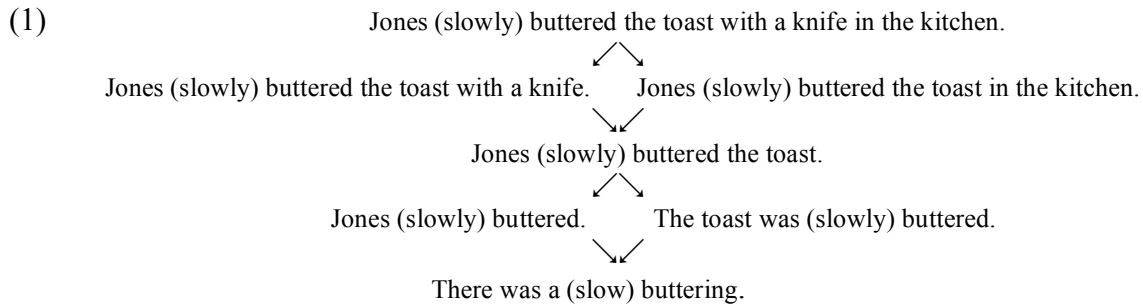


Event semantics.¹ Submitted. Delia Graff Fara & Gillian Russell, eds., *The Routledge Companion to the Philosophy of Language*.

Davidson's diamonds are a recurrent pattern of inference in natural language, in which elimination of a modifier phrase or argument, the arrows in (1), is valid; but, introduction reversing the arrows is not (Davidson 1967, 1985; Castañeda 1967; Parsons 1985, 1990):



(2) $\exists e(\text{Agent}(e, x_1) \ \& \ \text{slow}(e) \ \& \ \text{butter}(e) \ \& \ \text{Patient}(e, x_2) \ \& \ \text{with}(e, x_3) \ \& \ \text{in}(e, x_4))$

A Davidsonian logical form (2), being a conjunction of terms, explains that elimination of a modifier or argument is elimination of a conjunct. It further represents that all the conjuncts are about a particular e in a sentence which asserts that an e exists to satisfy them all. Introduction is thus shown to be a mistaken inference from the existence of some particulars satisfying given descriptions to the existence of a single one satisfying a conjunction of them:

(3) $\exists e(\text{Agent}(e, j) \ \& \ \text{butter}(e) \ [\text{an } x_3 : \text{knife}(x_3)] \ \text{with}(e, x_3))$
Jones buttered with a knife.
 $\exists e(\text{Agent}(e, j) \ \& \ \text{butter}(e) \ \& \ [\text{the } x_4 : \text{kitchen}(x_4)] \ \text{in}(e, x_4))$
Jones buttered in the kitchen.
 $\narrow \exists e(\text{Agent}(e, j) \ \& \ \text{butter}(e) \ \& \ [\text{an } x_3 : \text{knife}(x_3)] \ \text{with}(e, x_3) \ \& \ [\text{the } x_4 : \text{kitchen}(x_4)] \ \text{in}(e, x_4))$
Jones buttered with a knife in the kitchen.

Buttering with a knife in the pantry and again in the kitchen with a spatula does not imply that Jones ever took knife to butter in the kitchen.

In the logical forms for (1), the morpheme *butter* emerges with a single meaning for all its occurrences in various syntactic and morphological contexts. Variable polyadicity

¹ I could not have attempted Event semantics while standing on one foot without leaning on Cleo Condoravdi, Richard Larson, Paul Pietroski, Roger Schwarzschild and Achille Varzi. I am grateful to Terje Lohndal for extensive correspondence on an earlier draft, and special thanks to Alexander Williams for written comments and subsequent correspondence about the final draft and to Elena Herburger for corrections minutes before midnight. The article draws on my (2010) 'And': *Conjunction Reduction Redux*, USC, ms. 750pp.

ranging from zero to four arguments is just an illusion of the monadic *butter* in construction with a varying number of conjuncts. Logical form here answers to both inference in natural language and the univocality of its morphemes. Event semantics, so called, comprises those approaches to inference and grammar that would, in agreement with (2), introduce new parameters and decompose the simple sentence into a conjunction of terms containing them. Events, by the way, are the values for *e* in true sentences.²

This essay rummages for more gems of natural language to fix the logical syntax of talk about events in simple sentences. The existential event quantification with scope over the entire sentence in (2) turns out to be plural, and the cross-reference to events from one conjunct to another is by plural pronoun or definite description (*plural event quantifiers and pronouns*) rather than bare variable. Instead of relating to the same event *e* as in (2), every argument prompts its own events in a more extensive decomposition (*supermonadicity*), in which various relations between the several events hold the sentence together (v. (25) below). Emending how quantifier phrases and descriptions prefix to their scope, *adverbialization* interposes an adverb derived from the nominal phrase's descriptive content so that what is spoken as (4), for example, is always parsed along the lines of (5):

- (4) The butler buttered.
 (5) The butler *while a butler* buttered.

