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The Treatment of Ordinary Quantification in English Proper

Abstract. In this paper we bring together some well-known lines of criticism directed at Montague Grammar, such as (i) taking a stilted, highly regulated variety of language as the object of inquiry; (ii) ignoring the meaning of content words; and (iii) the failure to treat hyperintensionals; and suggest a coherent, and we believe much simpler alternative based on structured meanings.

INTRODUCTION

Among the many inventions that made PTQ such a monument of intellectual achievement was the insistence on presenting a significant fragment of *ordinary* English, as opposed to the semi-formalized (sometimes fully formalized) and regimented English-like sublanguages used in most works of philosophical logic at the time. Yet upon rereading the founding papers of Montague Grammar (MG), in particular (Montague 1970a, 1970b, 1973), all reprinted in (Thomason 1974), linguists brought up in a more descriptive tradition are inevitably struck by the stilted "English" of the fragments. The problem is not so much that the pioneering examples from *Every man loves a woman such that she loves him* to *John seeks a unicorn and Mary seeks it* could hardly be regarded as examples of ordinary language but that there has been an alarming lack of progress in this regard. Nearly forty years have passed, and papers discussing seminumerical puzzles like *At least three professors graded at most five exams from seven or fewer students* are abundant, while the interpretation of ordinary language makes little progress. It's not that people couldn't say things like *My grandmother has more plates than utensils* it's just that they don't.

In this paper, while still avoiding the rough and tumble of actual spoken English, we take a less regimented language variety, that of copy-edited journalistic prose, and investigate the semantics of *ordinary quantification* in this variety we call *English proper* (rather than 'proper English' to avoid the association with primness and pedantry). In Section 1 we discuss how various uses of *for all* and *every* are to be sorted out, and describe informally how the dominant usage of *every* can be accounted for in a model that preserves most of the goals, but very little of the formal techniques, of MG. In Section 2 we suggest that the analysis of quantifiers and similar function words needs to be supplemented by a more detailed analysis of content words, if semantics is to cover more realistic examples—statetements and inferences of the sort found both in ordinary English and in philosophical discourse. Since this brings into sharp focus the traditional puzzles concerning hyperintensionals, we consider these in some detail, and arrive at the conclusion that standard intensional theory is not tenable.

1 ORDINARY QUANTIFICATION

Our sample of universally quantified expressions is drawn from an American newspaper, the San Jose Mercury News (Merc). We manually analyzed 300 issues, totaling some 45 million words, to demonstrate that ordinary quantification is not at all close to the logical variety described in MG. As we shall see in Section 1.1, the data is dominated by a large number of other patterns. Since these are rarely amenable to a purely lexical, purely grammatical, or purely pragmatic treatment, in Section 1.2 we introduce a new Principle of Responsibility that forces us to look at such constructions more closely.

1.1 Universal constructions in English

In our corpus we find over 2400 occurrences of the strings *for all* and *For all*. Many of these could be called idiom chunks: *For all the glamour of aerial fish planting, it was a mass production money-maker []*[1] clearly does not mean anything like $\forall x$*glamour*$(x)(\ldots)$. A descriptive label such as *idiom, (partially) lexicalized expression,* or *snowclone* already hints at the necessity of stepping outside 'pure' semantics, bringing resources of a lexical or pragmatic sort on the issue at hand. In what follows, we will describe constructions as (partially) fixed patterns in the spirit of (Fillmore and Kay 1997), and ask what expressions like *[the Clarence Thomas hearings], for all their import []* or *For all their efforts at parity and fairness, [NFL officials ...]* actually mean. This is not a problem somewhere on the fringes of the data—as a matter of fact, examples like these are considerably more frequent than those involving standard quantifier readings.

[1]For reasons of expository convenience we will often considerably simplify the raw examples, indicating inessential parts by [] wherever necessary. In doing so, we attempt to make sure the simplified example remains an instance of English proper, i.e. an example that could be produced by a reasonable writer of English and would be left standing by a reasonable copy-editor.

We define a *construction* as a string composed of nonterminals (variables ranging over some syntactic category) and terminals (fixed grammatical formatives and lexical entries) with a uniform compositional meaning, obtained by a fixed process whose inputs are the meanings of the nonterminals and whose output is the meaning of the construction as a whole. Completely productive and highly abstract grammatical patterns such as

