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## Confessions of a schmentencite: towards an explicit semantics

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### ABSTRACT

Natural language semantics is heir to two formalisms. There is the extensional machinery of explicit variables traditionally used to model reference to individuals, and the intensional machinery of implicit index parameters traditionally used to model reference to worlds and times. I propose instead a simple and unified extensional formalism – *explicit semantics* – on which all sentences include explicit individual, world and time variables. No implicit index parameters are needed.

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I concede this victory to the schmentencite: strictly speaking, we *do not need* to provide both context-dependence and index-dependence in the assignment of semantic values to genuine sentences. His victory is both cheap and pointless. I propose to ignore it. (Lewis 1980, 90)

Natural language semantics is heir to two formalisms. There is the extensional machinery of explicit variables evaluated through the assignment function and bindable by quantifiers, traditionally used to model reference to individuals; and there is the intensional machinery of implicit index parameters initialized from the speech context and shiftable by operators, traditionally used to model reference to worlds and times. So there are debates over the best machinery for times, and proposals to add more parameters for further matters such as locations and perspectives.

I think that the use of two formalisms was already a mistake. There is neither need nor motivation for kludging together both sorts of machinery, because the phenomena – individual, world and time reference in natural language – are relevantly similar, and the extensional and intensional formalisms – suitably developed – prove expressively equivalent.

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Moreover, I argue that the extensional machinery is generally preferable. I thus defend what I call *explicit semantics*, on which all sentences include explicit world and time variables. These variables are articulated through syntactically obligatory mood and tense phrases, evaluated through the variable assignment, and bindable by modal and temporal quantifiers. The propositions expressed are simply true or false, without relativity to implicit points of reference (for world, time, or any other matter). I claim that the resulting style of semantics is not just simpler and more elegant, but also more constrained, and capable of delivering classical propositions: complete thoughts fit to bear truth-values.

Overall I aim to put explicit semantics on the map, as a positive and motivated view. Obviously, I cannot discuss every argument concerning world and time reference, nor consider every proposed parameter. My strategy is rather to show how the original arguments against extensional treatments of world and time fail, sketch an empirically motivated extensionalist alternative (fitting Lewis's 'schmentencite' view), and explore what may be gained from embracing explicit semantics as a whole. The skeptical reader should treat this as an invitation to explain why natural language semantics needs any intensional machinery whatsoever.

*Overview:* In §§1–4 I trace a historical arc through Montague and Kaplan, and on to eternal and then necessary contents, in which information needed for truth evaluation gets progressively shunted from the index into the proposition. Explicit semantics lies at the endpoint of this arc, when the index is emptied. In §§5–6 I compare explicit semantics as a whole to the mixed and purely implicit alternatives.

## 1. Montague on pragmatic languages, and the birth of index semantics

In the beginning, there was Montague, whose revolutionary idea is that natural languages can be modeled as formal systems via intensional logics. The pesky context-dependence of 'pragmatic languages' is treated by starting from an intensional language with an index for world and time parameters, and adding parameters for speakers, places, addressees and any other relevant contextual matters. This idea – shared by Montague (1968, 1970, 1973) and others such as Scott (1970), and the early Lewis (1970) – is perhaps most clearly expressed by Scott (1970, 151) as follows:

In general, we will have:

$$i = (w, t, p, a, \dots)$$

where the index  $i$  has many coordinates: for example,  $w$  is a world,  $t$  is a time,  $p = (x, y, z)$  is a (3-dimensional) position in the world,  $a$  is an agent, etc. All these coordinates can be varied, possibly independently, and thus affect the truth-values of statements which have indirect references to these coordinates.

So the starting point idea, from Montague, is that the semantic machinery is:



Thus consider the sentence:

### 1. *I am writing*

There are at least two aspects of context-dependence involved in 1. The first concerns the explicit indexical 'I'. The second concerns the world and time at issue, which – at least on the surface – does not seem explicit in the sentence. Index Semantics handles both aspects of context-dependence through the index.<sup>1</sup> Eliding over the compositional backstory, Index Semantics delivers the verdict that 1 is true at context  $c$  if and only if the index  $i_c$  is such that the agent of  $i_c$  is in the extension of the predicate 'am writing' at the world and time of  $i_c$ . This is a breakthrough: Montague's work opens up the vision of a precise, compositional treatment of natural language that can manage context-dependence.

There are three points worth highlighting. The first is that natural language semantics begins in the image of modal logic, and indeed with Montague's idea that the indices of intensional systems can manage all of the context-dependence of natural language. That proved to be a fruitful starting point. But it is an empirical question as to whether natural language really has the structure of an intensional system. (As I see it, the history of semantics I am tracing is the history of gradually erasing this fruitful mistake.)

Secondly, parameters were freely posited as needed. Thus Scott in the passage above proposes an open-ended list ( $i = (w, t, p, a, \dots)$ ), and

<sup>1</sup>As Lewis (1980, 85) would later tell the tale, the friend of Index Semantics (including his earlier self: Lewis 1970) had posited 'a happy coincidence' between these aspects of context-dependence. To which he adds: 'How nice'. Then: 'No; we shall see that matters are more complicated.'

Cresswell (1972, 8; cf. Lewis 1980, 87) notes that this way lies a coordinate for 'previous drinks', and that in general 'there is no way of specifying a finite list' of parameters for all contextually relevant information. (As I argue in §§5–6, explicit semantics adds useful constraints.)

Thirdly and most crucially, there were two guiding rationales for separating reference to individuals (via variables) from reference to worlds and times (via parameters). The first guiding rationale was that simple sentences like 1 were considered world and time neutral. Thus Kamp (1971, 231) says, with respect to times:

I of course exclude the possibility of symbolizing the sentence by means of explicit quantification over moments ... Such symbolizations ... are a considerable departure from the actual form of the original sentences which they represent – which is unsatisfactory if we want to gain insight into the semantics of English.<sup>2</sup>

And likewise Recanati (2007, 66) says, with respect to worlds:

Clearly, the possible worlds relative to which propositions are evaluated are not themselves represented in, or an aspect of, the propositions in question. Thus 'Brigitte Bardot is French' is true, with respect to a world *w*, iff Brigitte Bardot is French in *w*; but the sentence 'Brigitte Bardot is French' only talks about Brigitte Bardot and the property of being French. The world of evaluation is not a constituent of the content to be evaluated.

(As I argue in §§3–4, this perspective is natural but syntactically naive, ignoring the obligatory mood and tense features specifying the world and time at issue. For instance, in 'Brigitte Bardot is French', English plays the trick of packing the root verb  $\sqrt{\text{be}}$ , indicative mood and present tense all within the seemingly simple 'is'.)

The second guiding rationale was that natural languages were thought to be impoverished vis-a-vis world and time reference. It was seen that natural languages could track an indefinite collection of individuals, so this was modeled through an infinite stock of variables. But it was also thought (at first) that natural languages could only hold one world and one time perspective. Hence it was thought that world and time should be modeled by just a single world point and time point (Prior 1957). As Kratzer (2014, §5) says:

<sup>2</sup>Though Kaplan (1989a, 503) allows that 'An alternative [and more traditional] view is to say that the verb tense in *S* involves an implicit temporal indexical ...' But he questions why we should adopt this view, when 'no modal indexical is taken to be implicit'. I think that Kaplan is right to keep world and time in parallel, but only wrong not to consider the prospect of a modal indexical more seriously (§4).

