

Events and Argument Structure

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Abstract

The inference from *Jones buttered the toast in the kitchen* to *Jones buttered the toast* is intuitively compelling, and Davidsonian event semantics explains why: action sentences express descriptions of events, about which indefinitely many things can be said. I trace the logical form tradition from this founding observation through thematic separation, definite reference to events, and plural event quantification; show the resulting format extending, unchanged, to aspect, measurement, and the attitudes; and present three contemporary advances—Schein’s supermonadic event layers, Schwarzschild’s elimination of individual variables, and Pietroski’s minimal monadic combinatorics. In the end, a dissociation emerges: logical forms are relentlessly monadic, while the event concepts uncovered by cognitive science are irreducibly polyadic. I resolve the mismatch with a two-level architecture: language composes G-concepts, satisfied by extralinguistic S-concepts that anchor them to the world. The system so described is a candidate domain-general Language of Thought.

Significance Statement

We use language to convey who did what, how, and to whom. How language packages this information has occupied event semantics for sixty years, and the answer is surprisingly austere. Where the mind tracks rich, relational scenes—someone acting on something, with a tool, in a place—sentences describe events through simple one-place predicates, with participants reachable only through their roles in events. Tracing this tradition from Davidson through Schein, Schwarzschild, and Pietroski, this review argues that the austerity is no accident: it is the signature of a distinct level of mental representation—a candidate Language of Thought—interfacing with the richer representations that organize our experience of the world. Semantic theory thereby yields testable hypotheses about cognition.

1. INTRODUCTION

Do sentences describe events? And if so: how many, of what sorts, and how do they relate to the named participants? Prior to Davidson (1967), the logical analysis of sentences had little to do with events. His postulation of a hidden, existentially quantified event variable turned adverb-drop entailments into logical validities, and initiated sixty years of inquiry into what else events can do. The event count per clause grows (e.g., a killing folds together an action and a causal consequence); thematic assignees peel off into their own conjuncts, inhabiting event layers connected by bridge relations; and, individuals drop out entirely. The systematicity of the resulting forms and their distance from surface syntax invites the question of what kind of cognitive system could produce them.

‘Argument structure’ often concerns role projection and alternations in the syntax (Hale & Keyser 2002; Levin & Rappaport Hovav 1995; Rappaport Hovav & Levin 2010; Levin & Rappaport Hovav 2005; Levin 2015). Here, I review the logical form tradition, which has chiefly been concerned with what sentences say about events and individuals through the analysis of inference patterns. The tradition aims to model argument-structure alternations (e.g., the causative-inchoative) as formal validities. The pursuit of inferential validity repeatedly forces hidden structure, and logical forms that decompose what is described. Importantly, these forms can be wrong two ways—truth-conditionally or structurally—and, on the reading I develop, they are furthermore held up against psycholinguistic and developmental evidence as hypotheses about what the mind computes (cf. Partee 1979).

Syntax and semantics are unusually tight here. On my read—not shared by all working in event semantics—logical forms translate representations at LF (May 1985; Hornstein 1995). The constituents of logical form generally mirror morphosyntactic ones, and display a strikingly restricted format; supporting the hypothesis that it reflects the combinatorics of a concept composition system. I take two further steps: (i) logical forms correspond to expressions in a general, amodal Language of Thought; and (ii) this LoT’s representations are distinct from those otherwise populating the mind (see the recent synthesis in Quilty-Dunn et al. 2023). One powerful motivation for this two-level architecture is precisely an observed dissociation between semantics and cognitive psychology: where neo-Davidsonians have verbs express monadic predicates (e.g., $\text{Give}(e)$), experimental evidence suggests that their cognitive correspondents are polyadic (e.g., $\text{Give}(x, y, z)$).

I proceed as follows. Section 2 assembles the tradition’s foundations: the event argument, reference to events, and the structuring of events into parts and pluralities. Section 3 carries the apparatus into less settled domains—aspect, measurement, and attitudes—where the format holds as the content varies. Section 4 presents frontier advances: supermonadic

Thematic role: A relation between an event and a participant that characterizes the participant’s role—e.g., $\text{Agent}(e, x)$ or $\text{Patient}(e, y)$.

Language of Thought (LoT): A structured, compositional system of mental representation with predicate-argument syntax showing role-filler independence.

structure, pure event semantics, and the compositional system. Section 5 develops the architecture these results jointly motivate: an interface apportioning ‘meaning’ at two levels, one described by linguistic semantics and the other by cognitive psychology. Telling this story requires smoothing many details; for a fuller development, see Wellwood (in progress).

2. FOUNDATIONS

This section assembles the tradition’s tools, on which everything to follow builds. Three developments organize the narrative: the event argument and its separation into thematic conjuncts; reference to events, selected by higher predicates and definitely described; and the structuring of events into parts and pluralities.

2.1. The event argument

2.1.1. From zero events to one. Consider the inference from *Jones buttered the toast in the kitchen at midnight* to *Jones buttered the toast in the kitchen* to *Jones buttered the toast*. Each step drops a modifier while preserving an entailment, see example 1. This is puzzling given familiar approaches to logical form: the number of arguments to what appears a unary predicate changes with each modifier, and so no systematic logical relation obtains between them (example 1a; ‘ $\vdash$ ’ means ‘proves’). Davidson (1967) dissolves the puzzle by postulating a hidden event argument that is existentially quantified (example 1b).

- (1) Jones buttered the toast in the kitchen. *entails*: Jones buttered the toast.
 - a. $\text{Butter}_3(\text{Jones}, \text{Toast}, \text{Kitchen}) \not\vdash \text{Butter}_2(\text{Jones}, \text{Toast})$
 - b. $\exists e[\text{Butter}(e, \text{Jones}, \text{Toast}) \ \& \ \text{In}(e, \text{Kitchen})] \vdash \exists e[\text{Butter}(e, \text{Jones}, \text{Toast})]$

Read ‘There is an event e of Jones’s buttering the toast, and e is in the kitchen,’ dropping *in the kitchen* secures the inference in example 1b by conjunction reduction, pairing intuitive entailment with formal validity. In addition to these benefits, Davidson’s proposal recasts a class of informal semantic observations—that *in the kitchen* characterizes the buttering, rather than the toast—as consequences of logical form.

The postulation of the event argument has clear precedent, too: it lets adverbs do for verbs what adjectives do for nouns. Additional modifiers simply elaborate what is said about a thing, and can be dropped while preserving entailment to the unmodified variant. Standard analyses of sentences with modified nominals like *This is a red ball* produce *This is a ball* by the very same logical rules that preserve adverb-drop entailments.

