Cognitive Grammar in relation to Linguistics is an interesting analog to Phenomenology in relation to Philosophy. Thematically, Cognitive Grammar approaches linguistic phenomena from the perspective of language users' experience of percptual and situational structures — as such, language structure is a kind of formalization, communication, and/or re-construction of patterns of organization within consciousness. This perspective certainly seems amenable to Phenomenology more immediately than paradigms that connect language-meanings to logical propositions, or to the mechanical operations of semantic and grammatical rules. Meanwhile, methodologically, Cognitive Grammar embraces a style of analysis grounded in first-person perspective; the linguist's reflective judgments on which potential expressions in a given language would be deemed acceptability to typical speakers of that language, and why. True, that kind of subjective but evidence-based methodology — linguists using their own sense of syntactic propriety and semantic coherence to determine qualifications like the acceptability of particular sentences, but doing so in the guise of generic speakers' language-use rather than any idiosyncratic preferences the linguist herself may have — is common across many paradigms of linguistic research. In the case of Cognitive Grammar, however, the researcher imagines linguistic phenomena situated in hypothetical perceptual and interpersonal contexts. Issues like acceptability are accordingly assessed with consideration to the overall experiential, practical, and situational enacting and conceptualizing that would constitute the cognitive givens talked about and grounding communicative practice. Insofar as practical and experiential context is treated as intrinsic amongv the details needing to be consulted for trustworthy assesments of, say, acceptability — rather than comparingb a given linguistic performance against dictionaries or style-books — Cognitive Grammar eveals a metatheoretic commitmnt to the practical/experiential environing of cognition in general as something that can be systematically investigated, enough to make linguistics work as a rigorous science.

Cognitive Grammar, in short, requires for the coherence of its scientific aspirations that a kind of first-personal but social-pragmatic analysis — which we can argue is quite akin to Phenomenology — can be performed which is also scientifically rigorous and amenable to third-person follow-up; phenomenological claims being reviwed and synthesized within a scholarly community. Cognitive Grammar needs a story of its scientific merit that overlap with Phenomenology's parallel story: that first-person reports do not devolve into stream-of-consciousness but can mine experience for regulative patterns and recurring desiderata that can be critically examined by a sufficiently sympathetic research community, giving rise to theoris and models which can claim third-person objectivity, or at least claim that a reasonable disputative process exists to make claims toward objectivity evaluable and, as such, potentially believable. In short, the phenomenologist can claim that an organizing gestalt she thinks is formulative in her experience as both consciously immediate and logicall unified, described from a reflective stance, is not a "subjective" phenomena in the epistemological sense of something idiosyncratic to her, but instead a first-personal phenomenon she can approach as something which others can find also in their own experience; similarly the cognitive linguist can consider her acts of producing or receiving linguistic artifacts, in representative perceptual-situational contexts, bearing in mind that she is a fluent speaker of one or more languages and can anticipate the language-processing practice of others. The very fact of fluency, or competence, implies a certain degree of credibility in ascribing linguistic beliefs to others. Accordingly, so long as we consider a speaker fluent is a language, we commit to finding her basically trustworthy in guessing how fellow speakers would respond to artifacts in that language, and therefore to generalize from subjective judgments outward. This is a good example of how furst-person reflection can be scientificaly operationalized for multi-party disputation; Phenomenology seems to envision a similar dialectic but one expanded outward from language to cognitive acts and experiential groundings in thir totality.

From at least a metascientific perspective, at least, a dialog between Phenomenology and Cognitive Grammar seems promising. Both disciplines topicalize and fine-tune related but complementary methodological issues. Phenomenology, one the one hands, attends more vigorously to a philosophical problemmatics of origination and a "critique of metaphysics", making a willful "bracketing" of extra-experiential assumptions an intrinsic part of its method. Cognitive Grammar may be sympathetic to but not necessarily dependent on similar philosophical performances. For example, an important issue in modern linguistics is whether we have "innate" mental faculties for creating and understanding language or whether language originates as a specialization or repurposing of some other, more general or primordial faculty. Whatever our intuitions about that, surely those are the kind of assumptions that should be "bracketed" in a phenomenology-style analysis. By comparison, while Cognitive Grammar appears to be internally consistent irrespective of any particular opinion vis-à-vis linguistic innateness, I'm not aware of any crucial importance attached to either entertaining or suspending beliefs about innateness (or any other foundational linguistic-cum-philosophical subject matter, like whether a universal grammar underlies individual grammmars or what sort of preceptual inputs qualify as *linguistic* stimuli durin childhood). Certainly Cognitive Grammar methodology is not *constituted* by the *absence* of such belief, the way that Phenomenology is essentially shaped by its counter-traditional, "Cartesian" style.

Notice however that Cognitive Grammar does intrinsically orient analysis to disciplinary commitments — to the accuracy of subjective syntactic/semantics assessments and reports, to the value of hypthetical experiential episodes as proxies for actual ones, to the approximate commonality of experience among a language community — which cannot be just passively accepted (or rejected); they must be actively (even if unconsciously) presupposed in the research process. Phenomenology, given how it thematizes both the legitimacy of (experientially-grounded) presuppositions and the suspension of presuppositions drawn indirectly from scientific or philosophical beliefs, therefore points to a latent contrast in metalinguistic commitments between those that are tangential to and those that are constitutive of the Cognitive Grammar affiliated paradigms: without self-consciously witholding considerations on presumptive "metaphysical" linguistic matters (like innateness vs. linguistic empiricism), Cognitive Grammar does not necessarily to endeavor to classify it's practitioners beliefs on the axis of bracketing vs. disclosure — the commitments that can be suspended partitioned from those that seem either experientially irrefutable or transcendentally prerequisite for any notion of experiential certainty in the first place. Scientists presumably feel that an *entirely* presuppositionless science is impossible, while a more philosophical angle can investigate how, nonetheless, presuppositions vary in their metaphysical posture. Belief in a "poverty of stimulus" suggesting innateness, say — or, conversely, belief that the rich experiential structure surrounding even small-scale language acts presents substantial language-acquisitional stiumli (thereby falsifying the premise of poverty and that avenue of advocacy for innateness) — can both be claimed to stand differently in the ebb and flow of cognitive-linguistic metatheory than commitments to, say, the disputational objectivization of first-person reports.

At the same time, Cognitive Grammar can be claimed to illuminate a wider, or at least a different, intellectual spectrum for the objectivizing dialectic than Phenomenology alone. What I mean is that Phenomenology's path from subjective reflection to rationalistic claims is fairly repetitive: philosophers discuss specific hypothetical/prototypical episodes of consciousness and then write about them in an academic style which invites community reflection and to be read against certain scholarly traditions. Cognitive Grammar does all that too, but there are introduced by virtue of its linguistic subject-matter other discursive facets: the schematic representation of linguistic structure (e.g. parse trees); the diagramming of perceptual-situational gestalts; even technological applications... Scolars can debate which tactics for representing language structure are most suited or most organically consistent for describing language artifacts via the Cognitive-Grammatic lense. The representations specific to Cognitive Grammar can be contrasted with those developed in other grammar theories and their correlative research programs, such as Combinatory, Dependency, and and Head-Driven Phrase-Structural Grammars. These disparate programs are, also, not exclusively focused on explanatory revelations about human language — contemporary linguists also have practical concerns, like text mining and Natural Language Processing. One question for semantic and syntactic theories is whether they are buttressed by computational evidence — whether software created according to the language models and representations are successgul for useful tasks, like classifying documents, machine translation, or pulling information from Natural Language resources.

Cognitive Linguistics in general does not need to mimic these practical concerns — after all, if language understanding does indeed build off of integrated percepual and experiential situatedness, we should be skeptical about the prospects for computers and "Artificially Intelligent" agents to parse language with anything like native fluency (even setting aside how a machine's language processing, correct or not in terms of our desired practical ends, cannot be equated to human empathic understanding). Contrariwise, however, we can also speculate that if the gist of Cognitive Grammar is how a plethora of environing situations — the spatial and force-dynamic arrangements trenchant to our construal of practical scenarios — can be sorted into a relatively small set of canonical schema, corelated with details like noun tense and morphosyntactic modes of agreement, then a computational treatmnt of language need not percive the full spectrum of situational possibilities in full nuance, but only ascertain which one of several schema are evidenced in a given linguistic artifact. Cognitive Grammar would seem to support intuitions that truly humanlike "AI" Natural Language Processing is an unrealistic goal but that, at least potentially, computational NLP can be achieved to some useful approcimation, and employing cognitively realistic languag models can help that project. But I have no firm commitments in either direction; my point is that the technological and computational dimensions of linguistics are relevant for Cognitive Grammar whether or not this approach is sympathetic to the, at times, reductionistic paradigms of conventional formal/computational linguistics. Unlike pre-communicative experience, language is structured by the rigors of coordinated thought and normative signification — as language users we must shoehorn private experience into prototypes that can be expressed to others. Language, in effect, reveals that even rawly immediate experience has a logical order that, to some approximation, can be studied in abstraction — first because language merely by existing shows that this abstracting does happen, in one fashion; and second because language is a platform for studying it. Via language we can empirically study the articulations of conscious experience transcribed into a normative semiosis.