Quantification over worlds and times is treated differently from quantification over individuals, then. The distinction was made deliberately because it predicts differences that were thought correct at the time. Once an evaluation index is shifted, it is gone for good, and can no longer be used for the evaluation of other expressions. This constrains temporal and modal anaphora. Until the early seventies anaphoric reference to times and worlds in natural languages was believed to be constrained in precisely the way predicted by the evaluation index approach.

This is the story of the collapse of these two guiding rationales for separating reference to individuals from reference to worlds and times, and the emergence of symmetry between these referential systems. As Schlenker (2006, 510) says: '[T]he overwhelming evidence is that the semantic differences that were traditionally posited between the three ontological domains are largely imaginary.' Natural language semantics is heir to two formalisms, but these complications have outlived their rationales.

This is also the story of the (re-)emergence of *the proposition* lying between the sentence and its truth-value, and of pulling time reference and then world reference from the index into the proposition. Explicit semantics lies at the end of the story, when the index is finally emptied, and the proposition made complete.

## 2. Kaplan on indexicals, and Lewis on the schmentencite way out

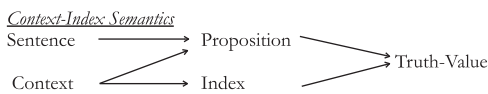
Kaplan (1989a; though the material was circulating by 1971) argues that Montague Semantics conflates the evaluation of indexicals with the treatment of intensions, and thus separates the two aspects of context-dependence seen in 1. Kaplan does not question the background intensional formalism he inherits from Montague, and so retains an index with a world and time parameter  $\langle w, t \rangle$ , and the concomitant treatment of modals and temporals as operators that shift implicit parameters.

But Kaplan's breakthrough is to posit a distinct, index-independent treatment of 'indexicals' (such as 'I', 'here' and 'now'), giving them a *character* (a function from context to content) and a contextually variable *content* (see Braun 2015 for a useful overview). For instance, 'I' for Kaplan has the character of referring to the speaker, and a content that varies depending on who is speaking. This requires two breaks from the Montagovian framework. The first is a posited intermediary between sentence and truth-value – *the proposition* – in which these contextually

variable contents get deposited. (As Stalnaker (1970, 277) comments, propositions serve as ‘an extra step on the road from sentences to truth values’ which are ‘justified only if the middlemen – the propositions – are of some independent interest ...’)

The second break from Montague is the deletion of certain index parameters – such as the agent and addressee parameters, which had been included to evaluate ‘I’ and ‘you’ – since their work is done through the effect of context on the proposition, prior to truth evaluation. (Here is the first step towards pulling information from the index into the proposition, and a crucial moral: to pull a given bit of information from the index into the proposition, find an associated indexical in the sentence to carry the information. As I claim in §§3–4, this is how to handle time and world information.)

Kaplan’s picture of the semantic machinery (cf. Lewis 1980, 96) – which still remains orthodox – is thus:



So Kaplan posits a ‘double dependence’ of truth on context: context can operate on the sentence, varying the proposition expressed (indexicals); but context can also operate on the index, varying the settings of the parameters the proposition is evaluated against (world and time).

It is worth flagging some further Kaplanian assumptions, which I will adopt but cannot defend here: the propositions expressed by sentences at contexts are *structured contents* with *constituents* (Kaplan 1989a, 494), some of these constituents are determined by *variables* which may occur *free* or *bound*, and the free variables get their contents through a *variable assignment*, viewed as a component of *context* (Kaplan 1989b, 591). (This treatment of the variable assignment is controversial in ways that will prove directly relevant. I return to the matter in §§4–5.)

For present purposes, the key question is why Kaplan keeps the index in the picture, rather than trying to handle all context-dependence via the effect of context on the proposition.<sup>3</sup> Part of the reason is that Kaplan regards simple sentences like 1 as world and time neutral (§1), and so sees no world and time indexicals to exploit. (It bears noting that extensional treatments of world reference were barely on the map for Kaplan, and that intensional treatments of world and time reference were

<sup>3</sup>I am indebted to Herman Cappelen and to Brian Rabern for helpful discussions on this question.

common ground to Montague and Kaplan. So our key question was barely at issue for Kaplan.)

But Kaplan and also Lewis (1980) do offer two explicit arguments for keeping the index in the picture. Kaplan (1989a, 502–503; see also Capellen and Hawthorne 2009, 70–73; and Schaffer 2012, 145–146) primarily offers *the operator argument*, which proceeds from the assumption that temporals and modals (like ‘eternally’ and ‘necessarily’) are operators, taking in a neutral sentence and holding it up to different values of an associated index parameter. Such a treatment indeed requires an index. As Kaplan (1989a, 503) explains:

If we built the time of evaluation into the contents (thus removing time from the circumstances leaving only, say, a possible world history, and making contents *specific* as time), it would make no sense to have temporal operators. To put the point another way, if *what is said* is thought of as incorporating reference to a specific time, or state of the world, or whatever, it is otiose to ask whether what is said would have been true at another time, in another state of the world, or whatever. Temporal operators applied to eternal sentences (those whose contents incorporate a specific time of evaluation) are redundant. Any intentional operators applies to *perfect* sentences (those whose contents incorporate specific values for all features of circumstances) are redundant.

But what is not obvious is why Kaplan assumes (as embedded in his formalism, 545) that temporals and modals are operators in the first place. (In §§3–4 I sketch an extensionalist alternative which treats temporals and modals as quantifiers rather than operators. What is not obvious is what motivates preferring the intensional package of indices and operators, over the extensional package of variables and quantifiers.)

Kaplan (1989a, 508–510; see also Lewis 1980, 85–88 and King 2003, 201–206) offers a related concern, as to the relation between:

2. *I am here now*

3. *Necessarily I am here now*

As he notes, 2 is something like a logical truth: ‘one need only understand the meaning of [2] to know that it cannot be uttered falsely’. But 3 can (and in many contexts does) express a falsehood. The puzzle is that 3 looks to follow from 2 by Necessitation. His solution is to say that the logicity of 2 stems from it being true at any proper speech context, but that the falsity of 3 is allowed by letting ‘Necessarily’ shift the world parameter to ‘improper’ settings on which the agent is not located at that time and place in that world. Thus he (1989a, 509) concludes:



The difficulty, here, is the attempt to assimilate the role of a *context* to that of a *circumstance*. The indices  $\langle w, x, p, t \rangle$  that represent contexts must be proper in order that ['I am here now'] be a truth of the logic of indexicals, but the indices that represent circumstance must include improper ones in order that ['Necessarily, I am here now'] not be a logical truth.

Relatedly, Lewis (1980, 86) says that indices are needed for independent one-feature-only variation under operators, to reach improper settings: 'The proper treatment of shiftiness requires not contexts but *indices*: packages of features of context so combined that they *can* vary independently.' He (1980, 88) concludes:

To do their second job of helping to determine the semantic values of sentences with a given sentence as a constituent, the semantic values of sentences must provide information about the dependence of truth on indices. Dependence on contexts won't do, since we must look at the variation of truth value under shifts of one feature only. Contexts are no substitute for indices because contexts are not amenable to shifting. Contexts and indices will not do each other's work. Therefore we need both.