2.1.2. Separating thematic roles. Davidson’s analysis retains a polyadic relation (e.g., $\text{Butter}(e, x, y)$), but entailment patterns reach further down: from *Jones buttered the toast* we can infer *Jones did something*, *Something happened to the toast*, and *There was a buttering*. These follow if each argument is introduced by its own conjunct (Castañeda 1967). Parsons (1990) develops the point into the neo-Davidsonian framework:

- (2) $\exists e[\text{Butter}(e) \ \& \ \text{Agent}(e, \text{Jones}) \ \& \ \text{Patient}(e, \text{Toast}) \ \& \ \text{In}(e, \text{Kitchen})]$
- (3)
 - a. $\vdash \exists e[\text{Agent}(e, \text{Jones})]$
 - b. $\vdash \exists e[\text{Patient}(e, \text{Toast})]$

Now the verb can be read as contributing only $\text{Butter}(e)$ —a monadic predicate of events. Participants enter through thematic role conjuncts on a par with adverbs, and the noted entailments to individual participations are again effected by conjunction reduction.

Event variable: A variable e ranging over events, a distinct ontological type from individuals; Davidson’s innovation, renders adverb-drop entailments logically valid.

Conjunction Reduction: A logical rule taking $\Phi(e) \ \& \ \Psi(e)$ to either conjunct; here always applied within an existential or definite quantifier’s scope.

Neo-Davidsonian event semantics: An analysis in which the verb contributes only an event predicate, each argument introduced by a separate thematic-role conjunct.

Parsons located thematic separation internal to the verb. The alternative—isolating each conjunct according to independent elements of the syntax (cf. Baker 1997 on the uniform mapping between thematic roles and syntactic positions)—renders the conjunctions grammatically assembled, and predicts greater flexibility. Schein (1993, 2017) provides the strongest arguments for this syntactic understanding, i.e., the thesis of *total separation*; I take up some of his lesser known moves in Section 4. The thesis contrasts with *partial separation* approaches which isolate Agent syntactically, but not Theme/Patient (see Kratzer 1996, 2003; see Williams 2009 for crosslinguistic challenges to partiality).

Convergent evidence for separation comes from nominalizations (Parsons 1990). The neo-Davidsonian analysis posits hidden quantification over events and silent relational expressions linking syntactic arguments to the main clause event for example 4a. In nominalizations, that linking is performed overtly by prepositional material, as in example 4b.

- (4) a. The Romans destroyed the city quickly.
- b. The destruction of the city by the Romans was quick.

Examples 4a and 4b are mutually entailing, inviting an account on which one can be formally proved from the other and *vice versa*. Vindicating such an account would require at least one more ingredient—definite reference to events (see Section 2.2.2).

2.2. Events as referential objects

2.2.1. Perception reports. The event argument is not only postulated for participant entailments; it can be selected by higher predicates. Perception reports provide the most direct evidence (Higginbotham 1983). Unlike example 5a, which can be true if Jones merely noted evidence confirming Mary’s departure, example 5b requires that Jones perceived her actual leaving, as evident in the asymmetry in felt-contradiction at the follow-on clause.

- (5) a. Jones saw that Mary left. But he didn’t see her go.
- b. Jones saw Mary leave. #But he didn’t see her go.

Higginbotham notes other ways in which perception reports with ‘bare infinitival’ complements differ from those with tensed clauses: the former is transparent (if Mary is the mayor and example 5b is true, then *Jones saw the mayor leave* is also true), and permits wide-scope readings of embedded quantifiers (*Jones saw everyone leave* can say, for each person, that Jones saw them leave). On his analysis, these properties follow if the complement in example 5b denotes an event rather than a proposition (cf. Barwise 1981).

On Higginbotham’s account, example 5b says there was a seeing event e_1 whose ‘Theme’ is an event e_2 of Mary leaving. The description of e_2 is considered given, hence occurs in the restrictor of the embedding quantifier (see Herburger 2000).

- (6) $\exists e_1[\text{See}(e_1) \ \& \ \text{Agent}(e_1, \text{Jones}) \ \& \ [\exists e_2 : \text{Leave}(e_2) \ \& \ \text{Agent}(e_2, \text{Mary})] \ \text{Theme}(e_1, e_2)]$

2.2.2. Definite event descriptions. Schein (2020) argues, however, that existential binding of the embedded event will not suffice for perception reports like example 5b. The problem is sharp with a negation in the embedded description, as in example 7.

- (7) Jones saw Mary not leave.

Focus partition:
 $[Qv : \Phi(v)] \Psi(v)$:
 backgrounded
 material Φ in the
 restrictor (‘given’),
 focused Ψ in the
 matrix (Herburger
 2000).

Higginbotham can't simply negate the embedded predicate, because that would be too weak: example 7 should be true whenever Jones saw any Mary-performed event that wasn't a leaving. But the sentence rather implies that Jones saw something specific (e.g., her staying put when a departure was expected). Higginbotham's patch thereby renders embedded *not* as a non-Boolean, antonymic operator, deriving a (positive) 'non-leaving.'

Schein argues that this analysis struggles on any of its logical, ontological, or grammatical interpretations, rewriting the embedded quantification as a restricted Fregean definite description with the negation in its restrictor. For the affirmative case, the two analyses are nearly equivalent; the definite earns its keep in the negative case; see example 8.

- (8) $\exists e_1[\text{See}(e_1) \ \& \ \text{Agent}(e_1, \text{Jones}) \ \& \ \text{Theme}(e_1, e_2)]$
 $[\iota e_2 : \neg \text{Leave}(e_2) \ \& \ \text{Agent}(e_2, \text{Mary})] \ \text{Theme}(e_1, e_2)]$

Here, the ι -term picks out the event singled out as Mary's not leaving—her staying put despite expectations—and the linking by Theme says that that was what Jones saw.

Two features of this move will recur in what follows. First, the shift from $\exists e$ to ιe is a shift in the referential status of the event variable: events can be quantified as well as picked out. Second, the description restricting the ι is supplied grammatically; in richer cases it might be fixed anaphorically. Hidden definites like these become further distributed across logical forms in contemporary work, as the descriptive event pronouns of Section 4.1.2.

Fregean definite

description: An expression $\iota e[\Phi(e)]$ referring to *the* event satisfying Φ , if one exists. Contrasts with the Russellian description which asserts existence.

2.3. The structure of events

2.3.1. Events have parts. What are these things that we quantify over and refer to using e variables? Thomson (1971) provides a foundational argument. On June 5, 1968, Sirhan shot Kennedy, and Kennedy died roughly a day later. The initial sentences in example 9 are both true of what happened, and anyone who saw the shooting might feel justified later in saying that they saw the killing. Yet, it seems contradictory to say that the shooting and the killing happened at the same time, as judgments on the follow-ups in example 9 imply.