Phenomenology, also, gathers consciousnss as reflected upon into something partially abstract, or with a structure that can be abstractly re-considered. There are some parameters of organization that seem so primeval to experience as to be indubitable. One is the episodic nature of perception and of deliberate action; mental phenomena seem neither sliced into instantaneous moments nor streaming in expansive segments. Instead, conscious reality is a chain of continuous but brief interludes: in one hypothetical kind of scenario, I open a door, which exercises one family of sensate and kinaesthtic attitudes; then I walk across th room; then I look out the window, and so forth. Such episodes stick together in language and maybe in memory, if I have occasion to say, or to later recall, that "I walked into the room" — the state of affairs I commit to memory or verbiage is actually a sequence of smaller episodes. This in turn issubsume into larger units, like when a narration reads "I walked into my living room, sat at my desk, and began to read". What stands out inviolably from this episodic bricolage is — minimally the temporality of, but more consequentially, the multiple scales of the temporality of consciousnss. Episodes link together and sequehtially coalesce into a more durational scale. Phenomenology marks this scale-transition terminology; *protention* and *retention*, for instance, connoting the episodic unity of consciousness over short time spans, is contrasted with concpts like *memory* and *anticipation*.

Meanwhile, an equally salient structuring principle lies in the epistemic attitudes that are carried into perceptual/enactive episodes: consider the contrast between casually looking at the window expecting to see the same scene as any other afyernoon and looking inquisitively because I hear a sound outside. Or maybe I see Hugo sleeping on the sofa, a "seeing" which is actually somewhat inferential, because he's always sleeping on the sofa this time of day. I don't need to confirm — if I briefly glance and see him lying still and relaxed — that the tabby cat on the couch is Hugo and that he's sleping, for me to think to myself (and maybe say to someone else) that "Hugo is sleeping" or "Hugo is sleeping on the sofa". Of course, such a scenario an be altered: if we have two tabby cats then I may want to look more discriminately to ascertain that it is Hugo on the sofa; or I may want to observe him for a few seconds to check *if* he is sleeping, which is a different perceptual event and a different conscious experience that passively seeing "Hugo sleeping" in the throes of an assuming that he is, in fact, sleeping, by analogy to how seeing daylight out the window is *passive* if it's mid-afternoon but may be a premeditatd investigation if I have just woken up and don't know the time.

Here, too, is an apparently "transcendental" or "categorical" (allowing a Kantian echo) pattern in consciousness — the sliding scale of activeness and passiveness in perceiving; the varying degree of epistemic thematization saturating different parts of experience. There are things we take for granted based on the familiarity of our most typical environments, becoming part of the propositional hum of things generally disclosing themslves in ways that carry information but no surprises. There are other things we are consciously aware of wanting to know. Some of our information about the world comes from presumptive expectations that we only really register when they are violated — say I suddenly see Hugo, having awaken, jump down from the sofa; now I have to update my baseline conception of how things are obtaining in my immediate surroundings. In that case I would not be startled to hear him scratching the chair, as compared to if I had not seen him wake up: our construals are woven from baseline assumptiona and then the occasional anomalies where my assumed picture must be revised. But layered within this cycle of passive experience and disruptive revision is another genre of epistemic episodes which is more deliberate and proactive; planning perceprual encounters around specific, epistemically thematized concerns, like looking out the window to trace an unfamiliar sound. This scale of epistemic passivity and activity can be set against — and in consciousness interweaves with — the scales of temporality.

We have then at least this matrix — the double-scale of temporal granularity and epistemic attentiveness — which seems to emanate from the depths of consciousness and yet have something like an abstract structure. Looking over the phenomenological (and philosophy of mind) tradition, we can find other such prereflective abstracta, like the contrast between hyletic sense-data (the purely embodied qualitative character of red or of silky smoothness) and qualia as propositional content (*red* and *smooth* as predicates); or the contrast between fully private experience (like corporeal sensations) and intersubjectively negotiated perception — we may not see the same scenes in exactly the same ways, but at least in productively *similar* ways, if we are in similar locales and vantage-points. A full catalog of these structures would involve a historical overview of Phnomenology as a whole, which is divergent from my aims in this paper. I want to highlight, however, that Phenomenology produces a philosophical narrative about certain ur-structures — described, if all goes well, not from prior scientific or world-view commitments but from commonsensical meditations on (mundane, everyday) consciousness — which can be thematized with the extra performative precision of scholarly discourse; with the care of finding the right language, entrenching usages, diagramming the conceptual relations which should be easier to memoize precisely because of terminological rigor ("protention"; "episodic"; "epistemic attitude"; "enactment"). These structurs get lifted out of the experiential realm and begin to condensate into an abstract regime, something defended like intellectual turf, discussed and analyzed.

Cognitive Grammar also has ur-structures — for sake of argument, consider on one hand the linguistic double-parameters of spatial and force-dynamic schema and, on another, the phenomenological double-scales of temporal granularity and epistemic thematization. Once entered in the intellectual ledger, the cognitive-linguistic schema become subject to a range of formal systemizations, from technical representations of language structures to lexicons, compilations of parts of speech and type-theoretic lexical classifications as well as of inter-word relations, even computer code for representing or automatically building representations of language artifacts. There have not been thus far analogous options for elaborating the phenomenologist's ur-structures — no code-repositories curated by Phenomenology research groups, no technological enhancements of phenomenological literature, for the most part. This is doubtless a manifestation of the historical context where Phenomenology has emerged, but we are now in a different context. Perhaps some 21st-century phenomenologists will engage with computers as agressively as Husserl engaged with mathematics in the *Formal and Transcendental Logic* or the *Investigations*.

Language, in short, is — at least on one level — a *formal system*, notwithstanding that it is also a human medium possessing an arguably irreducible layer of human subtlety and contxt-sensitivity. Linguistics in general, and perhaps Cognitive Grammar in particular, has to bridge experience and formalization. Spatial and force-dynamic schema are — for example and so to speak — one one side of the bridge as perceptual gestalts; but their formal trace is excavated analytically through syntactic and morphosyntactic theories; and a systematic model of morphosyntax involves something like formal language-representation. Insofar as parsing structures are described via "parse graphs" — the parsed sentence notated, with the supplemental data marking the contrast between a sentence spoken in an unstudied human context and the sentence as an object of analysis, as a graph of inter-word relations — then morphosyntactic agreement is a paramter manifest in specific inter-word pairs. So morphosyntactic agreement qua linguistic phenomenon straddles the experiential and formal realms — it can be studied in terms of what perceptual situations call for a particular noun or verb to be aligned with a particular verb, adjectuve, or adverb; it can also be studied as an enrichment of a formal structure. Through such formal strata Cognitive Grammar is not siloed in its study of perceptual groundings, but widens its disciplinary circle to reach a constellation of formal techniques that resonate with grounding experiential intuitions in suggestive ways, revealing both the potential and limits of formalization.

I would like to juxtapose this interdisciplinary continuation of Cognitive Grammar with the academic dissemination of Phenomenology — how the professional philosophical milieu where Phenomenology is mostly practiced shapes its transition from first-person speculation to an intellectual enterprise which, at least in its ways of organizing social resources, operates as a science. Cognitive Grammar operates in a similar milieu, but the strata of formalization evident in linguistics adds a wrinkle that has no direct analog in philosophy. Alongside the discursive and institutional norms which guide the systematization of Cognitive Grammar — the discipline of acdemic writing, peer review, conferences — there are also structural norms sited in linguistic formalizations through which cognitive theories can be explored. This is a development which phenomenologists should observe carefully, because the structural elaboration upon phenomenological research can be augmented beyond *just* inter-textual disputation in an academically curated speech situstion, and can engage with formal systems as logical and technological artifacts. Scholars, of course, debate, refine, and mathematize formal systems in similarly self-conscious academic circles; but insofar as they are modeled and simulated in technological and computational environments, formal systems *also* become technical artifacts which can be explored and manipulated. Alongside the "Communicative Rationality" of academic performance, they buttress a *technical* rationality of implementing computer models, crafting the algebra of formal systems, codifying inter-system translations, and so forth. Computational linguistics, to take one example, is a technical as well as an intellectual practice.