But Lewis (1980, 88–90) does see an alternative – the 'schmentencite way out' – which dispenses with index-dependence by arguing that it 'was needed only for the treatment of shiftiness, and we might claim that there is no such thing'. Indeed. Lewis's schmentencite dispenses with indices by having it that sentences never embed under operators, so shiftiness of sentence under operator never occurs – what occurs as constituents embedded under temporals and modals are not sentences but *schmentences*. So if the semantic value at a given context of 2 is  $p$ , the schmentencite denies that the semantic value of 3 is  $p$ ; and if the semantic value at a given context of 1 is  $q$ , she denies that the semantic value of the following is given by placing a 'temporal box' in front of  $q$ :

#### 4. *I am eternally writing*

She thereby denies that 3 follows from 2 by Necessitation, and allows that 1 might be a true eternal sentence but 4 still a falsehood. The content of 1 (at a given context) need not be a time-neutral thing for temporal operators to shift, if 4 does not even have operator-sentence structure.

Lewis's response (see opening quote) manages to be both fully concessive and utterly contemptuous, granting the schmentencite her 'victory' but calling it 'cheap and pointless'. My best guess is that Lewis thinks of the schmentencite view as formally possible but completely ad hoc, and sees no independent motivation for treating the embedded sentence-like material as non-sentential save to block the operator argument.

(My schmentencite finds independent motivation for treating embedded sentence-like materials as *open formulae*, and so she re-claims her victory but imbues it with purpose.)

It is worth continuing to note (from the end of §1) that Kaplan and Lewis are largely taking up the Montagovian image of natural language as an intensional system, still assuming that simple sentences like 1 are world and time neutral, and still offering few constraints on index parameters (§§5–6).<sup>4</sup> Indeed Lewis (1980, 99) concludes by acknowledging that Kamp, Cresswell, and others have shown that ‘there is a measure of disappointment in store’ since empirical adequacy requires that ‘we will have to repeat the world or time coordinates of our indices as many times over as needed’ – that is, infinitely many times (§§3–4).

This is the story of a motivated completion of the schmentencite program (thus ‘confessions of a schmentencite’). It is also the story of a kind of hyper-Kaplanian program, extending Kaplan’s treatment of indexicals all the way through to world and time reference.

### 3. The rise of eternalism, and the fall of the operator argument

While Kaplan’s Context-Index Semantics remains orthodox, there is debate over how best to model time reference within his framework. Kaplan is a *temporalist*, positing time-neutral propositions that can take different truth-values relative to different evaluation times. But the dominant view nowadays – says Richard (2015, 39) – is that of *eternalists*, who posit time-specific propositions with fixed truth-values, and so replace implicit temporal reference through an index parameter with explicit time variables in the proposition.<sup>5</sup>

Thus Stalnaker (1970, 1978) preserves the background context-index machinery but pares Kaplan’s  $\langle w, t \rangle$  indices down to  $\langle w \rangle$ .<sup>6</sup> (Here is a second step towards pulling information out of the index and into the proposition, leaving us one step away from explicit semantics – only the pesky world parameter remains.)

For present purposes the key issues are *why* eternalists opt to move the reference to times over to the extensional machinery, and *how* they then

<sup>4</sup>Lewis (1980, 98) says that Context-Index Semantics has ‘recourse to genuine context-dependence’ and thereby can claim the virtue of ‘shirk[ing] the quest for rich indices.’ This is good, but Lewis still offers no constraints on which parameters one can posit. He merely gives up a constraint – managing all context-dependence – that looked to be forcing infinitely many parameters.

<sup>5</sup>Contemporary temporalists include Ludlow (2001), MacFarlane (2003), Recanati (2007) and Brogaard (2012). Contemporary eternalists include Richard (1981), Salmon (2003), King (2003), Stanley (2005), Glanzberg (2009) and Soames (2011).

<sup>6</sup>Stalnaker (1970, 289) is actually non-committal on this score, allowing that there may be reason to add a time parameter to handle some tensed sentences. For present purposes I am interested in the move to drop the time parameter, and wish to credit Stalnaker with this idea, even if he was not fully committed to it.

answer the Kaplan–Lewis operator argument. As I see it, there are two primary rationales for eternalism, which are connected to the two original rationales for separating individual from world and time reference (§1). Basically, it was seen that these two rationales for separation fail for time reference, and hence that individual and time reference work in a parallel way, and so are appropriately handled by parallel formalisms. (All that remains is to extend this case to world reference).

So the first guiding rationale for separating time and individual reference was the thought that simple sentences like 1 ('I am writing') are time neutral. But subsequent work on tense undermines this naive image of time neutrality. So one main line of argument for eternalism – tracing back to Partee 1973 (see also Partee 1984 and Kratzer 1998; see Schaffer (2012, 135–136) for an overview of some of the relevant data) – is that tense displays all of the features of pronominal reference (a paradigm of explicit reference), displaying bound readings, strict/sloppy ambiguities, and E-type readings, *inter alia*, all of which look to be characteristic behavior of variables. Thus Partee (1973, 601) concludes: '[T]he tenses have a range of uses that parallels that of the pronouns, including a contrast between deictic (demonstrative) and anaphoric use, and ... this range of uses argues in favor of representing the tenses in terms of variables ...'

The referential view of tense thus undermines Kaplan's (1989a, 503; Kamp 1971, 231) idea that simple sentences like 1 contain 'no *temporal* indexical'. And so Enç (1986, 421; see also Ogihara 1996; Kusumoto 2005) says that, since time information is explicit, one should 'abandon the notion that intensions are functions from times and worlds, and maintain perhaps that they are only functions from possible worlds'. And likewise, King (2003, 223) maintains: '[I]f the proper way to treat tenses is *not* as index shifting sentence operators, then there is no need for temporal coordinates in indices of evaluation.' These theorists are following the Kaplanian playbook (§2): to pull a given bit of information from the index into the proposition, find an associated indexical in the sentence.<sup>7</sup>

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<sup>7</sup>This is not to say that using explicit time variables *rules out* an intensional treatment. As Ninan (2012, 403) clarifies, one can have explicit time (/world/individual) variables and treat temporals (modals/quantifiers) as quantifiers, but also tack on obligatory wide-scope time (/world/individual) lambda binders so that these variables cannot appear free. The resulting semantic values are time (/world/individual) neutral, and so require an index with a time (world/individual) point to compute a truth-value. I agree with Ninan that such a view is consistent, though I see no empirical motivation for positing such obligatory wide-scope lambda binders. King (2003, 221; see also Glanzberg 2011, 119) takes the view that the extensional treatment is still a 'simpler, more elegant, less ad hoc treatment.' I agree with King, so long as the extensional treatment is also extended to worlds (*pace* King 2003, 28–29; though see Schaffer 2012, §4.1), for otherwise the intensional treatment of time can still claim the advantage of preserving the world-time parallel.