These emendations retain the original explanation for the validity of modifier and argument elimination and for the invalidity of their introduction; but, the logical form that replaces (2) paraphrased sounds more like (6):

- (6) Jones while Jones participated & it was slow & it caused a buttering & the toast while toast participated in that, which had assistance which a knife while a knife participated in, & it was a being-in which the kitchen while a kitchen participated in.

² See Schein 2002 for more on the metaphysics of events. Speakers affirm (i)-(iii) without implying (iv) or (v), a dilemma for Davidsonian event semantics as its uncomplicated logical forms for (i)-(iii) do imply (iv) and (v) (v. Lombard 1985).

- (i) The Carnegie Deli faces Carnegie Hall.
 (ii) Carnegie Hall faces the Carnegie Deli.
 (iii) The Carnegie Deli facing Carnegie Hall *is* Carnegie Hall facing the Carnegie Deli.
 (iv) F The Carnegie Deli faces the Carnegie Deli.
 (v) F Carnegie Hall faces Carnegie Hall.

A necessary complication is to recognize that the material states identified in (iii) are not the observations under a perspective or scenes of those states that distinguish (i) and (ii) and undo the unwanted implication. The scenes or perspectives that here rescue event semantics from itself are however pervasive wherever there is predication.

It gets worse with annotations in logical form referring to perspectival events or states, scenes or frames of reference for the outside events the sentence is a report of. Event semantics, its syntax revised and the architecture of simple clauses fortified, is then found to resolve problems of extensional substitutivity under identity and to clarify the logical form of identity statements in natural language, deploying event talk to safeguard naïve reference into an austere ontology.

§1.1. *Plural event pronouns* make a quick entrance behind adverbs denoting events. Contrary adverbs (e.g., *gracefully* vs. *clumsily*) prove the source of syntactical insight:

(7) Jones gracefully and Godfrey clumsily buttered 613 pastries for brunch.

As what is graceful is not clumsy, Jones buttering 365 brioches and Godfrey, 248 croissants, attend to brunch with their own events. Their graceful and clumsy actions together butter the pastries. Saying so requires two more existential event quantifiers, and a plural pronoun dividing its reference between the two events supplants simple event variable in relating action to buttering:

(8) $\exists e \exists e_1 \exists e_2 ((\text{Agent}(e_1, j) \ \& \ \text{graceful}(e_1)) \ \text{and} \ (\text{Agent}(e_2, g) \ \& \ \text{clumsy}(e_2)) \ \& \ [{}_1E : Ee_1 \ \& \ Ee_2] \ \text{butter} \ 613 \ \text{pastries}[e, E])^3$

Note that *and* is univocally the sentential connective. The burden of collective predication falls on the plural event pronoun here and also in the logical form for (9), identical to (8) except for omission of the adverbs.

(9) Jones and Godfrey buttered 613 pastries.

Contrary adverbs recur in (10) and (11) with similar mission and further instruction:

(10) Jones gracefully and Godfrey clumsily separated the brioches to the left and the croissants to the right.

(11) At the loom, Arachne gracefully and her apprentice clumsily criss-crossed silk threads horizontally and linen threads vertically.

Neither the leftwards nor the rightwards parade of pastry is a separating on its own; and, the separating is itself neither to the left nor right, having components of both. So neither the leftwards event nor the rightwards event is described by the verb, and the adverbs modify a separate relation, Theme in (12), describing the brioches' and the croissants' participation (*pace* Kratzer 1996, 2003):

³ Atomic formulae, e.g., 'butter(*e*)', '*Ee*', appear with variables bare or in parentheses. Brackets indicate a molecular formula with the variables enclosed free, e.g., 'butter the toast[*e, E*]'. N.B. In 'Agent[*E, X*]', 'cluster[*E*]', *etc.*, the brackets flag abbreviation of complex, second-order formula composed of first-order relations— not primitive, higher-order relations, *v.* (15), (18).

- (12) $\exists e \exists e_1 \exists e_2 \exists e_3 \exists e_4 ((\text{Agent}(e_1, j) \ \& \ \text{graceful}(e_1)) \ \text{and} \ (\text{Agent}(e_2, g) \ \& \ \text{clumsy}(e_2)) \ \& \ [E_{12} : E_{12}e_1 \ \& \ E_{12}e_2] \ [\gamma E_{34} : E_{34}e_3 \ \& \ E_{34}e_4] \ \text{separate}[e, E_{12}, E_{34}] \ \& \ (\text{Theme}(e_3, b) \ \& \ \text{to the left}[e_3]) \ \text{and} \ (\text{Theme}(e_4, c) \ \& \ \text{to the right}[e_4]))$

Another plural pronoun referring to the leftwards and rightwards events must, in turn, relate the brioche's and croissant's participation to the separating, an e that separate(e). To continue in the spirit of (2) until it is abandoned below for supermonadicity, (10) could still be held to be about a single separating and the graceful and clumsy on the one hand and the leftwards and rightwards on the other could just be two ways to parse it into mereologically smaller events, into those where Jones and Godfrey are Agents and into those where the brioche and the croissant are Themes.

