \Box \zeta$ and $\eta \diamond \neg \zeta$.

Again somewhat more precisely: Consider four options for calling $\eta \diamond \zeta$ true in a state:

Four Possible Truth Conditions:

1. $\eta \diamond \zeta$ is true in σ if_{def} $\sigma | \eta \diamond \zeta | \cap \llbracket \eta \wedge \zeta \rrbracket \neq \emptyset$.
2. $\eta \diamond \zeta$ is true in $\sigma | \eta \diamond \zeta |$ if_{def} $\sigma | \eta \diamond \zeta | \cap \llbracket \eta \wedge \zeta \rrbracket \neq \emptyset$.
3. $\eta \diamond \zeta$ is true in σ if_{def} $\sigma[\eta \diamond \zeta] = \sigma$.
4. $\eta \diamond \zeta$ is true in σ if_{def} $\sigma[\eta \diamond \zeta] \neq \emptyset$.

The first and second of these form two horns of a dilemma proposed by Gillies. On the first, “might” counterfactuals come out (nearly) ubiquitously true. On the second, “might” counterfactuals receive only gappy truth conditions, and in particular receive no truth value at states containing no antecedent-and-consequence supporting points. The third and fourth define, in the spirit of update semantics, truth in terms of update stability. The third is the truth definition that Gillies adopts; it makes “might” counterfactuals false any time that the presupposition of entertainability is not idle. The fourth is equivalent to the first.

Faced with no acceptable options for defining the truth of a “might” counterfactual in a state, Gillies suggests that we drop what he calls the “division of semantic labor” by dropping the notion that a counterfactual’s semantic contribution decomposes into a state-expanding update rule followed by a check on the truth value of the main content. Instead, we should endorse a genuinely dynamic conception, on which the fundamental semantic contribution of the counterfactual is just to transition from one state to another, not to say something true or false and *thereby* transition from one state to another.

Call this the *Problem of Timing* – the difficulty created by claims whose presuppositions are in fact sufficient to bring about their truth, and which thus resist association with a truth-assessable content, because by the time that that content would be playing its semantic role (after presupposition accommodation occurs), it is too late for it to do any-

thing. Three preliminary points about the Problem of Timing, before turning to evaluative remarks:

1. Gillies holds that the presupposition of entertainability is not a presupposition proper because, *inter alia*, it does not project out of negation and other embeddings.⁸ However, it is not obvious to me that this is correct. Of course, since the presupposition of entertainability entails the truth of the simple “might” counterfactual, any attempt to accommodate that presupposition globally in the face of the negation of that counterfactual will be cancelled. And it is true that the negation of the more elaborate initial “might”-counterfactual in a Hegel sequence no longer seems to interfere with the acceptability of the subsequent “would”-counterfactual:

- It is not the case that if Sophie had gone to the parade, she might have been stuck behind someone tall (and been unable to see Pedro dance).
- If Sophie had gone to the parade, she would have seen Pedro dance.

But this is to be expected, since it is only the fact that Sophie’s being stuck behind someone tall at the parade can plausibly interfere with her seeing Pedro dance that makes the state expansion triggered by the presupposition of entertainability undermine the subsequent “would”-counterfactual. If that fact is denied, by denying

⁸ Gillies also notes, and places greater weight on the fact, that the presupposition of entertainability does not pass what von Fintel (2004) calls the “hey, wait a minute” test. Since, following the discussion of the Problem of Escapes, the projection behaviour of presuppositions has seemed to me central to the implications for the static/dynamic decision, I will set aside the “hey, wait a minute” test. This is perhaps an unwise decision, given the observations about accounting for the decision of whether to update made in the next subsection.

the “might”-counterfactual, then even if the presupposition does project out of negation, and accommodation does occur, it will not interfere with the subsequent “would”-counterfactual.

An adequate test case must thus utilize a denied, or otherwise embedded, “might”-counterfactual which does not undermine the role of the accommodated points in blocking acceptability of the subsequent “would”-counterfactual. It is not easy to construct a natural and clean case of this sort, but consider the following discourse:

- A: Sophie and I had been thinking about going to the parade yesterday, but it started pouring rain so we stayed home.
- B: The parade? With the way Sophie goes off on those endless statistical discussions about historical height changes and their relations to nutrition when she’s stuck behind someone tall? Don’t you think that was taking a big risk? I remember a couple of years ago when she and I were at the Superbowl and a tall man was standing in front of her. I thought I would die of boredom. The only upside was that she couldn’t see the halftime show, so her delicate sensibilities were saved the shock of that wardrobe malfunction.
- A: I don’t think that’s fair. It’s just not true that if Sophie went to the parade, she might get stuck behind someone tall, and then she’d start that statistical rant. She’s gotten much better about restraining herself.

Or:

A: Of course, I understood that if Sophie went to the parade, she might be stuck behind someone tall, and then she'd start that statistical rant. Still, what's life without risks?

- B: So why were you thinking of going to the parade in the first place? I thought you hated parades.
- A: Well, you know Sophie's a big Pedro fan, right? He was going to be dancing in the parade, and if Sophie had gone, she would have seen Pedro dance.

I am inclined to think that the final "would"-counterfactual is undetermined by either of the earlier "might"-counterfactuals, despite their embedding under holes such as negation or a factive verb.