(1) $NP<\alpha PERS\ \beta NUM>\ VP<\alpha PERS\ \beta NUM\ \gamma TENSE>$

and highly specified and almost entirely frozen idioms such as

(2) $NP<\alpha PERS\ \beta NUM>$ *kick*$<\alpha PERS\ \beta NUM\ \gamma TENSE>$ *the bucket*

will both be treated as constructions. On occasion, when we are interested in the substitution of one construction into another, it will be necessary to assign a grammatical category (defined as including morphosyntactic features specified in angled brackets) to the construction as a whole, so a syntactic theory roughly along the lines of GPSG (Gazdar *et al.* 1985) is presupposed. The combinatorial flexibility of the constructions suggests that more powerful theories, such as TAGs or LTAGs, (Joshi and Schabes 1997) may actually be a better choice, but for our current purposes, we are not particularly interested in transference across patterns, such as the phenomenon that the agreement portion of (2) is obviously inherited from that of (1). As a limiting case, entirely frozen expressions, i.e. those constructions that no longer contain open slots, like *go tell it to the Marines*, are simply taken as lexical entries, in this case, with meaning 'nobody cares if you complain'. (The indexicals implicit in the imperative *go* and explicit in the paraphrased *you* do not constitute open slots in the sense we are interested in here.)

Viewed from this perspective, the standard case, found in many examples like *the law [] makes helmets mandatory for all motorcyclists and passengers* or *[] lowers the quality of life for all concerned* is yet another construction:

(3) *X for all N*

where N is some (bare) noun phrase and X is some predicative element, often a verb or VP, as in *lowers the quality of life*, but, perhaps surprisingly, more often a nominal or NP, as in *a model for all nations*.

In many cases, the adjacency of *for* and *all* appear accidental, as in *[] honored for all his work* or *sell [] for all that the market will bear* even though in some of these cases the standard analysis ($\forall x$*his_work*$(x)\ldots$ or $\forall x$*market_will_bear*$(x)\ldots$) remains prima facie available.

Turning to *every*, of which there are about five times as many examples, here the dominant pattern is indeed one that lends itself to analysis in the standard terms: *every Californian with a car phone*, *every case*, *every famous star*, ... Remarkably, about 20% of these are time adverbials, *every day*, *every week*, *every time*, *every night* and so on. There are considerably fewer constructions with *every* than with *for all*, but they all share the property with (1) that they admit exceptions. In many cases, this is confirmed directly by the text: *every case*, *except that of Sen. Kennedy []*. In others, the text offers no overt exceptions, but it is clear that exceptions can be made: *every Californian with a car phone* except, of course, drivers of emergency vehicles...

Manual inspection of a large number of *every N<BAR 1>* constructions makes clear that their meaning is really 'every non-exceptional N' rather than 'every N'—in fact, in the whole Merc corpus we could not find a single example of the latter. The results would have been very different with a corpus based on calculus textbooks, and we do not deny that the episodic reading routinely analyzed in MG exists, at least in a regimented variety of technical English—the claim is simply that it is not a part of English proper.

We should add here that we claim no originality in recognizing the problem, as the defeasibility of natural language statements has already given rise to a wide variety of *non-monotonic logic* approaches (for an overview see (Ginsberg 1987)) and the fact that generics admit exceptions is often viewed as one of their defining properties since (Jespersen 1924). If there is an original claim to be made in this area, it is that universal quantification, as the term is understood in predicate calculus, plays no role whatsoever in ordinary English or, indeed, in any natural language.

To put this finding in the harshest possible terms, PTQ fails to deliver on its major promise to treat quantification in ordinary English, concentrating on the jargon of mathematics instead. While subsequent work in the MG tradition such as (Moltmann 1995) and (Lappin 1996) have clearly recognized, and to some extent resolved the local problem of exceptionality, the global problem of dealing with the large variety of relevant constructions sampled here remains as acute as ever.

1.2 The meaning of constructions

Among the thousands of constructions used in English only a handful like *(go) tell it to the Marines* are amenable to a purely lexical treatment, and only a handful like $S \rightarrow NP\ VP$ are purely compositional. In between, there is a vast range of expressions containing one or more open slots, and our primary interest in doing semantics lies with interpreting these. There is a clear intuition that nonce phrases such as *California driver* differ from lexicalized forms such as *Rottweiler dog* only in that the latter is part of the lexicon, and the basic components of its meaning is no longer surface accessible. California drivers are obviously humans with two properties that are true by definition, namely, that they live in California and that they drive a car, and many others that are derivable from these, such that they are above the California driver age limit or that they are featherless bipeds. In the formal model that we outline in Section 3, the meaning of nominals will be taken as a bundle (unordered conjunction) of predicates that correspond to the *essential* properties of the nominal in question. It is clear that both 'being Californian' and 'being a driver' are definitely part of the bundle of properties that form the base of the semantic model for California drivers, and we leave open the possibility that several other predicates are also part of the bundle. For example, it is hard to know whether the stereotype that California drivers are polite is part of the lexicon (viewed as a purely grammatical construct) or belongs in some nebulous encyclopedia of world knowledge. But to the extent speakers of English can and do pursue inferences on this basis, we view it as part of the task of semantics to account for these. We state this as our *Principle of Responsibility:*

> The semantics of any expression must be fully accounted for by the lexicon and the grammar taken together.