Plural event pronouns have been introduced to collect the events in which participants participate, and they divide their reference accordingly. Verbs also denote plural events and so then must the quantifier prefixed to the sentence. *Plural existential event quantification* (Gillon 1990; Pietroski 2005; Schein 1993, 2006; Schwarzschild 1991, 1996) with a verb denoting plural events is found in (13) given that the same morpheme *cluster* occurs twice:

- (13) The fires will cluster in two clusters (and not in one).
 (14) $\exists E ([\text{The } X : \text{fires}(X)] \ \text{Theme}(E, X) \ \& \ \text{cluster}[E] \dots)$
 (15) $\text{cluster}[E] \leftrightarrow_{\text{def}} \exists e Ee \ \& \ \forall e (Ee \rightarrow \text{cluster}(e))$

Divine law and faith that the events scattered in history are distinct find plural event quantification in (16) too:

- (16) In the era chronicled, two Roman bishops against their will and two Anglican churchmen at the behest of the throne have joined three English kings eagerly and ten French princesses reluctantly in holy matrimony.

Here the several joinings the verb denotes are equal in number to the sum of events executed against the will and events at the behest of the throne and fewer than the events submitted to eagerly and reluctantly; but, they are all in the plural.

§1.2. A more extensive decomposition of polyadicity is next, *supermonadicity*. In (16), the clerics are all joiners and so all Agents. In the conjunction of predicate phrases in (17), the first describes provocateurs, Agents in actions at the Pentagon and the second, victims, that is, Patients, acted upon on the Mall:

- (17) The Columbia students (noisily) and the Harvard students (quietly) surrounded the Pentagon and were crowded into the Mall.⁴

⁴ Also, (i) They loved and were beloved in love unrequited and unwanted.
 (ii) They killed and were killed in causes just and unjust.

(18) $O[E_i, E_j] \leftrightarrow_{\text{def}} \forall e(\exists e_i(E_i e_i \ \& \ \text{overlap}(e, e_i)) \leftrightarrow \exists e_j(E_j e_j \ \& \ \text{overlap}(e, e_j)))^5$

(19) $\exists e \exists e_1 \exists e_2 \exists e_3 \exists e_4 (\text{Participate}(e_1, C) \ \& \ \text{Participate}(e_2, H) \ \& \\ [\neg E_{12} : E_{12} e_1 \ \& \ E_{12} e_2] [\neg E_{34} : E_{34} e_3 \ \& \ E_{34} e_4] O[E_{12}, E_{34}] \ \& \\ \exists e_3 (\exists X \text{Agent}(e_3, X) \ \& \ \text{surround the Pentagon}[e_3, X]) \ \& \\ \exists e_4 (\exists X \text{Patient}(e_4, X) \ \& \ \text{be crowded into the Mall}[e_4, X])$

The Columbia students participated, and the Harvard students participated; & it all was a surrounding the Pentagon and a being crowded into the Mall.

Sentence (17) commits a student to neither venue, leaving vague whether she acted at the Pentagon or was acted upon on the Mall. All that is implied is that the Columbia students participate in some way as do the Harvard students, and what they do constitutes the events subsequently described, so that some of the Columbia and Harvard students must have been at the Pentagon while the rest were on the Mall. The conjuncts in (19) mentioning the students are necessarily vague about what they are up to in their noisy and quiet events, asserting only their participation. That vagueness however threatens translation of (20). In the event that Harvard students mercilessly tease Columbia students and Columbia students decline to tease themselves, (20) is false:

- (20) The Harvard students and the Columbia students teased the Columbia students.
 (21) The Harvard students participate and the Columbia students participate; & it was a teasing.

But its considered translation paraphrased in (21) is mistakenly true in that both the Harvard students and the Columbia students have participated, the former as aggressors and the latter as victims in the same event of teasing. To divorce the vagueness necessary for (17) from its ill effect on (20), the logical form for the latter must resolve two events, cause and effect:

(22) $\exists e_1 \exists e_2 \exists e_3 (\text{Participate}(e_1, C) \ \& \ \text{Participate}(e_2, H) \ \& \\ [\neg E_{12} : E_{12} e_1 \ \& \ E_{12} e_2] [\neg E_3 : E_3 e_3] \text{Cause}(E_{12}, E_{34}) \ \& \ \text{tease}(e_3)^6 \ \& \ \text{Participate}(e_3, C))$

The Columbia students participate and the Harvard students participate; & it caused a being teased & the Columbia students participate in that.