This idea of representing tense in terms of explicit time variables is naturally connected with developments in syntax. Current views of syntax generally posit a *small clause* where the root verb meets its arguments, with obligatory *mood* and *tense* projections (and other projections such as aspect which are not relevant here):

[<sub>MP</sub> Mood ... [<sub>TP</sub> Tense ... [<sub>VP</sub> Small Clause]]].

The small clause is not a stand-alone matrix clause but requires inflectional elements including mood and tense (see for instance Cinque 1999; see Glanzberg 2011, 116–120 for a summary of philosophically relevant issues). Thus in 1, ‘am writing’ is not a single element but rather how English spells out the blend of a root verb ( $\sqrt{\text{write}}$ ) with indicative mood, present tense and other elements. The mood phrase is a natural repository for world information and the tense phrase is a natural repository for time information. There are more things specified in the sentence than are dreamt of in Index Semantics, and in particular, there is a place for explicit world and time indexicals. (Though the case of worlds must wait til §4.)

The second guiding rationale for separating time and individual reference was the thought that natural languages are expressively impoverished vis-a-vis times, only storing a single time perspective. But it soon emerged – from the work of Kamp (1971) and Vlach (1973) – that natural language is not expressively impoverished whatsoever vis-a-vis times, and in fact has the expressive power of an extensional system capable of ‘storing’ indefinitely many temporal points for further reference, just as an infinite stock of time variables would ensure. So a second main line of argument for eternalism surfaces, on which time reference in natural language has exactly the expressive power predicted by an extensional system of explicit variables.

This is not to say that the intensionalist treatment is refuted. Indeed it is known that, for any extensionalist treatment, there is a logically equivalent intensionalist reformulation, deploying infinitely many parameters and a fitting repertoire of operations to shift amongst them (Quine 1960; see also Kuhn 1980 and Cresswell 1990). Rather the point is that an extensional system immediately *predicts* the expressive power of natural language, while the intensional system needs epicycles just to *mimic* this successful prediction. In this vein van Benthem (1977, 426), contrasting the tense logic tradition with ‘the use of predicate-logical formulas containing moment variables’, notes:

[I]f one is willing to increase the complexity of the index to any extent (while adding enough operators to take profit of it), there is no need ever to resort to predicate logic *technically*, but in our opinion it is a Pyrrhic victory.

The deeper point is that the two guiding rationales for separate formal treatments of individual and time reference have both collapsed, and instead, the empirical phenomena of individual and time reference have proven relevantly similar, with exactly the referential features and expressive power that the explicit program predicted from the start.

Obviously, I cannot hope to settle the case for eternalism here. But for present purposes, I only need the less controversial claim that the eternalist position with explicit time variables is empirically open.

What becomes, however, of the Kaplan–Lewis operator argument for temporalism (§2)? I sketch a natural eternalist reply, that begins with the claim that the content of simple sentences like 1 is determined through a free time variable, which the assignment of the context sets to the speech time. So if Sadie is speaking at noon on 26 March 2018, then (irrelevant details aside) the essential content expressed at this context is<sup>8</sup>:

*Sadie writes at noon on 3/26/18*

This makes tokens of 1 talk about the speech time, and also ensures the redundancy-in-any-context of 1 with:

*5. I am now writing*

On this treatment, 5 merely specifies the speech time twice, both through the indexical ‘now’ and through the free variable set by the assignment of the context to the speech time. So far, so good.

Secondly, temporals like ‘eternally’ are regarded as quantifiers not operators. (Operators essentially mimic the effect of quantifiers in cases where it was thought that there is no explicit variable to bind.) In particular, ‘eternally’ is a universal quantifier binding free time variables in its scope. This makes 4 go false, with the essential content:

*( $\forall t$ ) Sadie writes at  $t$*

Thus the temporal quantifier binds a hitherto free variable.<sup>9</sup> This shows how temporals are not redundant. 1 can be true but 4 still false, as was wanted.

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<sup>8</sup>Here and below I report structured contents via a casual blend of English and logic, to convey claims about constituency (e.g. that the time at issue is a constituent of the content) in a simple and neutral way, without taking a stand on the canonical format for structured contents. See Soames (1987) and King (2007) for some detailed regimentations, either of which could be adopted here.

What I just described as a natural eternalist reply is equally a form of Lewis's 'schmentencite way out', on which the content of 1 at a given context is not a constituent of the content of 4 (§2). The unembedded 1 is treated as having a time-specific content (e.g. being about 3/26/18). But the content of the embedded material in 4 is not this time-specific content, as the hitherto free time variable in 1 now occurs bound rather than free. So in 4 we do *not* see the time-specific content of 1 getting embedded. *That* treatment would yield vacuously quantified contents such as:

( $\forall t$ ) *Sadie writes at noon on 3/26/18*

What embeds is rather an open formula. Thus my eternalist take the schmentencite way out by denying that the content of 1 is a constituent of the content of 4 (at any context), and more specifically holding that the content of 1 is the content of a *closed sentence*, while the corresponding constituent of the content of 4 is the content of an *open schmentence*.

Indeed my natural eternalist reply just is Lewis's (1980, 89) third version of the schmentencite view:

[W]e might decorate the schmentences with free variables as appropriate. Then we might parse 'There have been dogs' as the result of applying 'It has been that ...' to the schmentence 'there are dogs at  $t$ ' where ' $t$ ' is regarded as a variable over times.

My schmentencite says this and adds that 'It has been that ...' has the effect of adding a quantifier binding the hitherto free time variable.

Lewis (1980, 89) continues: 'Schmentences would be akin to the open formulas that figure in the standard treatment of quantification.' And indeed this eternalist/schmentencite treatment is parallel to the orthodox treatment of the unembedded sentence:

6. *He is dancing*

versus the bound counterpart:

7. *Everyone is dancing*

The content of 6 is determined via a free individual variable, which the assignment function sets to a contextually salient male. So if the contextually salient male is Irving, then (irrelevant details aside) the essential content expressed at this context is:

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<sup>9</sup>This fits what Ninan (2012, 403) calls 'standard views of this sort' on which 'each VP has an argument place for a silent temporal pronoun which can either be bound or get its value from the variable assignment'.

*Irving dances*

But on the bound reading, 7 does *not* express the vacuously quantified claim embedding this sentential content, which would be:

$(\forall x)$  *Irving dances* ('Everyone is such that Irving dances')

Rather on the bound reading, 7 expresses a content embedding an open schmentence content:

$(\forall x)$  *x dances*

With the schmentencite way out of the operator argument open, the primary Kaplan–Lewis argument for an intensional treatment of time reference no longer compels. This is not to say that there are no other arguments to consider.<sup>10</sup> But it is to say that the primary motivation that originally drove theorists to use intensional machinery for time reference fails.

It is worth continuing to note (§1) that eternalists are still upholding the Montagovian image of natural language as an intensional system for worlds, still assuming that sentences like 1 are world neutral (though not time neutral), and still offering few constraints on index parameters. But something else has gone badly: the deep parallels between world and time reference – preserved in Montague and in Kaplan – have now been broken. Times have been shunted over to the extensional machinery of explicit variables, but worlds stand alone, the last to be left to the intensional machinery of implicit parameters.