The paradigms of these research programs that emphasize engineering over academic disputation don't necessarily align seamlessly with Cognitive Grammar, and still less with Phenomenology. Despite their *internal* commitment to "bracketing" phenomenologists are still educated participants in the modern world and many presumably do accept in broad outlines the scientist's worldview. Many phenomenologists probably "unofficially" believe that mental phenomena have mundane neurophysical explanations (they are not magic or divine revelations or flux in a sacred ether), however opaque to consciousness itself. So Phenomenology is not *constitutively* antagonistic to a "natural science" of cognitiona and perception. In the Philosophy of Mind, moreover, the path to materialistic perspectives on mental phenomena seems to diverge in two irections — one being the direct study of material systems themselves that we reasonably believe are seats for the neurophysical correlates of consciousness, like neurons and synapses; the other is a mkre functioanlist attemp to describethe systematic organization of such material systems, on the premise that it is easier to make scientific process by seeing the brain (or the entire embodied nervous system) as a large-scale functional system than by reductively studying the biology and physics of microscale constituents, like nerce cells. Sure, we may believe that vision is driven

by cells in the eye and optic nerve, as well as specific brain regions; but the explanatory gap between whatever organic properties we may discover researching these bodies and the lived immediacy of visual qualia seems no less expansive. At least as a supplement to such microphysical investigation, functionalist methodologies can potentially narro, even if not elimibate, such explanatory gap. In Cognitive Grammar, for instance, the subtle variation between schematically similar situations is in a sense transcendended by morphosyntactic rules; our language-forming process of mapping perceptual givens to morphosyntactic and lexical prototypes and finding a communicatively stable encoding for them certainly seems amenable to functional description: such meta-cognitive finessing of our preceptual surround is a good candidate of a *functionality* available to our minds, as we are (and in our being) intelligently intersubjective and information-processing life-forms. Insofar as we have formal presentations of perceptual and enactive structures that seem both subjectively realistic *and* faithful to a kind of inner logic, we have the possibility for a rapproachment between Phenomenology and cognitiv functionalism, the two paradigms bridged by the *functional* utility of cycling between immediate and subtly particular experience and formally tractable concept-systems we us to construct productive precis of our environing situations — which in turn can be modeled as formal systems and investigated in that light. Language bears witness to this experiential-to-formal-to-experiential rotation in an especially ubiquitous and well-structrued topos, which is why linguistic methodologies like Cognitive Grammar can be a useful case-study for phenomenological formalization in general.

The preceding discussion has set forth why I believe the formalizing strategies available to Cognitive Grammar should be interesting to Phenomnology, in part because they are perforce available to Phenomnology as well. A formalized cognitive linguistics may not be immediately a formalized Phenomenology, but but it comes tantalizingly close to that, as I hope to show before the end of this paper. But I have until now been addressing this formalization obliquely, talking *about* Phenomenology and Cognitive Grammar as scholarly phnomena rather than *within* either (or both). Here, for most of what follows, I will focus in on one specific formal development of Cognitive Grammar from both a cognitive and computational perspective, which I will then conclude by placing in a more classically phenomenological context.

Part I Cognitive and Computational Process

Any attempt to bridge Computational Linguistics and Cognitive Grammar or Phenomenology must solicit one or several "founding analogies", linking phenomena on the formal/computational side with those on the cognitive/computational side. Here, I will start from the analogy of *cognitive* and *computational process*, or generically "process" (of either variety). Processes, per se, I will leave undefined, although a "computational" process can be considered roughly analogous to a single function implemented in a computer programming language. Th story I want to tell goes something like this: understanding language involves many cognitive processes, many of which are subtly determined by each exact language artifact and the context where it is created. Properly understanding a piece of language depends on correctly weaving together the various processes involved in understanding its component parts, and the structure of the multi-process intergration is suggested by the grammar of the artifact. Grammar, in a nutshell, uses relationships between words to evoke relationships between cognitive processes.

My formal elaboration of this model will be inspired at an elementary level by process *algebra* in the computational setting, but more technically by applied *type theory*. Inter-process relations are the core topic of Process Algebra, including sequentiality (one process followed by another) and concurrency (one process executing alongside another). In practice, detailed research around Process Algebra seems to focus especially on concurrency, perhaps because this is the more complex area of application (designing computer systems which can run multiple threads in parallel). It is likewise tempting to imagine that cognitive-linguistic processes exhibit some degree of parallelism, so that the various pieces of understanding "fall into place" together as we grasp the meaning of a sentence (henceforth using *sentence* as a representative example of a mid-size lanuag artifact in general). Nevertheless, I will focus more on *sequential* relations between processes, suggesting a language model (even if rather idealized) where cognitive processes unfold in a temporal order.

On both the cognitive and computational side, temporality is relative rather than quantified: the significant detail is not "before" and "after" in the sense of measuring time but rather how one process logically precedes another in effects and prerequisites. No theoretical importance is attached to *how long* it takes before processes finish, or how much time elapses between antecedent and subsequent processes (in contrast to subjects like optimization theory, where such details are often significant). We can set aside notions of a temporal continuum where subsequent processes occupy disjoint, extended time-regions; instead, one process follows another if anything affected by the first process reflects this effect at the onset of the second process. Time, in this sense, only exists as manifest in the variations of any state revelant to processes — in the computational context, in the overall state of the computer (and potentially other computers on a network) where a computation is carried out. Two times are different only insofar as the overall state at one time differs from the state at the second time. Time is *discrete* because the relevant states are discrete, and because beneath a certain sclae of time delta there is no possibility of state change.

Analogously, in language, I suggest that we set aside notions of an unfolding process reflecting the temporality of expression. Of course, the fact that parts of a sentence are heard first biases understanding somewhat; and speakers often exploit temporality for rhetorical effect, elonging the pronunciation of words for emphasis, or pausing before words to signal an especially calculated word choice, for example. These data are not irrelvant, but, for core semantic and syntactic analysis, I will nonetheless treat a sentence as an integrated temporal unit, with no value atributed to temporal ordering amongst words except insofar as temporal order establishes word order and word order has grammatical significance in the relevant natural language/dialect.

While antecedent/subsequent inter-process relations are among those formally recognized in Process Algebra, this specific genre of relation is implicit to other models important to computer science, such as Type Theory and Lambda Calculus. If *type-T* is a type, then any computational process which proceduces a value of type *type-T* has a corresponding ("functional") type (for sake of discussion, assume a "value" is anything that can be encoded in a finite sequence of numbers and that "types" are classifications for values that introduce distinctions between functions — e.g., the function to add two integers is different than the function to add two decimals; more rigorous definitions of primordial notions like "type" and "value" are possible but not needed for this paper). Similarly a process which takes as *input* a value of *type-T* is its own type. If two processes have these two types respectively — one outputs *type-T* and the other inputs *type-T* — then the two can be put in sequence, where the output from the antecedent becomes the inut to the subsequent. In this manner inter-process sequential relations become subsumed into "type systems" can can be studied using type-theoretic machinery rather than Process Algebras or Process Calculii as such.

There also exists a robust type-theoretic tradition in (Natural Language) semantics, which is disjoint from but not entirely irrelevant to the type systems of formal and programming languages. Semantic types are recognized at several different levels of classification, but some of the most interesting type-theoretic effects involve medium-grained semantic criteria that are more general than lexical entries but more specific than Parts of Speech. For example, the template *I believed X* generally requires that *X* be a noun (?*I believed run*), but more narrowly a certain *type* of noun, something that can be interpreted as an idea or proposition of some kind (?*I believed flower*). Asher and Pustejovsky point out the anomaly in a sentenc like "Bob's idea weighs five pounds" (ex. 2 p. 5), which possesses a flavor of unacceptability that feels akin to Part of Speech errors but are not in fact syntactic errors. The object of *weigh* is "five pounds" and its subject is "Bob's idea", which is admissible *syntactically* but fails to honor our semantic convention that the verb "to weigh" should be applied to things with physical mass (at least if the direct object denotes a quantity; contrast with *Let's all weigh Bob's idea*, where the *idea* is object rather than subject). These conventions are analogous to Part of Speech rules but more fine-grained: there is a meaning of *weigh* which has (like any transitive verb) to be paired with a subject and object noun, but beyond just being nouns the subject must be a physical body (in effect a sub-type of nouns) and the object a quantitative expression (another sub-type of nouns). Potentially, type restrictions on a coarse scale (e.g. that the subject of a verb must be a noun) and those on a finer scale (as in this sense of *to weigh*) can be unified into an overarching theory, which spans both grammar and semantics — for instance, both Part of Speech rules and usage conventions of the kind often subtly or cleverly subverted in metaphor and idioms (see "flowers want sunshine", "my computer died", "neutrinos are sneaky", as rather elegantly compactified by assigning sentient states to inert things). This is one way of reading the type-theoretic semantic project.

Along with Process Algebra, my take on linguistic understanding is informed by type theory (in both computational and linguistic contexts), but particularly by the merged notion of *typed* processes. So if we say that something has the *type* of a physical-body noun — that "Physical Body" is a type in the overall semantics of language — then I propose a

corresponding type of cognitive (perceptual and conceptual) processes characteristic of perceiving and reasoning about physical things. A particular designatum — a bag of rice, say — is subsumed under the semantic type insofar as our perceptual encounters with that thing — and/or our concepual exercises pertaining to its properties and proclivities (like being difficult to carry) — are roughly prototyped by a certain generic kind of cognitive process. This assumes that there is a similitude among processes of perceiving and thinking about physical bodies (at least the mid-sized, quotidian physical things that tend to enter nonspecialist language) sufficient to subsume them under a common prototype, which I then argue forms the cognitive substratum for the semantic type "Physical Object". Moreover, I contend a similar cognitive substratum can be found for other mid-scale semantic types that underlie analyses of semantic acceptability and metaphoricality, like "Living Thing", "Sentient Living Thing" ("flowers want sunshine" is metaphorical because it ascribes propositional attitudes to something whose type does not literally support them), and "Social Institutions" ("The newspaper you're reading fired its editor" exhibits a "type coercion" where *newspaper* is read first as an object and then as a company). One feature of semantic types is the lexical superposition of different types to produce what (in a slightly different context) Gilles Fauconnier calls a "blend": in "Liverpool, which is near the ocean, built new docks", the city is treated as both a geographic region and a body politic.