The vagueness of the Harvard and Columbia students' participation notwithstanding, what they do is said to cause the Columbia students' humiliation. The Columbia students had no hand in the causal event, and (22) is false, as a translation of (20) should be.

⁵ That is, mereological overlap. $O[E_i, E_j]$ just in case E_i mereologically coincide with E_j .

⁶ I.e., the dynamic condition of suffering, enduring or experiencing teasing, v. *embarrass, shame, humiliate, torment*.

This argument repeats itself *mutatis mutandis* wherever nominal phrases can occur allegedly conjoined, and thus a resolution into smaller events occurs across-the-board at every argument position.^{7, 8}

In the initial Davidsonian logical form (24) for (23), relations to events relate to the same event e :

- (23) Jones buttered the toast in the kitchen.
 (24) $\text{Agent}(e, x_1) \ \& \ \text{butter}(e) \ \& \ \text{Patient}(e, x_2) \ \& \ \text{in}(e, x_3)$
 (25) $\text{Participate}(e_1, x_1) \ \& \ \text{Cause}(e_1, e_2) \ \& \ \text{butter}(e_2) \ \& \ \text{Participate}(e_2, x_2) \ \& \ \text{in}(e_2, e_3) \ \& \ \text{Participate}(e_3, x_3)$

With *supermonadicity*, it is small events all the way down, with every nominal phrase, including each conjoined (v. (11)), launching its own. It doesn't get lonelier than that, spinning around in a subevent solo, unrelated to anything else except through the mediation of further relations between events. This revision to clausal architecture is warranted by three elementary observations: i. sentences with multiple conjunctions (17) demand a certain vagueness about the manner of participation in the events

⁷ That is, if an alleged coordination of quantifier phrases or descriptions, [DP_i Det NP], coordinates sentences based on the participation relation, then any sentence of the forms in (i) threatens to confuse the manner of participation associated with the two tokens of DP_i unless they describe different events:

- (i) ... DP_1 ... DP_1 and DP_2 DP_2 ... DP_1 and DP_2 ...
 ... DP_1 and DP_2 ... DP_1 DP_1 and DP_2 ... DP_2 ...

Besides pairing Agent and Patient or Theme as in (17), other pairings force recourse to a vague participation relation too:

- (i) 613 diverse hedge funds variously sold and sold to 365 equity funds and 248 mutual funds in a single day's trading.
 (ii) 365 equity funds and 248 mutual funds variously sold and were sold in the course of a day's trading.
 (iii) 365 equity funds and 248 mutual funds variously sold and were sold to in the course of a day's trading.
 (iv) 365 equity funds and 248 mutual funds were variously sold to and sold in the course of a day's trading.
 (v) The preparation of these Balkan delicacies has variously stuffed full and stuffed into other vegetables— thirty eggplants, fifty peppers, eighty tomatoes, 130 olives and 210 pearl onions, weighing 34 kilos in total.
 (vi) For these Balkan delicacies, thirty eggplants, fifty peppers, eighty tomatoes, 130 olives and 210 pearl onions, weighing 34 kilos in total were variously stuffed full and stuffed into other vegetables.

⁸ Pietroski (1998), arguing from rather different considerations, also reaches the conclusion that thematic relations themselves occasion the introduction of an event quantifier.

A dyadic relation ' $\text{C}(e_1, e_2)$ ', if e_1 is meant to be a cause and e_2 its effect, leaves no room for reference to the event that is cause and effect combined, for which purpose one may prefer to substitute a triadic relation ' $\text{C}(e_1, e_2, e_3)$ '. For relevant discussion, see Pietroski 1998, 2000 and references cited and Schein 2002.

described, ii. this vagueness should not then confuse aggressors and victims (20), and iii. any participant's participation may be described by an adverb that is contrary to how anyone else participates ((7), (10), (11), (17)).

§1.3. *Adverbialization* of nominal descriptive content is a fact of grammar. First, descriptive anaphora, both implicit and explicit as in (26), co-varying with the events described, must fall within the scope of the event quantifier adverbialization derives as in (28):

(26) Every fugitive from a federal prison is soon apprehended near it. (after Enç 1986)

(27) Every fugitive from a federal prison; *as of some; time* is soon *after that; time* apprehended near it.

(28) [Every x : $\exists e$ fugitive from a federal prison $[e,x]$]
 [*while*⁹ e : fugitive from a federal prison $[e,x]$]
 $\exists e'$ (soon(e,e') & apprehended $[e',x]$ &
 $[\gamma$: federal prison(y) from which x is a fugitive in e] near(e', y))

Second, the adjective *respective* can only be interpreted as in some way modifying the matrix scope of its host nominal phrase, as if it were the adverb *respectively* (Gawron & Kehler 2002, 2004). Suppose that twins rent the same make and model vehicle and pose for photographs with the two cars in which it is variously true that:

(29) The twins stood beside their respective rentals.

The twins stood behind their respective rentals.