#### 4. Cresswell and Stone on worlds, and the pull of the world-time parallel

It was left to Cresswell (1990) – and also Stone (1997), Schlenker (2006), Schaffer (2012) and Cresswell and Rini (2012) – to argue that the considerations arising with time reference arise in parallel ways with world reference. Just as the eternalist posits time-specific propositions, so the *necessitarian* posits world-specific propositions (as opposed to the *contingentist*, who upholds the image of world-neutral contents evaluated through an index featuring world parameters). She posits explicit world variables in the content. Just as the eternalist says that what is said in 1 is about the present time, so the necessitarian says that what is said in 1

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<sup>10</sup>For example, Recanati (2007) offers an argument from cognitive and language learning considerations, and Brogaard (2012) offers an argument from claims about perceptual content. I cannot review these or other arguments in this space.

is about the actual world. Just as the eternalist contrasts 1 with past tense variants about past times such as:

*8. I was writing*

So the necessitarian also contrasts 8 with subjunctive mood variants about hypothetical scenarios such as:

*9. I would be writing*

In a context in which the speaker is imagining what she would be doing if she did not have to grade papers, 9 is naturally read as being about this imagined scenario.

The necessitarian promises to complete the program of explicit semantics from Montague on to Kaplan on to Stalnaker and the eternalists, by deleting that last pesky world parameter

$\langle w \rangle$ , and finally pulling both world and time information from the index into the proposition, leaving the index empty.

Necessitarianism is decidedly a minority view. The majority view is eternalism-contingentism, with time-specific but world-neutral propositions held against a world parameter for truth evaluation. But I think that the eternalist-contingentist combination lacks consistent motivation, since exactly the same arguments for eternalism can be mimicked in the modal domain as arguments for necessitarianism (and equally: the obvious objections to necessitarianism can be mimicked in the temporal domain as objections to eternalism, and the eternalist rejoinders can be mimicked). In general, time and world reference are relevantly similar.

So consider the two main arguments for eternalism above (§3). The first argument undermined the guiding temporalist rationale of time-neutral contents, by revealing time variables (supported by referential features, and the syntactic posit of obligatory tense phrases). But parallel considerations arise with worlds. Thus Stone (1997; discussed also in Schaffer 2012) convincingly emulates the Partee (1973) data, showing that not just tense but mood as well displays the full referential signature of pronominal reference. As Stone (1997, 7) summarizes:

[T]he interpretation of modals offers the same range of effects that characterize the interpretation of pronouns and tense. The only difference is the type of object involved. Where pronouns refer to individuals, tenses refer to times/ events, and modals refer to hypothetical scenarios.

Percus (2000) argues for explicit world pronouns, and Speas (2004, 266) maintains: 'The evidence for a world argument comes from the fact that



the world within which a sentence is to be interpreted shows the same locality conditions and restrictions on interpretation that pronouns and tense do.’ And Schlenker (2006, 504), drawing these considerations together, speaks of ‘a pervasive symmetry between the linguistic means with which we refer to [individuals, times and possible worlds]’, and thus (2006, 509) calls for ‘treating times and possible worlds in the way that we treated individuals’ (2006, 509).

And syntactically – as already discussed in §3 – the tense projection comes alongside an obligatory mood projection, which is a natural repository for world information. In just the way that a tense projection specifies the time at issue, a mood projection specifies the world at issue. Thus the idea of world-neutral contents is just as syntactically naive as the idea of time-neutral contents.

The second argument for eternalism undermined the temporalist rationale of expressive poverty, by revealing that natural languages have the expressive power that the extensional system predicts for times. But the same considerations arise with worlds. Thus Cresswell (1990, 34–46) shows that natural language has the expressive power of an extensional system capable of ‘storing’ indefinitely many world points, just as an infinite stock of world variables would ensure, concluding (1990, 45): ‘[A]ll sentences are to be evaluated at a denumerably infinite sequence of worlds in a manner exactly analogous to the treatment of the temporal case ...’ As Kratzer (2014, §5) aptly summarizes, drawing the ‘unified machinery’ conclusion:

Cresswell 1990 presented parallel arguments for modal anaphora, and showed more generally that natural languages have the full expressive power of object language quantification over worlds and times. Quantification over worlds or times is thus no different from quantification over individuals, and should be accounted for in the same way.

As she explains, ‘Natural languages have syntactically represented individual variables’ and ‘It would be surprising if [natural languages] used two different equally powerful quantification mechanisms.’ There is neither need nor motivation for kludging together extensional and intensional machineries.

Overall, both Schaffer (2012) and Cresswell and Rini (2012) argue for semantic parallelism concerning world and time reference.<sup>11</sup> As Cresswell and Rini (2012, vix) say: ‘If you are faced with an argument in the

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<sup>11</sup>Though Cresswell 1990 goes for the opposite pole, opting for an implicit semantics across the board. He keeps individual, world, and time reference in parallel by shifting them all over to the intensional

philosophy of modality, there ought to be a corresponding argument in the philosophy of time which has the same structure.’ This semantic parallelism should not be surprising given the deep parallels in our conceptions of time and possibility – what is surprising is that the eternalist-contingentist majority would break the parallel without motivation.

Obviously, I cannot hope to settle the case for necessitarianism here. But for present purposes, I only need the less controversial claim that the necessitarian position with explicit world variables is empirically open too (alongside the eternalist position with explicit time variables).

What then becomes of the Kaplan–Lewis operator argument (§2) for contingentism? It should come as no surprise that parallel maneuvers are open to the necessitarian as were open to the eternalist (§3). So a natural necessitarian approach – paralleling the eternalist/schmentencite approach of §3 – involves two elements. First, simple sentences like 1 are regarded as having a world-specific content, contextually determined through a free world variable, which the assignment of the context sets to the speech word. So if Sadie is speaking in *w*<sub>17</sub>, then the essential content expressed is:

*Sadie writes in w*<sub>17</sub>

This makes tokens of 1 about the speech world, and also ensures the redundancy-in-any-context of 1 with:

10. *I am actually writing*

On this treatment, 10 merely specifies the speech world twice, both through the indexical term ‘actually’ and through the free variable set to the speech world.

Secondly, modals like ‘necessarily’ are no longer regarded as operators but just as quantifiers. In particular, ‘necessarily’ is a universal quantifier binding free world variables in its scope. This allows the following to go false:

11. *I am necessarily writing*

Since 11, in any context with Sadie speaking, is treated essentially as expressing:

( $\forall w$ ) *Sadie writes in w*

This shows how modals are not redundant, in that 1 can be true but 11 false. And it shows how 3 is not derivable by 2 by Necessitation, since 2

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machinery. Cresswell and Rini 2012 (esp. ch. 9) opt for a more deflationary ‘no fact of the matter’ view. My reasons for preferring explicit semantics over implicit semantics are given in §6.

features a free world variable that occurs bound within 3. Thus Glanzberg (2011, 118) aptly notes:

It is not clear whether the kind of sententiality needed by the operator argument can ever be found in the syntax of natural language. It does not appear to hold for modality either. Modal auxiliaries, verbal mood, etc. all live outside of VP, and appear to occupy heads around the T level. Like tense, they do not function syntactically as sentential operators.