- (9) a. Sirhan shot Kennedy. It happened just after midnight on June 5th.
 b. Sirhan killed Kennedy. #It happened just after midnight on June 5th.

If the shooting and the killing are the same, they must share all their properties. But they have different temporal profiles, and so they are distinct. Thomson concludes that killings include both the murderous act and the victim's death as parts (Thomson 1977).

2.3.2. Decomposing agenthood. Pietroski (1998) offers a complementary route to event distinctness, using a similar argumentative strategy that he resolves through logical form rather than part-wholes. On April 14, 1865, Booth pulled the trigger of his pistol, and the bullet entered Lincoln's skull. The statements in example 10 are therefore true; moreover, intuition suggests they could be made true by the same event.

- (10) a. Booth shot Lincoln with a pistol on April 14, 1865.
 b. Booth pulled the trigger with his finger on April 14, 1865.

However, if the same event satisfies both logical forms, we face contradiction: the shooting ended about when the bullet entered Lincoln, but the pulling ended about when the bullet left the gun. The shooting has parts the pulling lacks, so they cannot be the same.

Pietroski's solution decomposes the Agent relation: to be Agent of event e is for some action you perform to causally ground e . Simplifying a little, *Booth shot Lincoln* looks like:

- (11) $\exists e_2[\text{Shooting}(e_2) \ \& \ \exists e_1[\text{Action}(e_1, \text{Booth}) \ \& \ \text{Grounds}(e_1, e_2)] \ \& \ \text{Patient}(e_2, \text{Lincoln})]$

Here, our sense that examples 10a and 10b describe the same event tracks the unity of action (i.e., Booth made only one major contribution to the causal order that day) while the main event records one of potentially many consequences, joined together by a bridging ‘Grounds.’ This move is compatible with Kratzer’s (1996; 2003) syntactic severance of the external argument (building on Marantz 1984; Pytkäinen 2008), but the motivations and consequences differ. An architectural payoff of this move surfaces in Section 4.1.1.

2.3.3. Plural event variables. Events furthermore come in pluralities. When the Romans destroy the city, it takes many individual actions. When Jones butters 613 pastries, there are many individual butterings. And, sentences with plural noun phrases give rise to collective and distributive readings: read collectively, example 12 says that there was a single carrying event performed by the boys together; read distributively, it says there was a plurality of events, each of which consisted in a carrying event by one of the boys.

- (12) The boys carried the mannikin upstairs.

Boolos (1984) shows that plural quantification can be handled by second-order monadic variables—variables ranging over pluralities of things rather than one thing at a time. We can thereby quantify over ‘some things’—the boys, several individuals taken together—without positing a further object—a set of the boys—that the predicate holds of. Using this posit, the collective/distributive contrast is expressible as follows: read collectively, a single carrying takes a plurality of agents (example 13a); read distributively, a plurality of carryings distributes, at least one for each agent (example 13b). Simplifying (lowercase e , x mark singularities, uppercase E , X pluralities; Ee says that e is among the E s):

- (13) a. $\exists e[\text{Carry}(e) \ \& \ [\iota X : \text{boys}(X)] \text{Agent}(e, X) \ \& \ \text{Theme}(e, \text{the mannikin})]$
 b. $\exists E[\text{Carry}(E) \ \& \ [\iota X : \text{boys}(X)]$
 $[\forall x : Xx][\exists e : Ee] \text{Agent}(e, x) \ \& \ \text{Theme}(E, \text{the mannikin})]$

In example 13b, $\text{Carry}(E)$ holds of the plurality of events E , each e among which is a carrying. That the mannikin relates to E rather than e in this example is motivated: given its plural replacement (*the mannikins*), we aren’t liable to infer that each boy carried the plurality; in fact, that variant fails to insist on any boy-mannikin pairs at all. Observations like this provide strong evidence for total thematic separation (Schein 1993).

3. EXTENDING THE ANALYSIS

Beyond the action and perception sentences that motivated it, the event analysis enters into less settled territory. Despite talk of very different things, the shape of the neo-Davidsonian logical form holds fixed—a first sign that the format is independent of its content.

3.1. Aspect

3.1.1. Eventualities. Beyond sentences that intuitively describe events, the wider linguistic survey has led to a working taxonomy of *eventualities* (Vendler 1957; Mourelatos 1978), dividing events into the simple (*leave*) and complex (*draw a circle*), and contrasting both with processes (*run*) and states (*want*, *believe*), pairwise distinguishable by a host of familiar diagnostics (e.g., differential acceptability with *in/for an hour*, or *stop*).

Eventuality: The superordinate category subsuming events, processes, and states—the situation types a predicate can describe (Bach 1986).

An important inferential distinction divides process (example 14a) from event (example 14b) when marked with progressive aspect (i.e., ‘the imperfective paradox’; Dowty 1979): process descriptions entail their aspect-free variant, while event descriptions do not:

- (14) a. Ann was running in the park. So, she ran in the park.
 b. Ann was drawing a circle. # So, she drew a circle.

Parsons (1990) analyzes this as a matter of distributing silent relations—Hold and Culminate—at logical form; other approaches appeal to decompositions of complex event descriptions into other categories like process and state (Pustejovsky 1991). Rothstein (2004) reanalyzes the lexical-aspectual class members in terms of inter-eventuality relations.

3.1.2. Telicity. Lexical *aktionsart* and argument structure jointly influence telicity: whether a predicate’s meaning specifies an end. Famously, the same verb can head an atelic VP with a mass or bare plural object, and a telic one with a ‘quantized’ object (example 15), suggesting parallels between the composition of NP and VP meaning (Taylor 1977; Bach 1986; Krifka 1989). Modifiers induce the same contrast: a bounded path renders an otherwise atelic predicate telic, as in example 16.

- (15) a. Ann was drinking beer/beers for hours. So, she drank beer/beers.
 b. Ann was drinking a beer for hours. # So, she drank a beer.
 (16) a. Ann was running in the park. So, she ran in the park.
 b. Ann was running to the park. # So, she ran to the park.

These parallels suggest that aspect is a predicate-level phenomenon (Verkuyl 1993). Similar effects are found with stative predicates, where the internal argument’s structure governs whether the subject takes an existential reading or not (Husband 2012).

3.1.3. Grammatical aspect. Above the eventuality description sits grammatical (viewpoint) aspect: the perfective and imperfective operators presenting an event as completed or ongoing (Smith 1991). Indeed, correspondences between telicity and grammatical perfectivity may both reflect maximization over events (Filip 2008; and see Section 4.1.2).