"Weighs", too, as a verb, can be given a typed-process interpretation. In its least metaphoric sense, "to weigh" connotes a practical action of measuring some object's weight by using something like a scale; as *cognitive* process the verb embodies are ability to plan, reflect upon, or contemplate this practice. So an "idea weighing 5 pounds" is anomalous because it is hard to play out in our minds a form of this practical act where the thing being weighed is mental. Howevere, there are plenty of more figurative uses related to "weighing ideas", "heavy ideas", and so forth, so we are able to isolate the dimension of "judging" and "measuring" which is explicit in literal "weighing", and abstracting from the physical details use "weigh" to mean "measure" or "assess" in general. The phrase "weigh an idea" therefore connotes its own cognitive process — imagining someone thinking about the idea in an evaluative way — but this figurative "script" is closed off by "5 pounds" which forces us to conceive the weighing literally with a scale, not figuratively as a kind of mental assessment. Once again, the type anomaly can be seen as a failure to map the linguistic senses evident in a sentence to an internally consistent set of cognitive procedures for dilating the semantic content seeded within each word.

Notice that I am treating cognitive processes, in themselves, as semantic more than grammatical phenomena. Literally, weighing something is a multi-stp act (lifting it on the sale, reading the measurement), and even in our mental replay of hypothetical weighing-acts it seems impossible not to imagine distinct phases (just as it is impossible not to picture left and right sides of an imaginary cow). Howevere, I assume that the cognitive script is figured by the lexeme "weighs" as a connotative unit: whatever internal structure our mental script of "weighing something" has, this structure is not a *linguistic* structur that must be encoded grammatically. Similar, the concept *buttered toast* suggests a confluence of perceptual, physical-operational, and concptual aspects — we are inclijed to regard toast as *buttered* if it looks a certain way and also if we have seen someone apply butter to it (or have done so ourselves) and also if we are in a context where we expect to find toast that may be buttered (we are not disposed to call a piece of bread in a grocery store "buttered toast" even if it has that appearence). So the adjective "buttered" introduces multiple cross-modal parameters in addition to the underlying concept "toast"; but I feel that the lexeme aggregates these parameters into a single *linguistic* unit. In Langacker's terms, the various elements of "buttered" do not suggest *constructive effort*, as if deliberate *linguistic* processing were needed to unpack the linguistic entity to its constituent parts. Instead, "buttered" functions *semantically* as a unit (and likewise syntactically as the unit entering relations with other words — e.g. buttered-toast is an adjective/noun pair, not the noun "butter" at the root of the adjective) — even if its cognitive process is multi-faceted. Indeed, this is precisely the signifying economy of language: it captures complex cognitive procedures by iconic, repeatable lexical units.

On that theory, tieing specific word-senses to stereotyped cognitiv processes is a matter of semantics, not grammar per se. Grammar, I contend, come into play when multiple processes need to be integrated. The concept "buttered toast", for example, seems to start from a more generic concept (toast) and then add extra detail (the buttering, with all that implies conceptually, pragmatically, and sensorially). This is suggested by the substitutability of just "toast" for "buttered toast":

- (1)I snacked on toast and coffee.
- (2)I snacked on buttered toast and iced coffee/.

Because the first sentence is perfectly clear, it seems that the ideas expressed (at least in this context) by *toast* and *coffee* are reasonably complete in themselves, so the adjectives have the effect of starting with a complete idea and adding on etra

detail. Procedurally, then, it seems like we have some process which takes us to "toast" and "coffee" and then, subsequent to that (logically if not temporally) we add the wrinkle of re-conceivingbthe toast as buttered and the coffee as iced. In short, the adjective-noun pairing is compelling us to run a pair of cognitive proceesses in sequence, one establishing the noun-concept as a baseline and one adding descriptive detail by an "adjectival", a specificational process.

Counter to that analysis, someone might judge that phrases like "buttered toast" and "iced coffee" are conventional enough that we don't interpret them through two meaningfully disjoint processes. This is entirely possible, given how erstwhile aggregate expressions bcome established units — what Langacker calls *entrenchment*. Different phrases ehibit different levels of entrenchment:

- (3)I snacked on toast and instant coffee.
- (4)I snacked on toast and Eritrean coffee.

Arguably "instant coffee" is a de facto lexical unit, partly because reading it in terms of constituent parts is rather nonsensical (there's no non-oblique way to understand "coffee" being qualified as "instant"). Surely, however, "Eritrean coffee" is heard as a compound phrase (at least in 2019 — it is unlikely, but not impossible, that future Eritrean coffee growers will be so successful that we hear the phrase as a brand name or culinary term of art, like "Hershey's kisses" or "French toast"). The status of "iced coffee" is probably somewhere between those to. But to the degree that a language element (whether word oe phrase) is entrenched and generally processed linguistically as a unit, I maintain, it tends to be governed by an integrally complete cognitivee process — not necessarily one without inner structure, but where the elements of this structure piece togther perceptually and situationally, rather than seeming to be *linguistically* disjoint conceptualizations that are brought together by the shape of linguistic phrases. Conversely, where a cognitive process has this integral character, discursive pressures nudge the language toward entrenching some descriptive phrase as a quasi-lexeme; what starts being heard as a compound designation evolves to the point where language users don't attend to constituent parts.

Obviously, this theory presupposes that there is an available distinction to be drawn between a "procedural" synthsis of disparate cognitive processes and a perceotual and/or conceptual synthesis constitutive of individual cognitive episodes. Phenomonology seems to back this up — there are some conceptual compounds that seem more episodically fused than others. Buttered toast may evoke a temporally not-quite-instantaneous conceptualization — at the core of the concept is a practical activity that takes a few seconds to complete — but we also can imagine the buttering-act apprehended in one sole episode. On the other hand, "Eritrean coffee" ties together concepts of much more scattered provnance; the perceptual unity of *coffee* (in the sense of a spcific liquid in a specific container) along with the abdtract geopolitical "background knowledge" implicit in the adjective "Eritrean". As a cognitive synthesis "Eritrean coffee" is conceptual rather than perceptual. Provisionally we can treat this in the context of "buttered toast" being a partially-entrenched phraseology while "Eritrean coffee" is undeniably a phrasal compound, something whose constructive form must beparsed linguistically rather than figuratively.

This analysis, though, needs many cavats. After all, many bonafide *phrases* (not "quasi-lexemes") nevertheless exhibit significant Phenomenological unity — i.e., they evoke integral perceptual complexes: *big dog*; *hot coffee*; *speeding car*; *red foliage*. Linguistically these seem like an underlying concept acquiring perceptual specificity via adjectival modification: "hot" was how the coffee came to my exprience because I experienced it as hot (it wasn't like I experienced the coffee and then had to contemplate whether it is hot or cold). After all, coffee must be experienced as hot, cold, or lukewarm; it cannot be eprienced without temperature (assuming I am coming into contact with it and not just looking at it). Similarly a car must be sen as at rest, moving slowly, or speeding; foliage must be seen as having some color. I have argued, however, that unless entrenched as idiomatic phrases adjective-noun pairs like *hot coffee* or *buttered toast* should be read as grammatical complxes and accordingly (in my thoey) as junctures between distinct cognitive processes. On the other hand, I argued that "instant coffee" was effectively entrenched *because* there is no simplistic concepual unity between "instant" and "coffee", which makes it harder to hear the phrase as descriptive. Instead, the semantics of that particular adjective-noun connection are circuitous and a little hyperbolic: "instant" coffee is coffee as a substance (not a drink, in that state) from which coffee the drink can be quickly (but not instantaneously) prepared. There is a lot going on the semingly simple "instant coffee": the shift from coffee-as-substance to coffee-as-drink; the "instant" exaggeration. In this case, the adjectival modification has *so many* moving parts that, I'm inclined to argue, it is hard to cover the whole scenario with a dscriptive phrase; which in turn creates selective pressures for some pseudo-lexical unit to emerge (which turned out to be "instant coffee") as a mnemonic for the whole conceptual multiplex. Indeed conceptually intricate wholes

tend to quickly acquire pithy conventional nominalizations simply for rhetorical convenience ("Brexit Negotiations"; "Quantum Gravity"; "International Transfer Window"; "#metoo").