Again this is the schmentencite way out. The unembedded 1 has the contextually determined content of a closed sentence, with a world-specific content determined by a free occurrence of a world variable evaluated from the assignment function. This content is not what embeds under the modal in 9. *That* would be the vacuously quantified content:

( $\forall w$ ) *Sadie writes in w17* ('Every world is such that Sadie writes in w17')

Thus the schmentencite denies that the contextually determined content of 1 is a constituent of that of 11, just as she denies that the contextually determined content of 1 is a constituent of that of 4 (§3). The semantic value of the embedded material is not that of a closed sentence but rather that of an open schementence. Again this is not an ad hoc maneuver purely aimed to cut out the index, but rather a maneuver that is independently motivated, and matches the standard treatment of individual reference (§3).

Once worlds are pulled from the index into the proposition, the proposition is at last rendered as a complete thought. The index is empty and may, at last, be discarded (or at least, Kaplan's core cases of time and the world turn out to require no indices. Further proposals for parameters such as location and perspective still need to be considered. But the background dialectic shifts: what were relatively lightweight proposals to add parameters to a pre-existing index would now bear the much heavier burden of justifying complicating the semantic machinery with an index at all. The price of positing parameters just went up).

There is one last wrinkle: some – such as Rabern (2013) – will say that the index has not been emptied because the *variable assignment* remains.<sup>12</sup> But, as made explicit in §2, I am following Kaplan (1989b, 591; see also Heim and Kratzer 1998, 242–244) in treating the assignment as a feature of the context, not the index. After all, the assignment is what makes sentences like 6 ('He is dancing') get contents like *Irving dances*, and

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<sup>12</sup>My thanks to Jeff King and Brian Rabern for helpful discussions.

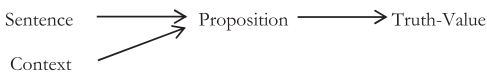
so looks like a way of delivering the speaker's contextually intended referent.

But it is not obvious that the assignment can be treated as a feature of context. Lewis (1970; cf. Lewis 1980, 90) treats the assignment as an index parameter.<sup>13</sup> There is a tension lurking in the Kaplanian framework, determinants of what is said are supposed to be features of context, while shiftable operands are supposed to be parameters of indices. *But the assignment is both.* It both determines what is said when a variable is free, and serves as a shiftable operand of lambda binders and quantifiers (on a Tarskian treatment).<sup>14</sup> So it may be said that the Kaplanian framework I have been starting with comes broken, in ways that matter for how I would adjust it.

So Rabern (2013, 399) develops an alternative view on which the assignment is not a feature of the context but instead lingers as the one and only parameter of the index, with the semantic values of sentences at contexts not being propositions (type *t*) but rather being functions from assignments to propositions (type  $\langle \gamma, t \rangle$ ). While this is not a matter I can discuss any further here, I will keep Rabern's position on the table for further discussion (§5), as a close cousin of explicit semantics which shares some of its advantages.

And so I arrive at the end of a long arc, starting from Montague's Index Semantics, through to Kaplan's Context-Index Semantics and the eternalist revision, and on to the fully explicit semantic program of Context Semantics. The last pesky world parameter is finally emptied into the proposition. In Context Semantics, propositions are *perfect* – they contain all information needed for truth evaluation, including world and time information. All context-dependence is mediated by indexicals, including temporal indexicals (specified by the tense phrase) and modal indexicals (specified by the mood phrase). The overall shape of the semantic machinery is simplified. No index remains:

#### Context Semantics



<sup>13</sup>Indeed Lewis (1980, 89) draws on the idea that the assignment is an index parameter, to say that the schmentences are still index-dependent: 'Truth of a schmentence at an index would be like satisfaction of a formula by an assignment of values to variables.'

<sup>14</sup>Tarski (1983) offers a recursive definition of when an assignment satisfies a formula, including the following clause for universally quantified formulae: Assignment *a* satisfies ' $(\forall x)\Phi$ ' iff: for any assignment  $\beta$  that is an *x*-variant of *a*,  $\beta$  satisfies ' $\Phi$ '. The relevant point is that Tarskian quantifiers shift the starting point assignment to look at alternative assignment points.

In my experience, some philosophers will argue about the details of time or (more probably) world reference. I cannot engage with these issues in this space (though see Schaffer 2012 as well as Kneer [manuscript](#)). And some philosophers will argue that index parameters are still needed for further matters such as locations and perspectives, or for the assignment itself. I cannot even begin to discuss these cases here. (Though see Schaffer 2011 for more on perspective – there I argue that perspective is not an obligatory syntactic projection like world or time, but rather syntactically projected from specific terms such as ‘tasty’, as is explicit in constructions like ‘tasty to Ann’.)

But some philosophers will be more open to thinking through the prospects for explicit semantics, and will allow that eternalism and necessitarianism are at the very least available options. These philosophers will be curious as to whether an explicit Context Semantics offers anything to gain, and may well let their decision on eternalism and/or necessitarianism, or Context Semantics generally, turn on what gets them to the best overall semantic framework. This strikes me as the most reasonable approach, so accordingly I turn to argue for the general preferability of a fully explicit semantics to any implicit alternative.

## 5. The joys of explicit semantics, as compared with mixed semantics

No confession is complete without the promise of salvation at the close. Accordingly, I conclude by reflecting on the joys of an explicit semantics as seen in Context Semantics (§4). What if natural language semantics could be done in a uniform way for individual, world and time reference, using only the extensional machinery of variables and quantifiers? I hope that by exhibiting the joys of explicit semantics, I might help draw those uncertain about the arguments for eternalism and necessitarianism (§§3–4), or those uncertain about positing implicit parameters for locations, perspectives or other less central cases, towards a general theoretical preference for the explicit approach.

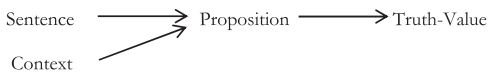
From my perspective, intensional languages form an interesting class of artificial languages, worthy of logical study. For natural language semantics, they were a fruitful mistake.

There are two relevantly different comparisons for explicit semantics. The first comparison – pursued in this section – is with *mixed semantics*,

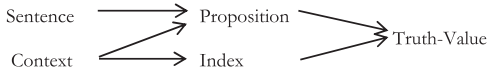
which invokes some extensional machinery and some intensional machinery. This is the dominant view and my primary target, for kludging together two different formalisms without empirical motivation. The second comparison – postponed til §6 – is with *implicit semantics* (Cresswell 1990), which invokes intensional machinery across the board (even for individual reference), and so in some respects is the ‘mirror image’ of explicit semantics. This view is seldom taken very seriously, but I think it deserves more serious consideration since it can also lay claim to treating the parallel phenomena of individual, world, and time reference in parallel ways.

As compared to mixed semantics, I claim that explicit semantics enjoys three main advantages, the first and most obvious of which is greater simplicity and elegance. It should be visible that explicit semantics invokes simpler and more uniform semantic machinery:

Context Semantics



Context-Index Semantics



There may be reasons for complicating the formalism, but reasons must be given. The morale of §§1–4 is that the individual, world, and time reference prove to be relevantly similar. Natural language semantics is heir to two different formalisms, but these complications have outlived their rationale. (This is an invitation to the friend of mixed semantics to do better. What empirical phenomena compel such complications? What are the principled reasons for invoking different formalisms for these cases?)