(30) The twins stood between their rentals.

In contrast to (30), there can be no photograph for which:

⁹ 'While' for illustration and paraphrase. Expected is the range of relations, temporal, causal, causal explanatory, mediating the interpretation of *if*-clauses or absolute clauses including variation therein due to differences between tensed and reduced clauses.

Adverbialization is grammar sometimes without apparent effect framing the events reported, *The liar was deep asleep*. Compare:

- | | |
|---------------------------------|--|
| (i) The liar fails a polygraph. | (ii) The sometimes liar fails a polygraph. |
| Any liar fails a polygraph. | Any sometimes liar fails a polygraph. |
| Every liar fails a polygraph. | Every sometimes liar fails a polygraph. |

As expected from adverbialization, the polygraph failures of (i) are an effect of lying, and any lie that escapes detection is a counterexample to what is asserted. In (ii), it seems that sometimes lying makes one anxious enough to fail a polygraph even when telling the truth. To be a sometimes liar is to *always* be a sometimes liar, for as long as one lives. So, to do something while a *sometimes* liar is to do something while oneself. Thus, *The liar was deep asleep* is *The sometimes liar while a sometimes liar was deep asleep*, with *sometimes* unspoken.

(31) *The twins stood between their respective rentals.

For the twins to be in respective possession of their rentals, as the nominal describes them, puts them in a pair of states in each of which a twin is opposite her own rental. Such a state frames a standing beside (or a standing behind) if its twin is beside (or behind) her rental, (29). But, neither of the states that respective possession denotes frames a standing of a twin between the rental in it, (31). This nonsense that (31) cannot escape is a consequence of adverbialization demanding that the twins' being with their respective rentals frame their standings between.

The scope of adverbialization tracks the scope of the nominal phrase adverbialized:

(32) At the thriller in Manila, Muhammad Ali's trainer and Joe Frazier's trainer pulled their respective champions apart.

(33) At the thriller in Manila, Muhammad Ali's trainer and Joe Frazier's trainer pulled apart their respective champions.

Given the scope of *their respective champions* in (32), it is immediate that the states of respective possession separately frame only the champions' being pulled: Ali's trainer grabbing Ali and Frazier's trainer grabbing Frazier pull hard until the champions are parted. Later noticed is the macabre interpretation in which the states of respective possession each frame a champion's being pulled apart by his trainer. The macabre becomes more salient in (33) to the extent that stylistic movements favor the scope worn on the sleeve, here the one now including *apart* within the scope of *their respective champions*.¹⁰ Note that for the only sensible interpretation of (32) and (33), the scope that adverbialization affords to *respective* is the minimal one that the host nominal phrase itself requires, a relation expressing participation in some events—a scope that is too small for the felicitous use of the proper lexical adverb *respectively*:

(34) *At the thriller in Manila, Muhammad Ali's trainer and Joe Frazier's trainer respectively pulled their champions apart.

(35) * At the thriller in Manila, Muhammad Ali's trainer and Joe Frazier's trainer pulled apart their champions respectively.

(36) ?? At the thriller in Manila, Muhammad Ali's trainer and Joe Frazier's trainer pulled their champions respectively— apart.

Nominal descriptions are the adverbs dedicated to the smallest relations to events, reflecting an economy of expression and compactness in natural language, which reserves lexical adverbs for larger phrases containing whole verbs.

¹⁰ Slighted is the variation from speakers like myself for whom (33) is unambiguously macabre to those for whom the contrast between (32) and (33) is rather weak.

§2. *Extensional Substitutivity under Identity*. (Barber 2000; Carlson 1982, Forbes 1997, 1999; Predelli 1999; Saul 1997ab, 1999, 2007; Szabó 2003)

Adverbialization (v. Forbes 1999) joins forces with supermonadicity to resolve puzzles of extensional substitutivity under identity:

- (37) The ponds the temperatures of which were recorded early this morning were colder than the ponds the temperatures of which were recorded early this evening.
- (38) Every pond the temperature of which was recorded early this morning was colder than every pond the temperature of which was recorded early this evening.
- (39) Venus Pond early this morning was colder than Venus Pond early this evening.
- (40) * Venus Pond was colder than Venus Pond (was).

From neither (37) nor (38) is there implication that the morning ponds are other than the evening ponds. If, in fact, Venus Pond (Maui) is among them both, (37) and (38) imply (39). In so far as adverbial qualification is necessary to escape contradiction (*cf.* (40)), its only source in (37) and (38) are the nominal phrases themselves which, according to adverbialization, do indeed supply adverbial phrases to qualify participation in the events described.

As morning is not evening and manhood, not boyhood, the adverbs from adverbialization in (37) and (38) and in (41) cannot apply to the same event, a surpassing in (41), without contradiction:

- (41) The man surpassed the boy of his childhood in regrets and not much else.
Many a man surpasses the boy of his childhood in regrets and not much else.