Notwithstanding these variations, I still find a certain logic in the relation between phenomenological unity and semantic entrenchment. Perceptually integrated wholes may correlate with linguistically aggregate constructions insofar as there is a transparent logical destructuring in the perceptual unity: in the case of substance-attribute pairs (like "hot coffee") — deferring in the phenomenological context to Husserl's account of dependent moments — there is a basically unsubtle distinction between an underlying concept (like coffee) and the qualities which are its mode of appearance as well as conceptual predicates (like hot, cold, black, or light, describing sensory properties innate to the experience of a coffee-token as well as state-reports that can be propositionally attributed to it). Although the minimal sensate intention of the coffee and the predicative disposition toward ascriptions like *black* and *hot* are consciously intertwined, surely I am aware of a logicality in experience that gives the sensate and predicative dimensions different epistemic status. I don't think of my experience of the coffee's being hot as just a hot sensation qua medium of my sensorily apprehending the coffee, but rather as the sensate mechanism by which I observe the apparent fact that the coffee is hot, as a state of affairs and not just as subjective impression. We are constantly extrapolating our perceptual encounters to propositional content along these lines. As such, I contend such an (in some sense) innate perception-to-predication instinct grounds the procedural slicing of linguistic processes: *hot coffee* retraces ina linguistic construction the logical order of a coffee perception which on one level is a raw perceptual encounter but is simultaneously a predicative attribution. "Hot coffee" denotes a substancs that can be experienced in the mode of a base concept (coffee) which is given predicative qualification (the coffee *is* hot). The fact that there may not be a noticed temporal gap in *experience* between the sensate perception and the epistemic posture does not preclude a certain logical antecedent-subsequent ordering: the concept "coffee" is the predicative base for my propositional attitude that what I am dealing with here is hot coffee, not hot-sensations-disclosing-coffee or coffee-I-experience-as-hot (but who knows, maybe I'm hallucinating) or any other artificial skeptifying of my actual experience, which is of raw perception pregnant with propositional content.

So I wishbto justify claims that (non-entrenched) phrases complexes like "hot coffee" are unions of disjoint cognitive processes by noting that while such phrases evoke a certain perceptual unity, they evoke a *kind* of unity which we habitually regard *conceptually* as divided into sensate givenness founding epistemic attitudes. Cognitive processes are not exclusively perceptual; they are some mixture of perceptual and conceptual (and enactive/kinaesthetic/operational). A perceptual unity can cover two conceptual aspects, like a sheet covering two mattresses. So the perceptual unity of hot coffee can become the conceptual two-step of coffee as substance and hot as attribute; committing this unity to cognition as an overarching lifelong faculty involves registering a thought-process of coffee as a substance which can, in acts of logical predication, be believed to be hot or cold, black or light, etc. The apprehension of the substance is a different cognitive process than the predication of the attribute, in terms of how these mental acts fit within our epistemic models, even if these two processes are experientially fused. Typically we see the coffee before we touch or taste it, so already the coffee has a logical status apart from the heat we predicate in it. Likewise, even if the black color is inxtricable from our perceiving (apart from odd situations where we drink the coffee without looking at it), we know the color will change if we add milk (even if just in principle because, preferring black coffee, we don't actually do so); so we know the coffee has a logical substrate apart from its color too. All of this ideation is latent in the coffee-perceptions notwithstanding whatever perceptual unities we experience that cloak logical forms like substance/attribute under the inexorable togetherness of disclosure (the phenomenological impossibility of spatial expanse without color, say). In short, disjoint cognitive processes can be required to reconstruct a perceptually unified situation or episode, insofar as wec are not just living through the episode but prototyping, logically reconstructing, signifying it — the perceptual unity in the moment does not propagate to procedural atomicity in absrbing the episode into rational exercises.

Experience, then prsents *both* perceptual unities and cognitive-propositional multiplicity; language can inherit both holism on the perceptual side and compositionality on the rational side, even in a single enactive/perceptual episode. Depending on how we via language want to figure and express experience, we can bring either unity or compositionality to the fore. Our linguistic choices will evoke perceptual unity if they select entrenched word-senses or quasi-lexical forms; they will evoke compositionality if they gravitate toward compound phrases and complex, relatively rare lexicalizations and modes of expression. To the degree that we are interested in a cognitive-phenomenological *semantics*, we can attend to the first part of this equation, to how the understood atomicity of a word sense or a conventionalized phrase often suggests an object or phenomenon consciously apprehended as an integral whole; we can trace phenomenologically the apperceptive unity that seems to dribve the linguistic community's accepting lexical atoms in this sense. Conversely, to the degree that we are interested in a cognitive-phenomenological *grammar*, we can attend to how logically composite

predication emerges even within perceptual unity, because our encounter with phenomena is not (save for exotic artistic or meditative pursuits) the "dasein" of irreflective sensory beings immersed in a world of pure experience but the deliberate action of epistemic beings carrying (modifiable but not random) propositional attitudes to perceptual encounters.

Modeling grammar as a coordination between cognitive processes may be an idealization, precisely becaue the compositive and integrative faces of consciousness are two sids of the same coin: it's not as if we work through a thought of "coffee" or "toast", abstract and without sensory specificity, noticeably prelude to conceived/perceived attributes like "hot", "cold", or "buttered". But we can still ascribe to linguistic-understanding processes an idealized, "as if" temporality, treating the elucidating a sentence as a sequence of procedures leading from bare concepts to well-rendered logical tableau, suffusee with some level of descriptive and situational particularity. So we go from *coffee* to *iced coffee* to *butterred toast and iced coffee* to *snacking on butterred toast and iced coffee*; each link in the chain stepping up toward propositional totality. My point is not that the logical form of the sentence is composed from logically primitive and abstract parts, which is fairly trite; my point is that such logical composition is only apparent after a pattern of cognitive integration that is more subtle and exceptional. Extra-mentally, buttered toast is just toast with butter on it, a fairly simplistic logical conjunction. Read as a baton passed between two acts of mind, however — conciving toast and then conciving it buttered — the conjunction is more elaborate; the cognitive resources of "buttered" are not just "something with butter on it" but the implication of a sensory summation (the flavor, color, scent) and operational narrative (we have seen or performed the deliberate act of applying the butter). Similarly a person dressed up is not just someone whose torso is encircled by articles of clothing; a barking dog is not just an animal making random noises; a stray cat is different from a lost cat. In their interpenetration, cognitive processes develop (in the photographer's sense) narrative and causative threads that are latent in worldly situations but reduced out of logical glosses; that is why it seems incomplete, lacking nuance, or beside the point to explicate semantic meanings in logical terms, like "bachelor" as "unmarried man" (we can certainly imagine a sentence like "My best friend has been married for years but he's still a bachlor", meaning he still has the habits and attitudes of his single days).

A theory of sentences building from conceptual underspecification to logical concreteness does not preclude there being different scales of specificity. "I snacked on toast and coffee" is just as acceptable as "I snacked on buttered toast and iced coffee". The communication conveys as much situational detail as warranted in the conversational, pragmatic context. Language always has the *capability* to push further and further into specificty; how exhaustively the language user avails of this capability is a matter of choice. As theorists of language we must then analyze how language possesses the *latent* capacity to draw ever finer pictures; the adjectival *buttered* toast and *iced* coffee takes the granularity of signifying at one level (the level of the "I snacked on toast and coffee" sentence) and layers on (or really layers *within*) a yet more specific level. The architecture how this happens is well addressed by type-theoretic mehods (both coaese and mid-grained).

Note that "buttered" in "buttered toast" is in the current examples not absolutely essential; the sentences without this qualification are similar in meaning to the sentenes with it. This suggests that if the adjectives designate (or solicit) cognitive processes that build upon some other (logically) prior process, the anterior process can also suffice on its own, at least in the context of these example sentences.

Part II Interpretive Processes and Triggers

My central thesis in this paper is that language understanding involves integrating diverse "cognitive procedures", each associated with specific words, word morphologies (plural forms, verb tense, etc) and sometimes phrases. This perspective contrasts with and adds nuance to a more "logical" or "truth-theoretic" paradigm which tends to interpret semantic phenomena via formal logic — for example, singular/plural in Natural Language as a basically straightforward translation of the individual/set distinction in formal logic. Such formal intuitions are limited in the sense that (to continue this example) the conceptual mapping from single to plural can reflect a wide range of residual details beyond just quantity and multitudes. Compare *I sampled some chocolates* (where the count-plural suggests *pieces* of chocolate) and *I sampled some coffees* (where the count-plural implies distinguishing coffees by virtue of grind, roast, and other differences in

preparation) (note that both are contrasted to mass-plural forms like *I sampled some coffee* where plural agreement points toward material continuity; there is no discrete unit of coffee qua liquid). Or compare *People love rescued dogs* with *People fed the rescued dogs* — the second, but not the first, points toward an interpretation that certain *specific* people fed the dogs (and they did so *before* the dogs were rescued).

The assumption that logical modeling can capture all the pertinent facets of Natural-Language meaning can lead us to miss the amount of situational reasoning requisite for commonplace understanding. In *People fed the rescued dogs* there is an exception to the usual pattern of how tense and adjectival modification interact: in *He has dated several divorced millionaires* it is implied that the ladies or gentlemen in question were divorced and millionaires *when* he dated them: that the events which gave them these properties occurred *before* the time frame implied (by tense) as the time of reference for the states of affairs discussed in the sentence (jokes or rhetorical flourishes can toy with thse expectations, but that's why they *are*, say, jokes; consider the dialog: "He likes to date divorced women — I thought they were all married? — Not after he dated them!"). But we read "people fed" in *People fed the rescued dogs* as occurring before the rescue; because we assume that *after* being rescued the dogs would be fed by veterinarians and other professionals (who would probably not be designated with the generic "people"), and also we assume the feeding helped the dogs survive. We also hear the verb as describing a recurring event; compare with *I fed the dog a cheeseburger*.