The format to hand invites a conservative treatment of the imperfective paradox; here is my synthesis. Pietroski (1998) observes that actions are, in the limiting case, tryings—intentionally characterized events, with direction given by the Content thematic relation (see Section 3.2). Suppose, then, that the progressive form asserts an event—grounded in an agent’s action—to be underway, with the rest specifying the action’s Content. Simplifying ($\wedge P$ marks an intensional context, $\exists \text{Circle}$ etc. elides the logic of the indefinite):

- (17) Ann was running. So, Ann ran.
 a. $\exists e_2[\text{Run}(e_2) \ \& \ \exists e_1[\text{Agent}(e_1, \text{Ann}) \ \& \ \text{Grounds}(e_1, e_2) \ \& \ \text{Content}(e_1, \wedge \exists e_3[\text{Run}(e_3) \ \& \ \text{Culminates}(e_3, e_2)])]]]$
 b. $\vdash \exists e_2[\text{Run}(e_2) \ \& \ \exists e_1[\text{Agent}(e_1, \text{Ann}) \ \& \ \text{Grounds}(e_1, e_2)]]]$
 (18) Ann was drawing a circle. #So, Ann drew a circle.
 a. $\exists e_2[\text{Draw}(e_2) \ \& \ \exists e_1[\text{Ag}(e_1, \text{Ann}) \ \& \ \text{Grounds}(e_1, e_2) \ \& \ \text{Content}(e_1, \wedge \exists e_3[\text{Draw}(e_3) \ \& \ \text{Th}(e_3, \exists \text{Circle}) \ \& \ \text{Culminates}(e_3, e_2)])]]]$
 b. $\not\vdash \exists e_2[\text{Draw}(e_2) \ \& \ \exists e_1[\text{Ag}(e_1, \text{Ann}) \ \& \ \text{Grounds}(e_1, e_2)] \ \& \ \text{Th}(e_2, \exists \text{Circle})]]]$

On such a picture, the ‘paradox’ reduces to a question of where the demotion to Content falls. For process predicates, nothing lies beyond the running, so progressive-to-perfective is conjunction reduction (example 17). For event predicates, the culminating material—the contribution of the quantized object in example 18—falls beyond it, surfacing only within Content: no circles, not even incomplete ones (cf. Parsons 1990), are asserted to exist.

Seen this way, the progressive mirrors the causative/inchoative alternation. Where the inchoative pronounces a consequence without mention of its agentive cause, the progressive pronounces the agent’s doing without asserting its consequence.

3.1.4. Measurement. Descriptions of eventualities parallel those for objects, and cross-categorial *more* is sensitive in parallel (Wellwood et al. 2012; Wellwood 2015, 2019). My analysis of comparatives separates measurement from the root—*tall*, like *dog* and *run*, indicates a mere property—and puts it in the comparative morphology, as the logical form tradition separates participants from the verb. By adding another conjunct, the entailment to *Ann ran* is vindicated as an adverb-drop validity (d_B is Bill’s corresponding degree):

- (19) Ann ran more than Bill (did). So, Ann ran.
 $\exists e [\text{Run}(e) \ \& \ \text{Agent}(e, \text{Ann}) \ \& \ >(\mu(e), d_B)] \vdash \exists e [\text{Run}(e) \ \& \ \text{Agent}(e, \text{Ann})]$

Here, μ is a variable over measure functions, tracking non-trivial structure on the domain targeted (Wellwood 2019): atelic *run* resolves μ to duration or distance, as mass *soup* resolves it to volume or weight; telic and count domains (*jump more*, *more dogs*) count.

States submit to the same apparatus (Higginbotham 1985), and foreground attachment-height effects: targeting the stative core in example 20a resolves to degree, but example 20b resolves to number higher up. (In the latter, events e temporally constituted by the relevant states are counted, i.e. those e that begin when s takes hold, end when s lapses).

- (20) a. Ann was more available than Bill was.
 $\exists s [\text{Available}(s) \ \& \ \text{Holder}(s, \text{Ann}) \ \& \ >(\mu(s), d_B)]$
 b. Ann was available more than Bill was.
 $\exists E [[\forall e : Ee][\exists s : \text{Available}(s) \ \& \ \text{Holder}(s, \text{Ann})] \text{Constitutes}(s, e) \ \& \ >(\mu(E), d_B)]$

The format is familiar: Ann’s having been available is backgrounded, as in example 6, and Constitutes—the eventive counterpart of material constitution in the nominal domain—joins Grounds in a growing inventory of inter-eventuality relations.

Content: Relates an eventuality to a content—event, property, or proposition, in the standard taxonomy; a locus of intensionality, its structure fixed by complement syntax.

3.2. Attitudes and the event argument

3.2.1. Argument structure for attitudes. Attitude reports (including *see* with a tensed complement, example 5a) receive concomitant neo-Davidsonian revision: attitude verbs introduce states, with a thematic Holder (Kratzer 2006) and a relational Content whose character is fixed by complement syntax (Moulton 2009; Elliott 2017). Just as the buttering of example 2 is represented by an event predicate *Butter*(e) with an Agent relation, an attitude is a state predicate with a Content relation. Simplifying:

- (21) Jones believes that Mary left.
 $\exists s [\text{Believe}(s) \ \& \ \text{Holder}(s, \text{Jones}) \ \& \ \text{Content}(s, \wedge \exists e [\text{Leave}(e) \ \& \ \text{Agent}(e, \text{Mary})])]$

Example 21 is read: ‘Jones is in a belief state whose Content represents that Mary left.’ The relatum here is propositional, fixed by the finite complement; the matrix shape—state, Holder, Content—stays constant whenever the complement varies.

3.2.2. Alternations. Bare infinitivals deliver events (Theme; example 6); finite clauses deliver propositions (Content; example 21) (cf. example 5a). For control complements: self-ascribed properties (Chierchia 1989; Pearson 2016), which I render here as:

- (22) Jones wants to leave.
 $\exists s[\text{Want}(s) \ \& \ \text{Holder}(s, \text{Jones}) \ \& \ \text{Content}(s, \wedge \lambda x [\exists e : \text{Agent}(e, x)] \text{Leave}(e))]$

Read: ‘Jones is in a desire state whose Content is the property of leaving’—an event description with an open participation slot. Use of λ marks a choice point: closing the slot first-personally would deliver a closed event description, indistinguishable in semantic type from the propositional case. Yet, the logical structures differ. My idiom favors the structural reading. Congenially, complement size tracks content crosslinguistically in an implicational hierarchy (Wurmbrand & Lohninger 2023)—a gradient of structure.

The exceptional case marking complement of *want* sharpens the structural reading, differing minimally from example 22. Generalizing Higginbotham’s approach, I write:

- (23) Jones wants Mary to leave.
 $\exists s[\text{Want}(s) \ \& \ \text{Holder}(s, \text{Jones}) \ \& \ \text{Content}(s, \wedge [\exists e : \text{Agent}(e, \text{Mary})] \text{Leave}(e))]$

This is read: ‘Jones is in a desire state representing that Mary leaves, given she does something.’ Where control leaves the participation open, ECM fills it with the pronounced subject—in the restrictor. This shape lines up with the focus partitioning of Herburger (2000) and the focus-sensitivity of desire predicates (Villalta 2008).