As a second main advantage, explicit semantics is more constrained than mixed semantics, in multiple respects. The extensional machinery standardly comes with the following constraints baked in:

- the stock of variables posited is *infinite*
- the method of evaluating and shifting variables is through *the variable assignment* and *quantifiers*
- variables show up as components of *logical form*

In contrast, the intensional machinery predicts no comparable constraints. Rather the stock of points of reference is freely adjustable, the methods of evaluating and shifting these points are freely adjustable, and logical form provides no further guidance. (This is not to say that the intensional formalism is unacceptable, but only that the extensional formalism is preferable.)

Starting with the first bulleted point, the extensional machinery brings along an infinite stock of variables and a corresponding bold prediction about expressive power: natural language can track indefinitely many perspectives. It is uncontroversial that extensionalism yields such a prediction: indeed one of the original rationales for an intensionalist treatment of time and world was the thought that the extensionalist prediction was false, in that natural language could only track a single temporal and modal perspective (§§3–4).

But my point here is not just that the extensionalist prediction for time and world was eventually vindicated (§§3–4), but that the intensional machinery makes no comparable prediction whatsoever. Thus with time, temporalists went from positing one time parameter  $t$  (Prior, Montague, Kaplan), to two  $\langle t_1, t_2 \rangle$  (Kamp), to infinitely many  $\langle t_1, t_2, \dots \rangle$  (Vlach), just to fit the data. The number of temporal points posited is *a freely adjustable parameter*. This illustrates how the intensionalist machinery is less constrained. The temporalist semantics needs to be hand-tweaked to mimic what the eternalist semantics predicted all along.

Turning to the second bulleted point about evaluation and shifting, the extensional machinery brings along the assignment function and quantifiers. It should be admitted that the assignment function is not a very constrained posit. But we do have a strong independent grasp on the semantics of quantifiers (as seen in generalized quantifier theory: Barwise and Cooper 1981). So the extensionalist boldly predicts that temporals and modals both have the full range and structure of generalized quantifiers.<sup>15</sup>

But the intensional machinery does not carry along any fixed procedure for evaluating and shifting parameter values. With respect to evaluation, it is orthodox for parameters to be initialized from the context of utterance, so that the world and time at issue start off at the world and time of the

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<sup>15</sup>Actually – following Bach, Kratzer and Partee (Partee 1995) – I take it that natural language quantification comes in two forms. There are *D-quantifiers*, modeled on determiners, in which syntax straightforwardly provides the  $[[\text{Quantifier}]] [\text{Restrictor}] [\text{Scope}]$  structure of generalized quantifiers. And there are *A-quantifiers*, modeled on adverbial quantifiers, which arguably lack a syntactically obligatory restrictor argument, and for which general discourse-level phenomena such as *the question under discussion* may play a key restrictive role. My specific prediction is that modals and temporals are A-quantifiers.

speech context (and only shift as a result of operators). But nothing mandates this procedure, and one of the insights of MacFarlane (2003) is that the intensional machinery is flexible. So MacFarlane not only adds a perspective parameter, but he initializes it from the circumstance of evaluation, to capture a form of relativist assessment sensitivity.<sup>16</sup> My point is that MacFarlane has revealed an independent respect in which index parameters are relatively less constrained, in that their initialization procedure is another freely adjustable matter for the intensionalist, which may even differ across different parameters.

With respect to shifting parameter values, there is no independent constraint on the number or structure of operations. Thus with time, temporalists went from positing simple 'Past', 'Future', 'Always Will', and 'Always Was' operators (Prior's P, F, G, and H), to Kamp's 'Since' and 'Until' augmentation, to all sorts of complicated things such as metric tense operators 'It was/will be the case  $n$  units of time before/after.' These developments proceeded – as van Benthem (1988, 10–11) notes – 'until a system arose whose temporal operators looked remarkably like the *Quine operators* for a variable-free predicate logic' so that 'the tense-logical formalism had become as strong as a full-blown, two-sorted predicate logic ... freely allowing for quantification over [temporal items]'. Again the temporalist semantics needs to be hand-tweaked to mimic what the eternalist semantics predicted all along. Indeed while some mixed semanticists (Stanley 2005, 147–152) adopt the constraint of only positing parameters where natural language offers at least some associated operator, others (MacFarlane 2009, 244–246) reject even that constraint. So the range and structure of operators likewise seems to be a freely adjustable matter.

Turning to the third bulleted point about logical form, the extensional machinery posits variables and makes a correspondingly bold prediction about logical form: any information involved in truth evaluation is represented in logical form (with one admittedly worrisome exception: the assignment function). It is uncontroversial that extensionalism yields such a prediction: indeed one of the original rationales for an intensionalist treatment of time and world was the thought that the extensionalist prediction was false, in that simple natural language sentences such as 1 need time and world information for truth evaluation but do not represent the time or world at issue in logical form ( $\$2$ ).

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<sup>16</sup>Of course I cannot discuss relativism here. But see MacFarlane 2003, 2005, 2014; Kölbel 2002; Egan, Hawthorne, and Weatherson 2005; and Lasersohn 2005 for key relativist proposals, and Schaffer 2011 and Stojanovic 2017 for some of the many critical discussions.



But my point here is not just that the extensionalist prediction proves defensible (via referential treatments of tense and mood: §§3–4), but that the intensional machinery yields no prediction at all. Indeed the entire point of the intensional machinery is to posit additional implicit points of reference thought to be *missing* from the proposition. So, in general, the number and variety of points of reference that the intensionalist posits float free from the logical form representation of any given sentence.

It is worth pausing to emphasize that logical form representations are subject to strong independent constraints. Some say that every element in the logical form is traceable to an element in the syntax (Stanley 2000, 401). This claim is controversial but it is at least widely accepted that syntax provides some starting point guidance.<sup>17</sup> Some add that variables in logical form may be diagnosed by various tests, such as binding (Partee 1989; Stanley 2000; Stanley and Szabó 2000; see Schaffer 2011 for this and other diagnostics). These tests are all controversial but it is at least widely accepted that there are decent (if fallible) diagnostics for variables. (The friend of mixed semantics can hardly object too vocally, since she too posits variables in logical form for those cases in which she uses the extensional machinery, and so she too needs to regard this as an overall well-constrained enterprise.)

No comparable constraints arise for parameters. Thus in §§1–2 I noted that theorists like Montague, Scott, Kaplan and Lewis freely tacked on parameters as needed. In this vein, Kaplan (1989a, 504) says: ‘What sorts of intensional operators to admit seems to me largely a matter of language engineering. It is a question of which features of what we intuitively think of as possible circumstances can be sufficiently well defined and isolated.’ This hardly sets a clear constraint. Lewis (1980, 84) says that the list of parameters ‘should include time, place, world and (some aspects of) standards of precision’ and adds: ‘I am not sure what more should be added.’ And MacFarlane (2009, 245–246) faces a ‘proliferation’ worry about ‘opening the floodgates’, which he puts as ‘Pretty soon our nice ordered pairs will become ordered  $n$ -tuples!’ His immediate reply is: ‘Maybe you just need a lot of parameters to do semantics.’ Perhaps. But it would be better to do semantics without this open-endedness.<sup>18</sup>

<sup>17</sup>In this vein, McKeever (2018) argues ‘that one can reconcile the semantic criterion for positing variables with the demands of syntax’ by positing covert syntax, and points out that positing covert syntax ‘is pretty crucial to prevailing semantics methodology’.