To be sure, there are patterns and templates governing scope/quantity/tense interactions that help us build logical models of situations described in language. Thus *I fed the dogs a cheeseburger* can be read such that there are multiple cheeseburgers — each dog gets one — notwithstanding the singular form on "a cheeseburger": the plural "dogs" creates a scope that can elevate the singular "cheeseburger" to an implied plural; the discourse creates multiple reference frames each with one cheeseburger. Likewise this morphosyntax is quite correct: *All the rescued dogs are taken to an experienced vet; in fact, they all came from the same veterinary college*: the singular "vet" is properly alligned with the plural "they" because of the scope-binding (from a syntactic perspective) and space-building (from a semantic perspective) effects of the "dogs" plural. Or, in the case of *I fed the dog a cheeseburger every day* there is an implicit plural because "every day" builds multiple spaces: we can refer via the spaces collectively using a plural (*I fed the dog a cheeseburger every day — I made them at home with vegan cheese*) or refer within one space more narrowly, switching to the singular (*Except Tuesday, when I made it out of ground turkey and swiss*).

Layers of scope, tense, and adjectives interact in comples ways that leave room for common ambiguities: *All the rescued dogs are [/were] taken to an experienced [/specialist] vet* is consistent with a reading wherein there is exactly one vet, and she has or had treated every dog, as well as where there are multiple vets and each dog is or was treated by one or another. Resolving such ambiguities tends to call for situational reasoning and a "feel" for situations, rather than brute-force logic. If a large dog shelter describes their operational procedures over many years, we might assume there are multiple vets they work or worked with. If instead the conversation centers on one specific rescue we'd be inclined to imagine just one vet. Lexical and tense variation also guides these impressions: the past-tense form ("...the rescued dogs were taken...") nudges us toward assuming the discourse references one rescue (though it could also be a past-tense retrospective of general operations). Qualifying the vet as *specialist* rather than the vaguer *experienced* also nudges us toward a singular interpretation.

What I am calling a "nudge", however, is based on situational models and arguably flows from a conceptual stratum outside of both semantics and grammar proper, maybe even prelinguistic. There appears to be no explicit principle either in the semantics of the lexeme "to feed", or in the relevant tense agreements, stipulating that the feeding in *People fed the rescued dogs* was prior to the rescue (or conversely that *Vets examined the rescued dogs* describes events *after* the rescue). Instead, we interpret the discourse through a narrative framework that fills in details not provided by the language artifacts explicitly (that abandoned dogs are likely to be hungry; that veterinarians treat dogs in clinics, which dogs have to be physically brought to). For a similar case-study, consider the sentences:

- (5)Every singer performed two songs.
- (6)Everyone performed two songs.
- (7)Everyone sang along to two songs.
- (8)Everyone in the audience sang along to two songs.

The last of these examples strongly suggests that of potentially many songs in a concert, exactly two of them were popular and singable for the audience. The first sentence, contrariwise, fairly strongly implies that there were multiple pairs of songs, each pair performed by a different singer. The middle two sentences imply either the first or last reading,

respectively (depending on how we interpret "everyone"). Technically, the first two sentences imply a multi-space reading and the latter two a single-space reading. But the driving force behind these implications are the pragmatics of "perform" versus "sing along": the latter verb is bound more tightly to its subject, so we hear it less likely that *many* singers are performing *one* song pair, or conversely that every audience member *sings along* to one song pair, but each chooses a *different* song pair.

The competing interpretations for *perform* compared to *sing along*, and *feed* compared to *treat*, are grounded in lexical differences between the verbs, but I contend the contrasts are not laid out in lexical specifications for any of the words, at least so that the implied readings follow just mechanically, or on logical considerations alone. After all, in more exotic but not implausible scenarios the readings would be reversed:

- (9)The rescued dogs had been treated by vets in the past (but were subsequently abandoned by their owners).
- (10)Every singer performed (the last) two songs (for the grand finale).
- (11)Everyone in the audience sang along to two songs (they were randomnly handed lyrics to different songs when they came in, and we asked them to join in when the song being performed onstage matched the lyrics they had in hand).

In short, it's not as if dictionary entries would specify that "to feed" applies to rescued dogs before they are rescued, and so forth; these interpretations are driven by narrative construals narrowly specific to given expressions. The appraisals would be very different for other uses of the verbs in (lexically) similar (but situationally different) cases: to "treat" a wound or a sickness, to "perform" a gesture or a play. We construct an interpretive scaffolding for resolving issues like scope-binding and space-building based on fine-tuned narrative construals that can vary alot even across small word-sense variance: As we follow along with these sentences, we have to build a narrative and situational picture which matches the speaker's intent, sufficiently well.

And that requires prelinguistic background knowledge which is leveraged and activated (but not mechanically or logically constructed) by lexical, semantic, or grammatical rules and forms: *rescued dogs* all alone constructs a fairly detailed mental picture where we can fill in many details by default, unless something in the discourse tells otherwise (we can assume such dogs are in need of food, medical care, shelter, etc., or they would not be describd as "rescued"). Likewise "sing along" carries a rich mental picture of a performer and an audience and how they interact, one which we understand based on having attended concerts rather than by any rule governing "along" as a modifier to "sing" — compare the effects of "along" in "walk along", "ride along", "play along", "go along". Merely by understanding how "along" modifies "walk", say (which is basically straightforward; to "walk along" is basically to "walk alongside") we would not automatically generalize to more idiomatic and metaphorical uses like "sing along" or "play along" (as in *I was skeptical but I played along (so as not to start an argument)*).

We have access to a robust collection of "mental scripts" which represent hypothetical scenarios and social milieus where language plays out. Language can activate various such "scripts" (and semantic as well as grammatical formations try to ensure that the "right" scripts are selected). Nonetheless, we can argue that the conceptual and cognitive substance of the scripts comes not from language per se but from our overall social and cultural lives. We are disposed to make linguistic inferences — like the timeframes implied by *fed the rescued dogs* or the scopes implied by *sang along to two songs* — because of our enculturated familiarity with events like dog rescues (and dog rescue organizations) and concerts (plus places like concert halls). These concepts are not produced by the English language, or even by any dialect thereof (a fluent English speaker from a different cultural background would not necessarily make the same inferences — and even if we restrict attention to, say, American speakers, the commonality of disposition reflects a commonality of the relevant cultural anchors — like dog rescues, and concerts — rather than any homogenizing effects of an "American" dialect). For these reasons, I believe that trying to account for situational particulars via formal language models alone is a dead end. This does not mean that formal language models are unimportant, only that we need to picture them resting on a fairly detailed prelinguistic world-disclosure.

There are interesting parallels in this thesis to the role of phenomenological analysis, and the direct thematization of issues like attention and intentionality: analyses which are truly "to the things themselves" should take for granted the extensive subconscious reasoning that undergirds what we consciously thematize and would be aware of, in terms of what we deliberately focus on and are conscious of believing (or not knowing), for a first-personal exposé. Phenomenological analysis should not consider itself as thematizing every small quale, every little patch of color or haptic/kinasthetic sensation which by some subconscious process feeds into the logical picture of our surroundings that props up our

conscious perception. Analogously, linguistic analysis should not thematize every conceptual and inferential judgment that guides us when forming the mental, situational pictures we then consult to set the groundwork for linguistic understanding proper.

These comments apply to both concptual "background knowledge" and to situational particulars of which we are cognizant in rference to our immediate surroundings and actions. This is the perceptual and operational surrounding that gets linguistically embodied in deictic reference and other contextual "groundings". Our situational awareness therefore has both a conceptual aspect — while attending a concert, or dining at a restaurant, say, we exercise cultural background knowledge to interpret and participate in social events — and also our phenomenological construal of our locales, our immediate spatial and physical surroundings. Phenomenological philosophers have explored in detail how these two facets of situationality interconnect (David Woodruff Smith and Ronald McIntyre in *Husserl and Intentionality: A Study of Mind, Meaning, and Language*, for instance). Cognitive Linguistics covers similar territory; the "cognitive" in Cognitive Semantics and Cognitive Grammar generally tends to thematize the conception/perception interface and how both aspects are merged in situational understanding and situationally grounded linguistic activity (certainly more than anything involving Artifcial Intelligence or Computational Models of Mind as are connoted by terms like "Cognitive Computing"). Phenomenological and Cognitive Linguistic analyses of situationality and perceptual/conceptual cognition (cognition as the mental synthesis of preception an conceptualization) can certainly enhance and reinforce each other.

But in addition, both point to a cognitive and situational substratum underpinning both first-person awareness and linguistic formalization proper — in other words, they point to the thematic limits of Phenomenology and Cognitive Grammar and the analytic boundary where they give way to an overarching Cognitive Science. In the case of Phnomenology, there are cognitive structures that suffuse consciousness without being directly objects of attention or intention(ality), just as sensate hyletic experience is part our consciousness but not, as explicit content, something we in the general case are conscious *of*. Analogously, conceptual and situational models permeate our interpretations of linguistic forms, but are not presented explicitly *through* these forms: instead, they are solicited obliquely and particularly.