Only with supermonadicity providing enough events for the derived adverbs to modify will adverbialization license the substitutions. To substitute *the such-and-such* for *the so-and-so* in a sentence of natural language is always a double substitution in logical form—*the such-and-such while such-and-such-ing* for *the so-and-so while so-and-so-ing*. To be valid, it is not enough that the *such-and-such* are the *so-and-so*. It must also be that *while such-and-such-ing* is *while so-and-so-ing*, that is, that the derived adverbs describe the same events too.

§3. *Frames of reference and scenes*¹¹

The event that (2) describes and the events supermonadicity and adverbialization have so far introduced purport to deconstruct the goings on of the speaker's conscious report even as she is unaware of the fine-grained events enveloping her. Further annotations to logical form indicate perspective and frame of reference, representing the

¹¹ Scenes are introduced with different purpose in (Schein 2002) to address puzzles of event identity, and perspectives in (Schein 1993: chapter 10) to complete the incomplete definite descriptions translating pronouns.

epistemic conditions for observation of the events reported. If, for example, the frame of reference for (42) is taken to be that of the ballerina's proximate visual experience, the sentence puts her partner in synchronous orbit around her (possibly leading from an outstretched arm):

(42) The ice ballerina pirouetted with her partner on the left across the rink.

Alternatively, the frame of reference could be fixed at a moment by the line-of-sight pointing across the rink and tangent to the ballerina's curved trajectory, tracking the partner in a parallel course, on one side or the other depending on whether the speaker faces the ballerina and the frame of reference is centered on the speaker's point of view or on the ballerina's. The sentence is thus three-ways ambiguous, and it communicates no determinate thought at all unless the speaker and hearer agree on the frames of reference intended. A lexical ambiguity—*left*₁, *left*₂ and *left*₃—to sort them out would insult the concept's integrity, which must rather be *left in f*, for different choices for frame of reference *f*. In contexts that are not demonstrative for *f*, as in third-party transmission, to have understood (42) is to have grasped some descriptive intention like in (43), absent which, again, no determinate thought is expressed:

(43) In the orbital frames of references *f* centered on the agent's proximate visual experience, the ice ballerina pirouetted with her partner on the left in *f* across the rink.

Sentence (44) is also three-ways ambiguous—mercifully, not the nine ways it would be if the frame of reference for the second token of *left* were independent and possibly discontinuous from the first's:

(44) The ballerina will pirouette with her partner on the left to the middle of the ice, do a triple somersault, and pirouette with her partner on the left the rest of the way.

The instruction and knowledge not to switch frames of reference within sentence is itself a point of grammar. There is no thought here without description of a frame of reference, and its representation is subject to grammatical constraint.

For purposes of spatial orientation and navigation, analysis of the visual and auditory scene includes parameters justified by the agent's accurate navigation even as she is unaware of them in her experience of coarse-grained objects in location and in motion. Among the communicative intentions the design of language supports, I include the intention to convey to a companion witness accurate enough to guide her navigation,¹² for which she has to acquire a scene from words of mine encoding parameters that I do not consciously attend to or assert, such as a frame of reference. How the world is at any given moment, as fixed in true propositions, is not accurate witness for where you are in it, for which the logical form of utterances should be tricked out to choreograph and

¹² Think of two triangulating agents formulating and exchanging course corrections based on outputs and inputs in the language of a visual guidance system.

calibrate the speaker's and hearer's thoughts and perceptions. If narrative is rich enough to support the communicative intentions of its narrator, who is real or imagined (and always imagined if not real), it is short-sighted to suppose that the only parameter for narrative continuity is temporal—a timeline for world history and a succession of points or intervals along it as the narrative advances its 'now'. Even a 'here and now', the indices for a context of utterance, will not fix the thoughts expressed in a spatial vocabulary including *left*. Here we now are, imagine, at the moon landing site on schedule, and yet we are disoriented and disabled for visual navigation if the faulty periscope from our windowless rover swivels about randomly, no matter how detailed the image transmitted nor acute my report of it. A sequence of scenes or their narration is orienting and navigational for observer, speaker or hearer only if their lines-of-sight are known and the scenes constitute a survey conforming to some natural conditions on their continuity—conditions that regulate over the course of survey and narrative such parameters as needed to constitute a natural (stereoscopic, i.e., 3-D) cinematic experience. As with any contextual or discourse parameters, thoughts are more or less dependent on them, and some narratives may wash out that dependency in adopting an omniscient narrator or an arbitrary, unknown or neutral perspective. Nevertheless those parameters are always there for the asking.

In resolving a celebrated instance of the substitution puzzle, the metaphysics is spared only when conditions step in on the speaker's epistemic stance towards the events under report, granting that the nominal description contains expressions of such conditions:

(45) Three million passengers crowded National Airlines routes last year.

(46) ≠ Three million persons crowded National Airlines routes last year.