3.2.3. Gradable attitudes. The attitudes present a hard test for neo-Davidsonian theories, and here the measurement analysis of Section 3.1.4 makes its sharpest prediction. Cross-categorical *more* measures whatever structured domain a predicate supplies; attitude verbs supply Content-bearing states. So attitudes are measurable just in case those states are non-trivially ordered—and they are measurable: *confident*, *certain*, *afraid* all take *more* (equivalently: *more confidence*; Cariani et al. 2024), see example 24.

- (24) Ann is more confident that it’s raining than that it’s snowing.

There are two consequences to *more* measuring the attitude state. First, the grammar enforces the lexical ordering: violating the transitivity of *more confident* yields contradiction, not mere oddity (Cariani et al. 2024). Second, it is not the likelihood of the state’s Content that is measured—contra proposition-measuring analyses of epistemic gradables (cf. Lassiter 2010). Confidence reports can thereby describe incoherent attitudes, and the conjunction fallacy (Tversky & Kahneman 1983) can be reported without contradiction:

- (25) Ann isn’t confident that Linda is a bank teller, but she’s confident that Linda is a feminist bank teller.

Since a feminist bank teller is a bank teller, no credence function ranks the conjunction above either conjunct; the report is consistent because it measures the magnitude of a real, possibly irrational psychological object. Logical form thereby answers to cognitive evidence, and carries the fineness of grain that Section 5.3 will demand.

With these moves, the forms fine-tuned for talk of happenings reach states of mind—things that hold rather than happen; that is where Section 5 takes off.

Role Exhaustion (RE): Each syntactic dependent bearing thematic relation θ in a clause describing e exhaustively and uniquely specifies the participants filling θ .

Supermonadicity: Each participant inhabits its own event layer; layers are connected by bridge relations rather than by a shared event variable.

Participation (W): $W(E, X)$: X s are involved in events E , underspecified about how; specific thematic roles are assigned deeper in the structure.

4. THE SEPARATED ARCHITECTURE

Neo-Davidsonian separation gives each individual participant its own conjunct, but generally keeps all of them tied to a single event. This section presents three advances that further elaborate the framework—supermonadic structure, pure event semantics, and a hypothesized compositional system—and closes on the cognitive questions they raise.

4.1. Separated thematic structure

4.1.1. Three pressures towards supermonadicity. Schein (2017) departs most dramatically from the neo-Davidsonian picture, relating events to participants via chained inter-event relations forming what he calls a “braid.” His case depends initially on a background constraint, Role Exhaustion (see ‘thematic exhaustivity’, Carlson 1984; see Williams 2015 for a modern synthesis)—essentially, that thematic relations are functions.

Schein’s picture responds to three main pressures as sketched below, and posits: (i) in lieu of a main clause event relating to participants directly, participants have their own event projections; (ii) in lieu of uniformly specified thematic relations, an underspecified ‘Participate’ relation; and (iii) uniform linking of ‘participations’ via bridge relations to the main event description. The result is what Schein calls supermonadicity: each participant inhabits its own event layer, threaded by bridge relations rather than a shared variable.

(i) Separate participatings. Example 26 entails that what Jones did was graceful while what Jeeves did was clumsy; it doesn’t entail that any single event was both. So, any logical form that links both participations to a single event variable will get the entailments wrong. Two Agent conjuncts won’t do it, given RE: a second Agent instance would contradict the first.

(26) Jones gracefully and Jeeves clumsily buttered 613 pastries for brunch.

A syntactic alternative—deriving example 26 via Right-Node-Raising or ellipsis—will not do: that would divide the predicate between the agents, but example 26 is true even if Jones and Jeeves each buttered exactly half of each pastry. Schein’s fix thereby gives them distinct event variables. Simplifying (with variable-bindings deferred to example 33):

(27)	a.	$W(E_1, \text{Jones}) \ \& \ \text{Graceful}(E_1)$	<i>Jones participated, gracefully;</i>
	b.	$\& \ W(E_2, \text{Jeeves}) \ \& \ \text{Clumsy}(E_2) \dots$	<i>Jeeves participated, clumsily...</i>

So far, W is a placeholder saying only that something connects each individual to his events. Importantly for now: on Schein’s view, an adequate logical form for a sentence with n independently modifiable participants requires at least $n + 1$ event variables.

(ii) Competing thematic demands. Further, W is committed as underspecified. Consider example 28, wherein both *surround*, which takes Agent on its outer argument, and *be crowded into*, which takes Theme or Patient, are predicated of the coordinated subject.

(28) The Columbia students and the Harvard students surrounded the Pentagon and were crowded into the Mall.

Since the sentence commits no particular student body to either venue, the predicates’ linking demands cannot be resolved by simply dividing Agent or Theme between the outer DPs. The fix is to take Schein’s W as a top-level relation silent about thematic specificity, compatible with any division of participations across the inner predicates. To meet those selectional demands, specified thematic relations still project lower. Simplifying:

- (29) a. $W(E_1, \text{Columbia}) \ \& \ W(E_2, \text{Harvard})$ *Cs & Hs participated in events,*
 b. $\& \ \exists X \text{ Agent}(E_3, X) \ \& \ \text{Surrounded}(E_3)$ *agents surrounding the Pentagon,*
 c. $\& \ \exists Y \text{ Theme}(E_4, Y) \ \& \ \text{Crowded}(E_4)$ *patients crowded into the Mall*

The layered participations are connected, next, by inter-event bridge relations.

(iii) Linking participations. Underspecified participation is necessary, but it isn't safe. Suppose Harvard students teased Columbia students mercilessly while Columbia students teased no one—so, example 30 is false. A logical form saying only that Harvard and Columbia participated would be true here, however; Columbia did participate—just, as victims.

- (30) The Harvard students and the Columbia students teased the Columbia students.