2. Once the Problem of Timing has been pointed out, cases beyond "might"-counterfactuals are easy to construct. With definite descriptions and proper names, sentences such as:

- Sherlock Holmes exists.
- The set theorist who proved that the existence of a measurable cardinal entailed $V=L$ was a set theorist.

are entailed by their presuppositions, and thus come out true in any state, if the state is updated with the accommodation before truth value is assessed. A similar effect can be achieved in a slightly more convoluted way with it-cleft constructions, such as:

- It was Albert who wrote that book that was written by Albert if by anyone.

Here the existential presupposition entails the original claim, so again the claim is (nearly) tautologous if assessed for truth in a state only after accommodation has occurred. Somewhat more frivolously, one could follow the lead of Williamson (1994)'s use of "definitely*" as an ω -length iteration of the "definitely" operator, and introduce "regrets*" as a corresponding ω -length iteration of "regrets that". Then:

- Timothy regrets* that we cannot find the last red patch.

will be entailed by its own presupposition.

3. The Problem of Timing, unlike the Problem of Escapes and, to a lesser extent, the Problem of Gimcracks, is not aimed at the static/dynamic distinction as a choice between two mathematical characterizations of update functions (one adhering to STATIC, the other not), but instead at the choice between a relational and a monadic conception of semantic values. The Problem of Timing can emerge for claims whose update potential follows both Continuity and Introspection (as in the proper name and definite description cases above). The worry is not that a propositional content cannot, as a formal matter, be extracted from the update potential, but rather that any attempt to extract a propositional content will produce a content with truth conditions which are implausible and which do not explain the behaviour of the claim.

4.2. A FINAL MORAL

Gillies argues that the fan of the Static Conception should not adopt either the first or the second of the Four Truth Conditions set out earlier – the first because it overly proliferates truth, the second because it leads to undue gappiness. I also want to avoid inappropriate gaps, so I will set aside the second. And I agree that “might”-counterfactuals should not count as true simply in virtue of the *sub specie aeternitatis* compossibility of antecedent and consequent. But I do not think that the Static Conception is yet out of options.

The third of the Four Truth Conditions offers an alternative to the two horns of Gillies’ dilemma. This condition takes a “might”-counterfactual to be true if it leaves the incoming state unchanged, which is equivalent to saying that it is true if the *pre-accommodation* state already passes the “ $\eta \wedge \zeta$ ” test. As noted above, “might”-counterfactuals will be very frequently, although not completely ubiquitously, false on this condition. Disregarding gappiness, we thus have a choice between too much truth and too much falsehood. Neither choice is good, but making *both* choices is not so bad.

The fan of the Static Conception should say the following. “Might” counterfactuals express different claims relative to different contexts. When $\eta \diamond \rightarrow \zeta$ is assigned a proposition in a state σ without antecedent-and-consequent points, that proposition is false. However, when it is assigned a proposition in $\sigma|\eta \diamond \rightarrow \zeta|$, the assigned proposition is true. A normal utterance of $\eta \diamond \rightarrow \zeta$ in a prior state σ then expresses

both propositions, the false and then the true. When a speaker utters $\eta \diamondrightarrow \zeta$ in σ , his audience assesses the “might”-counterfactual for truth in σ , and discovers it to be false. Assuming (on general Gricean grounds) that the speaker wanted to say something true, they note that a predictable expansion of σ would then allow the speaker’s claim to be assessed as true. Thus they perform that expansion, and are *post facto* able to regard the claim as true. Since it is only true *post facto*, the ubiquitous truth does not undermine normal assertion of “would”-counterfactuals – some such counterfactuals are indeed true relative to current states, which then (via duality) make false the corresponding “might”-counterfactual (despite the fact that, were that “might”-counterfactual uttered, it would (after first being assessed as false) lead to an expansion of the state which would verify it and falsify the “would”-counterfactual) – absent actual utterance of the “might”-counterfactual, the state remains stable, and the “would”-counterfactual is unproblematic.

A final moral for the dispute between statics and dynamics, extracted from the Problem of Timing:

- **Third Moral:** The Static and Dynamic Conceptions differ in their innate teleology, as well as in their mathematics. On the Static Conception, the *prima facie point* of making an utterance is to introduce a proposition. On the Dynamic Conception, the *prima facie point* is to bring about an alteration in the current state. But examination of cases shows that there *are* utterances which have to be understood as pursuing the dynamic teleology, so the Static

Conception needs to make room for it. Making that room involves coupling the semantic story about the information expressed by a claim with a pragmatic story about the *reasons* speakers could have for saying something which is false in the current context. (The Problem of Timing thus turns out to be a context-expanding, rather than contracting, version of the phenomena for which Stalnaker (1979) introduces the diagonal proposition.) The Static Conception thus at best loses aesthetic ground on the Dynamic Conception, due to the static need for an independent collection of governing pragmatic principles. But presumably the Dynamic Conception is also going to need such principles, in order (for example) to account for the fact that the context-shifting update mandated by a “might”-counterfactual, or more generally by an existential epistemic modal, sometimes is and sometimes is not accepted in discourse, despite the fact that the update function is always equally available.

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