What Phenomnology *should* explicate is not background situational cognition but how attention, sensate awareness, and intentionality structure our orientation *visavis* this background: how variations in focus and affective intensity play strategic roles in our engaged interactions with the world around us. Awareness is a scale, and the more conscious we are of a sense-quality, an attentional focus, or an epistemic attitude, reflects our estimation of the importance of that explicit content compared to a muted experintial background. Hence when we describe consciousness as a stream of *intentional* relations we mean not that the intended noemata (whether perceived objects or abstract thoughts) are sole objcts of consciousness (even in the moment) but are that within conscious totality which we are most aware of, and our choice to direct attention here and there reflcts our intelligent, proactive interacting with the life-world. Situational cognition forms the background, and Phenomenology addresses the structure of intentional and attentional modulations constituting the conscious foreground.

Analogously, the proper role for linguistic analysis is to represent how multiple layers or strands of prelinguistic understanding, or "scripts", or "mental spaces", are woven together by the compositional structures of language. For instance, *The rescued dogs were treated by an exprienced vet* integrates two significantly different narrative frames (and space-constructions, and so forth): the frame implied by "rescued dogs" is distinct from that implied by "treated by a veterinarian". Note that both spaces are available for follow-up conversation:

- (12)The rescued dogs were treated by an experienced vet. One needed surgery and one got a blood transfusion. We went there yesterday and both looked much better.
- (13)The rescued dogs were treated by an experienced vet. One had been struck by a car and needed surgery on his leg. We went there yesterday and saw debris from another car crash — it's a dangerous stretch of highway.

In the first sentence "there" designates the veterinary clinic, while in the second it designates the rescue site. Both of these locales are involved in the original sentence (as locations and also "spaces" with their own environments and configurations: consider these final three examples).

- (14)The rescued dogs were treated by an experienced vet. We saw a lot of other dogs getting medical attention.
- (15)The rescued dogs were treated by an experienced vet. It looked very modern, like a human hospital.
- (16)The rescued dogs were treated by an experienced vet. We looked around and realized how dangerous that road is — for humans as

well as dogs.

What these double space-constructions reveal is that accurate language understanding does not only require the proper activated "scripts" accompanying words and phrases, like "rescued dogs" and "treated by a vet". It also requires the correct integration of each script, or each mental space, tieing them togther in accord with speaker intent. So in the current example we should read that the dogs *could* be taken to the vet *because* they were rescued, and *needed* to be taken to the vet *because* they needed to be rescued. Language structures guide us toward how we should tie the mental spaces, and the language segments where they are constructed, together: the phrase "*rescued* dogs" becomes the subject of the passive-voice *were treated by a vet* causing the two narrative strands of the sentence to encounter one another, creating a hybrid space (or perhaps more accurately a patterning between two spaces with a particular temporal and causal sequencing; a hybrid narration bridging the spaces). It is of course this hybrid space, this narrative recount, which the speaker intends via the sentence. This idea is what the sentence is crafted to convey — not just that the dogs were rescued, or that they were taken to a vet, but that a causal and narrative thread links the two events.

I maintain, therefore, that the analyses which are proper to linguistics — highlighting what linguistic reasoning contributes above and beyond background knowledge and situational cognition — should focus on the *intgration* of multiple mental "scripts", each triggered by different parts and properties of the linguistic artifact. The *triggers* themselves can be individual words, but also morphological details (like plurals or tense marking) and morphological agreement. On this theory, analysis has two distinct areas of concerns: identification of grammatical, lexical, and morphosyntactic features which trigger (assumedly prelinguistic) interpretive scripts, and reconstructing how these scripts interoprate (and how language structure determines such integration).

In the case of isolating triggers, a wide range of linguistic features can trigger interpretive reasoning — including base lexical choice; word-senses carry prototypical narrativ and situational templates that guide interpretation of how the word is used in any given context. "Rescued", for example, brings on board a network of likely externalitis: that there are rescuers, typically understood to be benevolent and intending to protect the rescuees from harm; that the rescuees are in danger prior to the rescu but safe afterward; that they need the rescuers and could not have reachd safety themselves. Anyone using the word "rescue" anticipats that their addressees will reason through some such interprtiv frame, so the speaker's role is to fill in the details descriptively or deictically: who are the rescues and why they are in danger, who are the rescurs and why they are benevolnt and able to protect the rscuees, etc. The claim that the word "rescue", by virtue of its lexical properties, triggers an interprtive "script", is a proposal that when trying to faithfully reconstruct speaker intentions we will try to match the interpretive frame to the current situation.

The "script" triggered by word-choice is not just an interpretive frame in the abstract but the interpretive *process* that matchs the frame to the situation. This process can be exploited for metaphorical and figurative effect, broadening the semantic scope of the underlying lexeme. In the case of "rescue" we have less literal and more humorous or idiomatic examples like:

- (17)I'm going to rescue her from that boring conversation.
- (18)The trade rescued a star athlete from a losing team.
- (19)Your invitation rescued me from studying all night.
- (20)New mathematical models rescued her original research from obscurity.
- (21)Discovery of nearby earth-like planets rescued that star from its reputation as ordinary and boring and revealed that its solar system may actually be extraordinary.
- (22)His latest comments rescued him from the perception that he never says anything controversial.
- (23)The Soviets rescued thousands of people from a basically-defeated Germany and sent them to Siberia.

Each of these cases subverts the conventional "rescue" script by varying some of the prototypical frame details: maybe the "danger" faced by the rescuee is actually trivial (as in the first three), or the rescuee is not a living thing whose state we'd normally qualify in trms of "danger" or "safety", or by overturning the benevolence we typically attribute to rescue events. In the penultimate sentence someone is described as rescuing *themselves*, but the effect is ironic: he actually caused trouble for himself, or so the speaker clearly believes. And in the final sentence the speaker clearly believes the

"rescue" was not needed, that it was not benevolent, and that the "rescuees" ended up worse off: so the choice of word "rescue" is clearly both ironic/sarcastic and implies a mockery of attempts to portray the rescuers as benevolent.

But in these uses subverting the familiar script does not weaken the lexical merit of the word choice; instead, the interpretive act of matching the conventional "rescue" script to the matter at hand reveals details and opinions that the speaker wishes to convey. The first sentence, for instance, uses "rescue" to connote that being stuck in a boring conversation (and being too polite to drift away with no excuse) is an unpleasant (even if not life-threatening) circumstance. So one part of the frame (that the rescuee needs outside intervention) holds while the other (that the rescue is in danger) comes across as excessive but (by this very hyperbole) communicating speaker sentiment. By both invoking the "rescue" script and exploiting mismactches between its template case and the current context, the speaker conveys both situational facts and personal opinions quite economically. Similarly, "rescue a paper from obscurity" is an economical way of saying that research work has been rediscovered in light of new science; "rescued from a bad team" is an economical way of connoting how an athletic career is less fulfilling on a bad team, and so forth.

All of these interprtive effects — both conventional and unconventional usages — stem from the interpretive scripts bound to words (and triggered by word-choice) at the underlying lexical level — we can assess these by reference to lexical details alone, setting aside syntactic and morphological qualities. Of course, then, a host of further effects are bound to morphological details when they *are* considered. Case in point are plurals: for each plural usage we have a concptual transformation of an underlying singular to a collective, but how that collective is pictured varies in context. One dimension of this variation lies with mass/count: the mass-plural "coffee" (as in "some coffee") figures the plurality of coffee (as liquid, or maybe coffee grounds/beans) in spatial and/or physical/dynamic terms. So we have:

- (24)There's some coffee on your shirt.
- (25)There's coffee all over the table.
- (26)She poured coffee from an ornate beaker.
- (27)There's too much coffee in the grinder.
- (28)There's a lot of coffee left in the pot.
- (29)There's a lot of coffee left in the pot — should I pour it out?

These sentences use phrases associated with plurality ("all over", "a lot", "too much") but with referents that on perceptual and operational grounds can be treated as singular — as in the appropriate pairing of "a lot" and "it" in the last sentence. With count-plurals the collective is figured more as an aggregate of discrete individuals:

- (30)There are coffees all over the far wall at the expresso bar.
- (31)She poured coffees from an ornate beaker.
- (32)There are a lot of coffees left on the table — shall I pour them out?

So mass versus count — the choice of which plural form to use — triggers an intrepretation shaping how the plurality is picturd and conceived (which is itself trigggered by the use of a plural to begin with). But if we restrict attention to just, say, count-plurals, there ar still different schemata for intending collections:

- (33)New Yorkers live in one of five boroughs.
- (34)New Yorkers reliably vote for Democratic presidential candidates.
- (35)New Yorkers constantly complain about how long it takes to commute to New York City.

The first sentence is consistnt with a reading applied to *all* New Yorkers — the five boroughs encompass th whol extent of New York City. The second sentence is only reasonable when applied only to the city's registered voters — not all residents — and moreover there is no implication that the claim applies to all such voters, only a something north of one-half. And the final sentence, while perfectly reasonable, uses "New Yorkers" to name a population completely distinct from the first sentence — only residents from the metro area, but not the city itself, commute *to* the city.