(after Gupta 1980: 23 & Moore 1994)

Frequent flyers recounted under (45)'s protocol keep it from implying (46). If the arithmetic predicate *three million* is a simple property '3M()' determined by the numeric identity of what is referred to, *three million passengers* does not refer to the one million whole persons who flew frequently. Away we go, denying the identity of passengers and persons to thwart the inference from (45) to (46) and asserting it in (47):

(47) The three million passengers who crowded National Airlines' routes last year were the one million frequent flyers loyal to it.

Worse, the three million passengers in (45) who are fewer persons do not always exist as such, subject to a condition that Doetjes & Honcoop (1997) aptly call *sequencing of events*:

(48) Three million passengers had three million opinions about the food on National Airlines.

(49) *Three million passengers have three million opinions about the food on National Airlines.

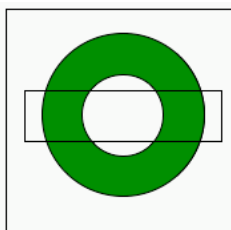
Sentence (45) can be followed by (48), recounting the passengers' experience onboard and continuing to count as many the fewer. In the present tense, however, (49) cannot count more passengers than persons who fly, despite the fact that these persons still have three million opinions about flights they remember all too well. The relation between the count and present tense wants explanation. Instead of the bare '3M()', imagine that *three million* translates as something like "now counted this way to three million" a description of events of measurement (the counter clicks, as it were) under an explicit protocol. What is counted and what the indefinite description *three million passengers* refers to is naïvely what there is, persons, who are counted and under some protocols recounted. With the counting now entered into the description, adverbialization derives (50) and (51):

- (50) Three million passengers *while counted to three million* had three million opinions about the food on National Airlines.
 (51) *Three million passengers *while counted to three million* have three million opinions about the food on National Airlines.

Clicking the counter as passengers go by frames or locates opinion recorded contemporaneously as in (48); but, there is no counting to three million that frames current conditions, which, according to (51), is what defeats (49). The speaker is secure in her constant reference to naïve, familiar objects by a sleight of hand that manipulates her epistemic conditions, in this case, conditions of measurement.

A fundamental relationship exists between the conditions of measurement and the scenes of what is counted, which under adverbialization frame the events reported. In the narrow scene or frame of reference in (52), there are exactly two green regions if finitely many. There is only one in the wide scene or frame of reference. This is not a metaphysical claim, for surely the regions counted under the narrow frame of reference still exist as parts of the green ring under the wider frame of reference. They are just not to be counted there, under conditions inappropriate for their measurement.

(52)



Think of the design of an optical counter, blind to what is counted—passengers or planets if you say so. To utter *two* is to take on a perspective from which what is reported projects a scene the optical counter measures as 2. Counting two commits to the narrow scene or frame of reference in (52) and to a report of what the events counted two may frame within it, whether counting passengers or planets, as reflected in number agreement in the following:

- (53) The morning star and the evening are playing hide-and-seek in the twilight, season after season.
- (54) *From the vantage point of Jupiter, (you can see that) the morning star and the evening star are circling the sun.
- (55) From the vantage point of Jupiter, (you can see that) the morning star and the evening star *is* circling the sun.

Narrow scenes while the morning star and while the evening star exist only from earth. From Jupiter, if anything, what is while the morning star and while the evening star converges on the same large scene of Venus in orbit, where there is exactly one Venesian region, undermining the plural number agreement.

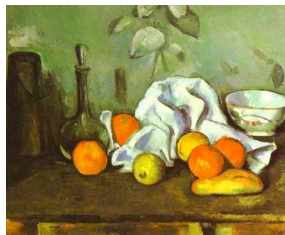
§4. Identity Statements

If supermonadicity and adverbialization are everywhere, they must also touch the most elementary assertions of identity. In any case, parsing (56)-(58) without them as closures of $\lceil X = Y \rceil$ is a garden path into a substitution puzzle without exit, as the sentences could only chase after different values for X and Y :

- (56) In a *mutual* declaration of *requited* love, the lover and beloved in the first love note are *not* the lover and beloved in the note returned.
- (57) The lover and beloved in either love note *are* the lovers exchanging them.
- (58) \neq The lover and beloved in the first love note are *not* the lovers exchanging them.

The logical forms and lexical items contained in (56)-(58) must admit modification by Tense at the very least and by the adverbs that, by hypothesis, adverbialization introduces with every nominal phrase. Beside hypothesis, modification in identity statements finds overt expression in (61), which differs from (60) in truth and differs only in the presence of a secondary predicate:

- (59) Still Life with Fruit Still Life with Ginger Jar, Sugar Bowl & Oranges



- (60) T The oranges in the first still life are the oranges in the second.
- (61) F The oranges in the first still life are the oranges in the second arranged the same way.
F They are them arranged the same way.