Section 2.3.2 anticipated the resolution: even simple transitives separate description of agentive doings from their causal consequences. Harvard and Columbia students participate in events that cause a being-teased, and the Columbia students participate in the being-teased. Cause—one of a small inventory of bridge relations connecting event layers—links them. Simplifying (E_{12} abbreviates Harvard's and Columbia's joint participation):

- (31) a. $W(E_1, \text{Harvard}) \ \& \ W(E_2, \text{Columbia})$ *Hs & Cs participated in events*
 b. $\& \ \text{Cause}(E_{12}, E_3)$ *those events together causing others*
 c. $\& \ \text{Teased}(E_3) \ \& \ \text{Patient}(E_3, \text{Columbia})$ *which were teasings of Cs*

The position of the outer DPs' events relative to Cause helps determine who counts as aggressor, who as victim. The analysis recalls Pietroski's decomposition of agenthood, and preserves causative/inchoative entailments: *the chocolate melted* pronounces a lower fragment of the form for *Ann melted the chocolate*. And it predicts instrumental attachments: *Ann melted the chocolate with her lens* fails to entail *the chocolate melted with her lens* because Instrument modifies an upper agentive fragment absent from the inchoative (Pietroski 1998). Bridge relations, rather than shared variables, hold event descriptions together.

4.1.2. Descriptive event pronouns. Schein needs one further ingredient answering how the events bridged are quantified or picked out. Not generally by sentence-level default existential closure, as can be seen with nonincreasing quantifiers like *no more than 60*:

- (32) 18 barrels filled no more than 60 bottles.

Example 32 says that, in total, the filling events involved at most 60 bottles—not that some of them did. But $\exists E[...]$ is true as long as any witness plurality exists, even if many more fillings occurred. Maximal reference—to all relevant events, not just some—is needed.

Schein (2017) proposes that bridge relations join event variables picked out by descriptive event pronouns: silent counterparts of *it/they* whose content is anaphorically fixed by adjacent predicate structure (i.e., Evans-style pronouns; Evans 1980; Sharvy 1980). Under nonincreasing quantifiers, they force maximal readings, while converging with existential readings under increasing quantifiers (*some, many*). A locality constraint on 'pro' keeps the information tracked finitely specifiable and structurally bounded.

4.1.3. The full braid. We can now assemble Schein's architecture. Example 33 is a canonical supermonadic logical form adapted from Schein's Chapter 2, example (147)—what he calls a 'braid'. It features two important kinds of formulas: existential $[\exists E_n \dots]$, introducing and describing a new event layer; junctures, beginning with $[\iota E \dots]$ (descriptive event pronouns), reaching out to other event descriptions and linking them via bridge relations. Simplifying:

Bridge relation:

Schein's term for relations linking event variables across layers—e.g., Cause, Overlap; kin to Grounds and Constitutes. Inventory left open.

Descriptive event

pronoun: $[\iota E: \text{pro}]$: a silent Evans-style pronoun referring to the events satisfying a locally-supplied description; forces maximal reference under nonincreasing quantifiers.

Schein's braid: A

canonical supermonadic logical form: participants in separate event layers, threaded by bridge relations and descriptive event pronouns.

- (33) Jones gracefully and Jeeves clumsily buttered 613 pastries for brunch.
- | | | |
|----|---|--|
| a. | $\exists E_1 W(E_1, \text{Jones}) \ \& \ \text{Graceful}(E_1)$ | <i>Jones participated, gracefully;</i> |
| b. | $\exists E_2 W(E_2, \text{Jeeves}) \ \& \ \text{Clumsy}(E_2)$ | <i>Jeeves participated, clumsily;</i> |
| c. | $[\iota E_{1,2} : \text{pro}_{1,2}][\iota E_3 : \text{pro}_3] \text{Overlap}(E_{1,2}, E_3)$ | <i>those events overlapping with</i> |
| d. | $\exists E_3 \exists X \text{Agent}(E_3, X)$ | <i>some agents' doings</i> |
| e. | $[\iota E_3 : \text{pro}_3][\iota E_4 : \text{pro}_4] \text{Cause}(E_3, E_4)$ | <i>bringing about</i> |
| f. | $\exists E_4 \text{Butter}(E_4)$ | <i>a buttering</i> |
| g. | $[\iota E_4 : \text{pro}_4][\iota E_5 : \text{pro}_5] \text{Overlap}(E_4, E_5)$ | <i>overlapping with</i> |
| h. | $\exists E_5 \exists Y \text{Patient}(E_5, Y)$ | <i>some undergoing events</i> |
| i. | $\text{Pastry}(Y) \ \& \ E_5 = 613$ | <i>of pastries counted to 613</i> |

Every line in example 33 is read as conjoined with each other. Lines (a) and (b) introduce Jones's participation (E_1) and Jeeves's (E_2); the pronoun $[\iota E_{1,2} : \text{pro}_{1,2}]$ reaches back and picks out exactly those two layers, while $[\iota E_3 : \text{pro}_3]$ reaches forward to the layer next introduced, and Overlap says the first coincides with the second. Top-level W resolves into Agent via Overlap; the pastries are Patient of the consequence events.

What the standard neo-Davidsonian logical form packages into a single event is here distributed across five interconnected event layers, threaded together by Evans-style descriptive event pronouns whose content is fixed by syntactic locality. The subject of a clause may be introduced far from the specific role it is understood to inhabit (W , plus Agent). The same may be true for objects; this can be checked by running the arguments of this section *mutatis mutandis* on a coordinated object.

Pure event semantics: A semantics in which the domain contains only events and states; individual variables are eliminated. Nouns express state predicates (Schwarzschild 2025).

⊙ (same participants): Holds between sets of states whose participants are identical. Replaces individual variables as the connective between predications.

4.2. Events all the way down

4.2.1. Nouns as state predicates. Schein's braids feature individuals: $W(E, \text{Jones})$ names Jones, and $\text{Patient}(E, Y)$ has a plural individual variable. We've seen the tradition turn relations between individuals into descriptions of eventualities—first verbs, then adjectives, and with Schein, every thematic participant. Nouns are the lone holdout. Schwarzschild (2025) closes the loop: nouns too express predicates of eventualities, and individual variables drop out altogether. With that, what becomes of an argument?

The opening gambit is one of symmetry. With adjectives already stativized (Section 3.1.4), Schwarzschild reanalyzes nouns in parallel: *window* expresses a property of states of being a window, as *open* expresses a property of states of being open. Compare the standard approach based on individuals (example 34), with Schwarzschild's (example 35).

- (34) $\exists x[\text{Window}(x) \ \& \ \text{Open}(x)]$
- (35) $\exists s_1[\text{Window}(s_1) \ \& \ \exists s_2[\text{Open}(s_2) \ \& \ \odot(s_1, s_2)]]$

Example 35 reads: 'There is a window-state s_1 that has the same participants as an open-state s_2 .' $\odot$ does the work the shared variable did, without naming the things involved.

The reanalysis is empirically motivated, not merely available; its sharpest payoff is in the mass domain. Definite mass phrases fail reciprocals just as singular count nouns do (*#The information contradicted each other*), yet license cumulative readings that count singulars lack—a dilemma for any view on which mass nouns denote pluralities of individuals. Pure event semantics dissolves it: mass nouns describe single states that are

multi-participant. Further consequences—stubborn distributivity, a crosslinguistic typology of number marking—are the substance of Schwarzschild (2025); the gist is that once nouns describe states, nominal number doesn't require a domain of individuals.