These examples demonstrate a point I made earlier, that mapping singular to plural is not a simple logical operation. We need to invoke narrative frames, interpretive scripts, and prelinguistic background knowledge to understand what *sort*

of plurality the speaker intends. To be sure, the more subtle plurals can still be read in logical terms, and we can imagine sentences that hew more crisply to a logical articulation:

- (36)All New York City residents live in one of five boroughs.
- (37)The majority of New York voters support Democratic presidential candidates.
- (38)Many New York metro area residents complain about how long it takes to commute to New York City.

According to truth-theoretic semantics, sentences compl addressees to believe (or at least consider) logically structured propositions *by virtue of* linguistic shape replicating the architecture of the intended propositional complexes, as these would be represented in first-order logic. This view on linguistic meaning is consistent with the last three sentences, which are designed to map readily to logical notations (signaled by quasimathematical phrases like "the majority of"). But most sentencs do not betray their logical form so readily: these latter sentences actually sound less fluent, more artificial, than their prior equivalents.

It is also true that the more "logical" versions are mor, we might say, dialectically generalized because they do not assume the same level of background knowledge. Someone who knew little about New York geography could probably make sense of the latter sentences but might misinterpret, or at least have to consciously think over, the former ones. So we may grant that exceptionally logically-constructed sentences can be clearer for a broad audienc, less subject to potential confusion, and indeed such logically cautious language is a normal stylistic feature of technical, legal, and journalistic discourse. But for this reason such discours comes across as self-consciously removed from day-to-day languag. More important, the current examples show that if addressees *have* the requisite background knowledge, linguistic structure does not have to replicate logical structure very closely to be understood. The content which addressees undrstand may have a logical form, and language evokes this form — guides addressees toward considering specific propositional content — but this does not happen because linguistic structure in any precise way mimics, replicates, reconstructs, or is otherwise organized propositionally. Instead, the relation of language to predicate structures is evidently oblique and indirect: language triggers interpretive processes which guide us toward propositional content, but the structure of language is shaped around fine-tuning the activation of this background cognitive dynamics more than around any need to model predicate organization architecturally. In the case of plurals, the appearance of plural forms like "New Yorkers" or "coffees" compels us to find a reasonable cognitive model for the signified multitude, and this modl will hav a logical form — but the linguistic structures themselves do not in general model this form for us, except to the limited degree neeeded to activate prelinguistic interpertive thought-processes.

I make this point in terms of plural *forms*, and earlier made similar claims in terms of lexical details. A third group of triggers I outlined involved morphosyntactic *agreement*, which establishes inter-word connections which themselves trigger interpretive processing. Continuing the topic of plurals, how words agree with other words in singular or plural forms evokes schema which guide situational interpretations. So for instance:

- (39)My favorite band gave a free concert last night. They played some new songs.
- (40)There was some pizza earlier, but it's all gone.
- (41)There were some slices of pizza earlier, but it's all gone.
- (42)There were some slices of toast earlier, but there's none left.
- (43)There was some toast earlier, but they're all gone.
- (44)That franchise had a core of talented young players, but it got eroded by trades and free agency.
- (45)That franchise had a cohort of talented players, but they drifted away due to trades and free agency.
- (46)Many star players were drafted by that franchise, but it has not won a title in decades.
- (47)Many star players were drafted by that franchise, but they failed to surround them with enough depth.
- (48)Many star players were drafted by that franchise, but they were not surrounded with enough depth.
- (49)Many star players were drafted by that franchise, but they did not have enough depth.

Plurality here is introduced not only by isolatd morphology (like "slices", "players", "songs"), but via agreements marked by word-forms in syntactically significant pairings: was/were, it/they, there is/there are. Framing all of these cases is

how we can usually schematize collections both plurally and singularly: the same set can be cognized as a collection of discrete indiciduals one moment and as an intgral whole the next. This allows language some flexibility when designating plurals (as extensively analyzed by Ronald Langacker: see his discussion of examples like *Three times, students asked an interesting question*). A sentence discussing "slices of pizza" can schematically shift to treating the pizza as a mass aggregate in "it's all gone". Here the antecedent of "it" is *slices* (of pizza). In the opposite-drection, the mass-plural "toast" can be refigured as a st of individual pieces in "they're all gone". The single "band" becomes the group of musicians in the band.

In the last five above cases, "it" binds (being singular) to "the franchise" seen as a single unit, but also to the "core of young players". The players on a team can be figured as a unit or a multiple. The franchise itself can be treated as a multiple (the various team xecutives and decision-makers), as in "they failed to surround the stars with enough depth". The last sentence is ambiguous between both readings: "they" could designate either the players or the franchise. Which reading we hear alters the sense of "have": asserting that the star *players* lack enough depth implies that they cannot excute plays during the game as effectively as with better supporting players; asserting that the *franchise* lacks depth maks the subtly different point that there is not enough talent over all.

The unifying thme across these cases is that when forming sentences we often have a choic of how we figure plurality, and moreover these choices can be expressed not only in individual word-forms but in patterns of agreement. Choosing to pronominalize "slices of pizza" or "cohort of players" as *it*, or alternatively *they*, draws attention to either the more singular or more multitudinal aspects of the aggrgat in question. But this effect is not localized to th individual it/they choice; it depends on tracing the pronoun to its antecdent and construing how the antecedent refrent has both individuating and multiplicative propertis. Thus both individuation and plurality ar latent in phrass like *slics of* or "cohort of", and this singular/plural co-conceiving is antecedently figured by how subsequent morphosyntax agrees with the singular or, alternatively, the plural.

Moreover, these patterns of agreement invoke new layers of interprtation to identify the propervconceptual scope of plurals. In *The band planned a tour, where they debuted new songs* we hear the scope of "they" as narrower than its antecedent "the band", because only the band's *musicians* (not stage crew, managers, etc.) typically actually perform. Likewise in "The team flew to New York and they played the Yankees", only the players are referenced via "they played" but presumably many other people (trainers, coachs, staff) are encompassd by "the team flew". And in *The city's largest theater company will perform* "*The Flies*" we do not imply that the Board of Directors will actually take the stage (the President as Zeus, say). Even in the course of one sentence, plurals are reinterpreted and redirectd:

- (50)The city's largest theater company performed "The Flies" in French, but everyone's accent sounded Quebecois.
- (51)The city's largest theater company performed "The Flies"; then they invited a professor to discuss Sartre's philosophy when the play was over.

In the first sentence, the "space" built by the sentence is wider initially but narrows to encompass only the actual actors on stage. In the second, the "space" narrows in a different direction, since we hear a programming decision like pairing a performance with a lecture as made by a theater's board rather than its actors. I disucssed similar modulation in concptual schemas rlated to plurality and pluralization earlier; what is distinct in ths last examples is how the interprtive processes for cognizing plurality are shaped by agreement-patterns (like *it* or *they* to a composit antecedent) as much as by lexical choice and morphology in isolation.

I have accordingly outlind a theory where lexical, morphological, and morphosyntactic layers all introduce "triggers" for cognitive processes, and it is these procsses which (via substantially prelinguistic perception and conceptualization) ultimately deliver linguistic maning. What is *linguistic* about these phenomena is how specifically linguistic formations — word choice, word forms, inter-word agreements in form — trigger these (in no small measure pre- or extra-linguistic) interpretations. But as I suggested this account is only preliminary to analysis of how multiple interpretive processes are *integrated*. Linguistic *structure* contributes the arrangements through which the crossing and intersecting between interpretive "scripts" are orchestrated. Hence at the higher linguistic scales and levels of complxity, the substance of linguistic rsearch, on this view, should gravitate toward structural intgration of intrpretive processes, even more than individual intrpretive triggers themslves.

This higher scale is my focus in the nxt section — seen from the perspective of formal and computational models as well as everyday language use.

Part III Procedures and Integration

So far I have criticized paradigms which try to account for linguistic meaning via concordance between linguistic and proppositional structur; the shape of predicate complexes. This critique has two dimnsions: first, although a predicate structure, a predicative specificity, does indeed permeate states of affairs insofar as we engage thm rationally, such logical order is not modeled by language itself so much as by cognitive pictures we develop via interprtive processes *triggred* by language dtails but, I believe, to some not insubstantial degree pre- or xtra-linguistic. Moreover, second, insofar as we *can* decelop formal models of language, these are not going to be modls of prdicate structure in any conventional sense. Cognitive-interpretive processes may have formal structure — structure which may even show a lot of overlap with propositional forms — but these are not *linguistic* structures. Insofar as language triggers but does not constitute interpretive "scripts", the scripts themselves (i.e., conceptual prototypes and perceptual schema we keep intelectually at hand, to interpret and act constructively in all situations, linguistic and otherwise) are not linguiatic as such — and neither is any propositional order they may simulate. Language *does*, however, structure the *integration* of *multiple* interpretive scripts, so the structure of this integration *is* linguistic structure per se — and formally modeling such integration can be an interesting tactic for formally modeling linguistic phenomena. However, we should not assume that such a formal model will reemble or be reducible to formal logic in any useful way — formalization does not automatically entail some kind of de facto isomorphism to a system of logic (if not first-order then second-order, modal, etc.).

Instead, I want to focus in on branches of computer science and mathematics (such a process algebra, which I have already referenced) as part of our scientific background insofar as the *structural integration* of diverse "processes" (computational processes in a formal sense, but perhaps analogously cognitive processes in a linguistic sense) can be technically represented.