To be them is not to be them that way. It wants explanation how a classical identity statement *simpliciter* comes to be expressed in the same words as conditioned identity except for the condition itself. There is no room for modification in $\lceil X = Y \rceil$. Instead, an identity relation ' $\mathcal{I}[E_1, E_2]$ ' is said to hold between events or states only if the participants in E_1 are identical to the participants in E_2 . \mathcal{I} identity holds between the oranges' participation in the event or state depicted in the first canvas and their participation in that of the second canvas, verifying (60) (v.(62)); but, that is not to say that their state in the second canvas is also the same arrangement. The further comment describing it as such results in the falsehood (61) (v. (63)):

- (62) [the $X : \exists E$ oranges in $1^{st}[E, X]$][$\exists E_1 : \exists E$ (while $[E, E_1]$ & oranges in $1^{st} [E, X]$)] participate $[E_1, X]$ & [$\neg E_1 : that_1$][$\neg E_2 : that_2$] $\mathcal{I}[E_1, E_2]$ & [the $X : \exists E$ oranges in $1^{st}[E, X]$][$\exists E_2 : \exists E$ (while $[E, E_2]$ & oranges in $2^{nd} [E, X]$)] participate $[E_2, X]$
- (63) [the $X : \exists E$ oranges in $1^{st}[E, X]$][$\exists E_1 : \exists E$ (while $[E, E_1]$ & oranges in $1^{st} [E, X]$)] participate $[E_1, X]$ & [$\neg E_1 : that_1$][$\neg E_2 : that_2$] $\mathcal{I}[E_1, E_2]$ & [the $X : \exists E$ oranges in $1^{st}[E, X]$][$\exists E_2 : \exists E$ (while $[E, E_2]$ & oranges in $2^{nd} [E, X]$)] participate $[E_2, X]$ & *arranged the same way* $[E_2]$

Given the common syntax that (60) and (61) warrant, adverbialization just joins in, as in (62) and (63), to further condition the events related by \mathcal{I} identity. As weak as \mathcal{I} identity is, (56), if it is just a negated identity *simpliciter*, falsely denies that there are events with the same participants in one of which the lovers participate while lover and beloved and another in which they participate roles reversed. The sentence as intended is however to be understood as a true denial of a conditioned identity, where the condition is to be conveyed by an appropriately crafted, tacit secondary predicate:

- (64) The lover and beloved in a love note are *not* the lover and beloved in the note returned *oriented the same way*.
- (65) The lover *at the 1^{st} address in a frame of reference $_1$* and beloved *at the 2^{nd} address there $_1$* are *not* the lover *at the 1^{st} address in a frame of reference $_2$* and beloved *at the 2^{nd} address there $_1$, that frame of reference $_1$ oriented the same way as that frame of reference $_2$.*

If all the nominal phrases are addressed to a frame of reference, the secondary predicate is definable as a relation between the two frames of reference described, as the paraphrase in (65) hints at. Resolving this last class of substitution puzzles takes it all onboard—adverbialization, frames of reference and the decomposition of identity statements to comport with supermonadicity. Yet, it respects that identity statements are always tensed and sometimes conditioned, while affirming that nominal phrases refer to what they naively refer to.

With all the event arguments in a supermonadic clause that adverbials, tense and secondary predicates might modify, it becomes an empirical question to discover its

grammar, which will lead to a canonical structure for the expression of spatiotemporal relations in a clause.

- (66) For some evenings in 1892, Venus was Hesperus (aligned with a crescent moon)
For some evenings in 1892, Venus was the evening star (aligned with a crescent moon).
- (67) * For some evenings in 1892, Hesperus was Venus (aligned with a crescent moon).
* For some evenings in 1892, the evening star was Venus (aligned with a crescent moon).

From the contrast (66)-(67), for example, it appears that the temporal frame adverbial, Tense, the secondary predicate, and the adverbial derived from the predicate nominal—in (66), *while Hesperus* or *while the evening star*—coincide in the events they describe, which are to be related by \mathcal{I} identity to events described by the subject's derived adverbial, *while Venus* in (66). Both modification and the asymmetry it induces in (66)-(67) again put the clause structure beyond reach of an analysis based on $\lceil X = Y \rceil$.

§5. There is no rest for the Davidsonian who pauses at (2), as a few facts of natural language lead quickly to plural event quantification, plural event pronouns in lieu of bare variables, supermonadicity and adverbialization. Along the way, the plural event pronouns are the means for *and* to be the univocal sentential connective in all its occurrences, including (7) and (9), and all nominal phrases survive any context referring innocently to the familiar and ordinary, despite the puzzles of substitutivity. Metaphysical arguments to the contrary all rest on errors of syntax parsing the puzzles without benefit of the enhanced clausal architecture. Some of these arguments are also deceived by the smoke and mirrors of scenes and frames of reference by which thoughts are calibrated and which logical form records with parameters for yet more events.

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