4.2.2. What 'argument' becomes. So, what becomes of an argument? Schwarzschild's and Schein's answers differ. Schein's $W(E, X)$ names its participants; Schwarzschild's $\odot(s, s')$ says only that the participants of s and s' are the same. In Schein's picture, participants connect to events via a variable X threaded through the braid; in Schwarzschild's, an 'argument' is not a primitive linked to an event but what remains after state-descriptions are woven together by $\odot$. The programs meet on counting, however: both hold that counting operates on descriptions of eventualities, not individuals, and so different descriptions can yield different counts for the same individuals (Schein 2017; Schwarzschild 2025).

Set Schein's braid next to example 35, however, and the shared shapes are striking. The dyadic elements— W , Cause and Overlap, $\odot$ —are irreducibly relational, and they do necessary work, as Section 4.1.1 argued. But they appear at the joints between event layers, never at the leaves: each dyad is paired with monadic predicates that describe its relata separately. The bones of the architecture are dyadic; the surface conjuncts are monadic. And the programs combine: Schein's braid for the verbal spine, Schwarzschild's $\odot$ for the nominals yields one fully separated logical form in which no individual variable survives.

4.3. The compositional system

Schein and Schwarzschild enrich the format; what compositional system could produce a format of that shape at all?

Assuming neither Schein's supermonadicity nor Schwarzschild's pure event semantics, Pietroski (2018) develops a Chomskyan view on which natural language meanings are instructions for building monadic concepts—a severely constrained format. Lexical meanings fetch concepts, and phrasal meanings are generated by just two compositional operations: M-junction conjoins two monadic concepts and D-junction combines a dyadic and a monadic one, linking one slot of the dyad to its monadic partner and existentially closing it (examples 36–37). Simplifying (and imposing my own pictorial gloss):

$$(36) \quad \circ \overline{\Phi(\circ) \wedge \Psi(\circ)}$$

$$(37) \quad \circ \overline{\exists[\Delta(\circ, \bullet) \wedge \Phi(\bullet)]}$$

In examples 36–37, $\circ$ marks an open variable slot and $\bullet$ a closed one. No variable is introduced—the link between slots is fixed by the operation itself—so the format stays monadic and tractable. The dense conjunction of example 2 is the output of a derivation in which every dyad is absorbed the moment it enters, leaving the system massively monadic—dyads compositionally transient, rather than absent. Meanings, on this view, are composable instructions—recipes for accessing and assembling concepts.

Icard & Moss (2023) show that Pietroski's formalism, Simple Monadic Predicate Logic (SMPL), is 'complete' (expressive enough for what natural-language meanings need), tractable (interpretation computationally feasible, not blocked by combinatorial explosion), and finitely learnable (acquirable from finite data). With the format and the system generating it both in view, what they are about—and which of the structures developed, layered braids or minimal combinatorics, the mind computes—is where we now turn.

5. INTERFACING WITH COGNITION

What the mind brings to events is richer than what language says about them. This section makes the mismatch precise, resolves it with a two-level architecture, and reads the result as a candidate domain-general Language of Thought.

5.1. Representing events

5.1.1. Event representation and processing. Up to this point, a major question has been what events are like. The reading I develop makes another unavoidable: what is a mental representation of an event like, and how are such representations put to use?

Three deployments fix the shape of an answer. In online comprehension, the language system consults event knowledge organized by participant role—rich, verb-keyed expectations about who does what to whom—computing thematic roles incrementally and launching anticipatory looks to thematically licensed referents before the word arrives (Altmann & Kamide 1999; McRae et al. 1997). In perception, event representations structure experience itself: we update event models at boundaries of the kind our aspectual vocabulary encodes (Zacks & Tversky 2001), surfacing the process/event typology of Section 3.1 as something tracked nonlinguistically (Wellwood et al. 2018; Wellwood 2020). And, in acquisition, they are in place before children know the words that express them, relating verb meanings to them by syntactic bootstrapping (Gleitman 1990). And this process is driven by thematic content rather than the number of syntactic arguments (Perkins et al. 2025).

5.1.2. A format dissociation. The lexical representations that the logical form tradition associates with verbs are monadic; the event concepts deployed in extralinguistic cognition are polyadic, and irreducibly so. How do we know? Before they produce language, infants represent giving events with a three-participant concept—Agent, Theme, and Recipient or Source—but hugging events with two, even when performed with an active ‘bystander’ (Gordon 2003; Wellwood et al. 2015; Perkins et al. 2025). This can’t be explained by reconstructing using the decomposed role structures posited in logical form, since nothing in the scene distinguishes whether the ‘third man’ should be considered a participant. Yet, infants distinguish the status of that third party according to *something*.

This polyadic shape isn’t an artifact of developmental tasks, either. Vision delivers the same: a viewer extracts who-did-what-to-whom from scenes glimpsed too briefly for naming (Hafri et al. 2018). And, it is robust: the same relational organization recurs across languages and conceptual domains (Gentner 2003; Rissman & Majid 2019)—plausibly reflecting the core knowledge that structures early cognition (Spelke & Kinzler 2007). The logical form tradition, by contrast, delivers monadic structures, yet keeps its descriptions tightly keyed to events, sorting the event’s constitutive participants (a butterer, a buttered thing) from circumstantial predications about it (with the knife, in the kitchen) (Williams 2015). Language and cognition traffic in the same events, just in different formats.

5.2. Two kinds of concepts

5.2.1. A compositional, separated, cognitive architecture. The compositional system of Section 4.3 does not specify which concepts its rules combine, nor how they relate to prelinguistic concepts. Pietroski (2010) allows that lexicalization may involve conceptual reformatting, but doesn’t commit to a picture on which different formats stably coexist.

Core knowledge:
Early-emerging,
domain-specific
cognitive systems for
representing objects,
agents, number,
space, and social
partners (Spelke &
Kinzler 2007).