<sup>18</sup>Stanley’s (2000, 391) constraint that ‘all truth-conditional effects of extra-linguistic context can be traced to logical form’ is intended to block *free enrichment* (Sperber and Wilson 1986), whereby one can freely add constituents to the proposition. The complaint is that free enrichment lacks adequate constraints.

This concludes my discussion of the second main advantage of explicit semantics over mixed semantics, namely that explicit semantics provides a more constrained approach. I should emphasize that I am not claiming that mixed semantics is without any constraints, or otherwise theoretically unacceptable. I am only saying that explicit semantics induces stronger constraints (on the number of points of reference, their means of evaluation and shifting, and the implications for logical form), and is thus theoretically preferable, given that its bolder predictions are borne out.

A third benefit of explicit semantics over mixed semantics – and the final one I canvass – concerns the treatment of propositional truth that it engenders. A semantics without indices preserves the natural view that propositions are perfect and complete, which harkens back at least to Frege (1967, 38; also 1979, 135):

A thought is not true at one time and false at another, but it is either true or false – *tertium non datur*. The false appearance that a thought can be true at one time and false at another arises from an incomplete expression. A complete proposition [Satz], or expression of a thought [Gedankenausdruck], must also contain the time datum.

But given implicit semantics, propositions are not complete but must be held up to further parameters. As Kaplan (1989a, 504) acknowledges: ‘This functional notion of the content of a sentence in a context may not, because of the neutrality of content with respect to time and place, say, exactly correspond to the classical conception of a proposition.’ Likewise, propositions are not true or false *simpliciter*, but only relative to parameter settings. The intensionalist trades the property of truth for the relation of truth-at-a-sequence.

How important is it to preserve the classical image of the complete proposition which is ‘either true or false – *tertium non datur*’? For those inured to the relativized notion of truth-at-a-sequence, the point may seem rhetorical at best. But for others this is a core platitude of semantics, to be preserved if possible. In this vein, Cappelen and Hawthorne (2009, 1) start from a platitude they label *simplicity*, which includes: ‘There are propositions and they instantiate the fundamental monadic properties of truth *simpliciter* and falsity *simpliciter*’ (2009, 1). As Lewis himself (1970, 18) says, in a different context: ‘Semantics with no treatment of truth-conditions is not semantics.’ To which it may be added that the relation of truth-at-a-

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But index parameters are just another way to freely enrich the eventual truth evaluation without representation in the logical form. Instead of freely enriching the proposition to factor in what one wants, one freely holds up the proposition to whatever added factors one wants.

sequence is not the same thing as the property of truth. My own view is that truth-at-a-sequence may be a passable substitute for the real thing, but that the real thing is still to be preferred if available.

So I conclude that explicit semantics is not just more simple and elegant than mixed semantics, but that it adds welcome constraints, and delivers classical propositions able to bear truth-values. To those philosophers curious if an explicit Context Semantics offers anything to gain over mixed Context-Index Semantics, and who will let their decisions on eternalism, necessitarianism and Context Semantics generally turn on what yields the best overall semantic framework, I say: explicit semantics is the lovelier framework.

And what if the index still remains, as on Rabern's preferred view (§4)? This particular version of mixed semantics – call it *almost-explicit semantics* – operates with explicit time and world variables in a parallel way just like explicit semantics, and posits only a single well-constrained index parameter for the assignment. Almost-explicit semantics cannot erase the index or fully recover complete propositions, but it does come with all of the constraints that come with positing world and time variables in logical form, and not allowing index parameters to be freely posited, freely initialized, or freely operated on. Rather we have just one parameter, initialized from the context, and operated on by standard quantifiers. Not bad. I thus reserve almost-explicit semantics as a backup view.

## 6. The joys of explicit semantics, as compared with implicit semantics

I have argued that explicit semantics is preferable to mixed semantics (§5). It remains to compare explicit semantics to implicit semantics (Cresswell 1990), which invokes intensional machinery across the board, even for reference to individuals. Both explicit and implicit semantics (but not mixed semantics) can boast a uniform and elegant treatment of individual, time, and world reference. For this reason, I think that implicit semantics deserves more serious consideration than it usually receives.

That said, I claim that explicit semantics enjoys three main advantages over implicit semantics, the first of which is a far more natural treatment of individual reference. It is worth saying why implicit semantics is seldom taken very seriously: the extensional treatment of individual reference seems so natural. To return to 1 ('I am writing'), it looks as if the reference to the speaker is glaringly explicit. This is in contrast to reference to world and time, which are only subtly explicit (in the mood and tense

features bundled in with the root verb). So it seems to me that – once the deep parallels between individual, time and world reference emerge – the most reasonable stance is to extend the clear case of explicit reference out from individuals to world and time, rather than backtracking and denying it for individuals. (Here is a natural route to explicit semantics: Start with the orthodox extensionalist treatment of individual reference. See that world and time reference turn out relevantly parallel. So extend the extensionalist treatment to world and time reference. What went wrong?)

The second advantage of explicit semantics over implicit semantics is that explicit semantics is more constrained. Though the comparison is more subtle than with mixed semantics (§5), since the friend of implicit semantics is not committed to positing an infinite stock of variables, an assignment function, or quantifiers in any case (since she avoids the extensional machinery altogether). So, for instance, she can run a reasonable *tu quoque* argument about the lack of constraints on the assignment function (which parallels the lack of constraints on parameter initialization).

But explicit semantics remains more constrained in terms of logical form (§5). Using extensional machinery commits one to the bold prediction that any bit of information involved in truth evaluation shows up as a component of the logical form (again with the worrisome exception of the assignment function). Using intensional machinery does not commit one to any comparably bold prediction. For instance, the question of whether any locational information is involved in truth evaluation, and if so whether it be a single location, two locations, or an infinite sequence of locations, is a question all of whose answers – for the intensionalist – involve the very same location-neutral logical forms, and seemingly can only be answered by something like Kaplan's open-ended enterprise of 'language engineering'.

The third advantage of explicit semantics over implicit semantics is that it preserves the classical Fregean image of complete propositions bearing absolute truth-values (§5). Again this is a point that some will dismiss as mainly rhetorical, but others will regard as very serious. And again I say that preserving platitudes about propositions and truth is at least a benefit, leaving open how major a benefit it is.

I do not think that any of the listed benefits of explicit semantics over either mixed semantics or implicit semantics are conclusive, and I am open to the prospect that explicit semantics has costs I have not contemplated. But for now, I must conclude that explicit semantics is a lovely framework, preferable to the alternatives. If Lewis's schmentencite can claim

her victory at long last, it is neither cheap nor pointless. Rather it arises only after the deep semantic parallels between individual, time and world reference are shown, and only in the wider context of choosing the best overall semantic framework.<sup>19</sup>

## Disclosure statement

No potential conflict of interest was reported by the author.

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