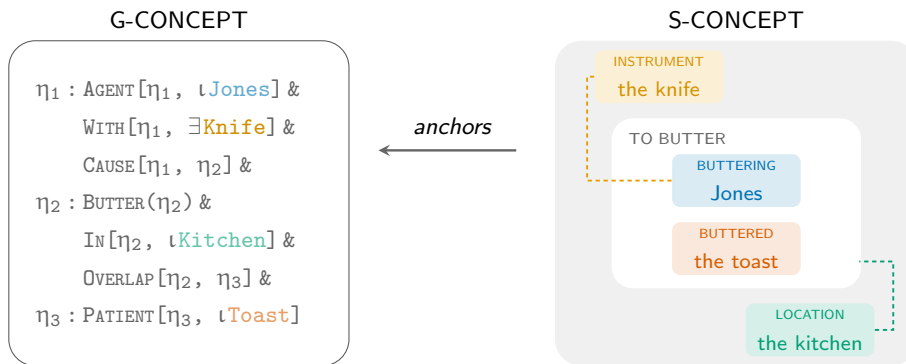


Figure 1

Schematic G/S architecture for *Jones buttered the toast in the kitchen with a knife*. Read right-to-left: the mind’s concept of the buttering event (right) makes true—and thereby anchors—the logical form the grammar builds (left), a braid of event concepts. The event concept holds the participants the verb requires inside it (a butterer, a buttered thing) and the optional circumstances outside (the knife, the kitchen); like colors link each left-hand term to the concept anchoring it, and dashed tethers mark the optional attachments. Both panels are concepts; the individuals that satisfy the right-hand concept are not depicted. *Key:* η , an event layer; $\iota / \exists$, ‘the’ / ‘a(n)’; Cause, Overlap, how the layers connect.

In ongoing work, I develop a two-level architecture in which Pietroskian rules compose G-concepts: stable, domain-general, amodal, higher-order symbols, satisfied (semantically) by extralinguistic representations—S-concepts—that anchor them (cognitively) to the world (Wellwood submitted). The logical form tradition characterizes the G-conceptual level (cf. Jackendoff 1990; Bierwisch & Lang 1989). Functionally, S-concepts track categories of things in the world like events and their participants; their internal format I leave open (see Quilty-Dunn et al. 2023 for options). If the architecture is right, the dimensions it encodes should be ones the mind tracks independently—and they are (Section 5.1.2).

5.2.2. Resolving the format dissociation. What dissociates is precisely the dimension animating Davidson: adicity (Figure 1). The polyadic structure demanded by cognitive psychology lives at the S level; the monadic combinatorics the tradition recovers lives at the G level; satisfaction links them without collapsing either into the other. Satisfaction is primitive—no conditions on an adequate satisfier are analytically prior—but not unconstrained: an S-concept satisfies a G-concept only if it is of the right type. Thematic linking, on this view, is an interface problem. This synthesis raises, but does not settle, how much of Schein’s apparatus—the iota-pronouns and descriptive event anaphors of Section 4.1.3—belongs to the G level, the interface, or the S level. The payoff is a semantic theory that can be structurally wrong, not only truth-conditionally. And its compositional, predicate-argument system invites a yet stronger reading.

5.3. The Language of Thought

The compositional, structure-answerable system just described is, I contend, what the logical form tradition has been describing all along: a Language of Thought (Fodor 1975) that is generative, symbolic, and systematic. This reading could most easily have foundered on

G- and S-concepts:

Higher-order compositional symbols (G-concepts) *satisfied by* category-tracking representations (S-concepts); their format left open (Wellwood submitted).

Satisfaction / anchoring:

Twin linking relations: G-concepts are *satisfied by* S-concepts (semantic); S-concepts *anchor* G-concepts to the world (cognitive).

the mental, and is the one it needs most: event semantics is a theory of happenings, and the obvious objection is that the mental is generally not a happening. But the attitudes submit to the same separated apparatus (Section 3.2): an attitude verb introduces a state with a relational Content argument, and the syntax of the complement fixes whether that argument describes an event, a property, or a proposition. That is just what a Language of Thought requires—not a function from worlds to truth-values, but a structured content with its grain read off the syntax, fine-grained in the way belief demands (one can believe a theory without believing its every logical consequence; Field 1978). On this view, the attitudes are G-conceptualized: their contents are logical forms, composed by the grammar.

My picture introduces a twist on Fodor’s own (Fodor 1975, 1998). Where he had one representational vehicle doing duty in both thought and recognition, the two-level view holds that the vehicle tokened in composition—G-conceptual, linguistic—is not the one tokened in categorizing the world—S-conceptual, extralinguistic. This substantive departure is what buys the format dissociation of Section 5.1.2: composition and recognition can answer to different formats only because they are not carried by the same vehicle. There is by now proof of concept that the monadic combinatorics at issue are complete, tractable, and finitely learnable (Section 4.3; Pietroski 2018; Icard & Moss 2023; Pietroski & Icard 2024)—each a constraint any candidate Language of Thought must meet, and properties one should hope to find in a biologically implemented computational system.

6. CONCLUSION

The logical form tradition’s distinctive thesis is that a sentence’s logical form mirrors what it describes, and that this can be detected through intuitively-compelling inference patterns. The advances I have reviewed—a format that holds fixed as content varies, events layered by participant, individuals dispensed with, and a minimal concept composition system—refine that thesis, and the two-level G/S architecture I have sketched completes it. On my picture, logical forms constitute G-concepts, one step removed from the S-concepts that organize our experience of the world and that anchor our language to it.

Open questions return us to the foundations. First, is the event variable primitive? Force dynamics (Talmy 1988; Copley & Harley 2015), truthmaker semantics (Fine 2017; Champollion 2025), and event-skeptical metaphysics (Moltmann 2025) say no. In my view, these proposals should answer to the same developmental and perceptual evidence canvassed here. Second, the conjuncts I’ve written as Agent and Patient stand in for a contested theory of roles (Fillmore 1968; Grimshaw 1990; Dowty 1991)—on the two-level view, this debate might resolve to a question of which level (G- or S-) fixes role content. Finally, integrating the analysis of further patterns in the stative (Maienborn 2005) and modal domains (Hacquard 2006, 2010) will show how far G-conceptual structure extends.

The upshot is a research agenda. A G/S model predicts, for instance, that the cost of composition is independent of S-conceptual adicity. It also provides new directions for theorizing about polysemy. Systematic polysemes like *lunch* are multi-sensed (the food, the eating), but those senses are neither arbitrary nor cross-linguistically variable, as they are for homophones (e.g., *bank*’s two senses as riverside or financial institution). On a G/S picture, the linguist’s intuition that polysemy inheres in single words can be borne out by combining G-conceptual unity with S-conceptual diversity. Exploring such cases will support the development of precise models of the interface.

Davidson began with an inference pattern and a hidden variable to explain it. Sixty years

of subsequent pursuit has uncovered a format too disciplined to be an accident. I find the signature of a Language of Thought, consisting of concepts composed by the grammar and tethered—but irreducible—to the mind’s richer ones of who did what to whom.. Semantic theory, so read, can be wrong structurally as well as truth-conditionally, and it can be vindicated—or refuted—by anticipatory looks, by an infant’s parse of a giving event, or by observation of the processes at work when a scene is glimpsed too briefly for naming.

The grammar of events, I have argued, is a fragment of the grammar of thought.

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