The Principle of Responsibility is only slightly stronger than the standard Principle of Compositionality which takes the semantics of any expression to be determined by the semantics of its lexical components and by the grammatical way those are combined. The additional requirement it imposes is that the 'pragmatic wastebasket' remain empty at all times: it doesn't matter whether we call ordinary inferences grammatical, lexical, or pragmatic (and perhaps extragrammatical), the overall system needs to account for these, either in one specific component, or by means of tracing the inference process through several components.

Let us begin with the *for all NP<+DEF>, S* construction. Clearly, this means something like '*S*, in spite of the usual implications of *NP<+DEF>*'. In the case of *the glamour of aerial fish planting*, the implication that needs to be defeased is that glamorous things are restricted to the few, a notion incompatible with *mass production*. The lesson from the example is already clear: to make sense of the construction we need to use a great deal of lexical information. Without doing so, the clear difference between the acceptability of the Merc examples and *???For all their protein content, eggs are shaped so as to ease passage through the duct* would remain completely mysterious.

As for non-exceptionality, mathematics offers two significantly different formal reconstructions of this notion. One approach, exemplified in (4), relates non-exceptionality to probability:

(4) *The typical number is irrational*

and can be rephrased as 'the set of exceptions has measure zero'. The other, exemplified in (5), relates to the satisfaction of no extra predicates:

(5) *The typical square matrix over Q has unequal eigenvalues*

Statements like (4) occur so frequently in mathematical discourse that they have a terminus technicus of their own: we say *almost all [numbers are irrational]*. Statements like (5) are interpreted more in terms of dimension than in terms of measure, and we speak of *lower dimension* when reducing these to more primitive notions.

These two approaches to non-exceptionality are not incompatible, but it may take very significant work to establish, as Martin-Löf (1966) did, that the statement *The typical binary string is not compressible* yields the same definition from both the measure-theoretic and the no-extra-predicates standpoint. Here we choose the second approach in light of the fact that there is no obvious way to define measure spaces over semantic objects like *legal cases* or *California drivers with car phones*.[2] Thus, to say that *Geraldo Rivera [[] reveals that he is an extremely attractive virile hunk of man who] has had sex with [] every famous star in the entertainment industry []* is to say that for all x such that x has no extra properties beyond being a famous star in the entertainment industry, Geraldo Rivera has had sex with x.

A less clumsy translation, very much in the spirit of generalized quantification, would be to say that the property of having had sex with Geraldo Rivera is implied by the property of being a famous star in the entertainment industry, and this is what we adopt for ordinary quantification: we say that *every* N is the set of *typical* properties that N has, where typicality is defined in the lexical entry of N. Since having four legs is typical of donkeys, *every donkey has four legs* will be true by definition, and cannot be falsified by the odd lame donkey with three or fewer legs.

But if having four legs is an analytic truth for donkeys, what about counterfactuals where five-legged donkeys can appear easily, or the rather clear intuition, not disputed here, that being four-legged is a contingent fact about donkeys, one that can be changed e.g. by genetic manipulation? The answer offered here is that to reach these, we need to change the lexicon. Thus, to go from the historical meaning of Hungarian *kocsi* 'coach, horse-driven carriage' to its current meaning '(motor) car' what is needed is the prevalence of the motor variety among 'wheeled contrivances capable of carrying several people on roads'. A 17th century Hungarian would no doubt find the notion of a horseless coach just as puzzling as the notion of flying machines or same-sex marriages. The key

[2]Not only do we need a measure space, we would need substantive agreement that this particular measure is the one that is "natural" to the domain, just as Lebesgue-measure is agreed to be *the* natural measure for real numbers. While defining measures for semantic objects can be done many ways, arguing for any of these as being natural is much harder.

issue in readjusting the lexicon, it appears, is not counterfactuality as much as rarity: as long as cloning remains a rare medical technique we won't have to say 'a womb-borne human'.

A notable consequence of our definition by typical properties is that the translation of *every donkey* will not differ significantly from that of *any donkey*, *a donkey*, *donkeys* or even *the donkey:* the typicality restriction pertains to them all. This is as we want it for cross-linguistic purposes, since the clearly generic readings are not tied to the same varieties of quantified NPs in all languages.

To summarize what we have so far: *every man loves a woman* means neither $\forall x man(x) \exists y woman(y) loves(x, y)$ nor $\exists y woman(y) \forall x man(x) loves(x, y)$—it means that woman-loving is a typical property of men, just as donkey-beating is a typical property of farmers. Importantly, it requires evidence beyond what is available in the example sentences to know whether farmers beat every donkey they can lay their hands on or just their own, and whether men love every women or just one.

2 CONTENT WORDS

Legend has it that once in a semantics class a student asked Barbara Partee *What is the meaning of life?*, and she responded, after a moment of thought, by writing **life′** on the blackboard. Since a key goal of the whole semantics enterprise is to provide a more satisfactory answer, we begin with analyzing two well known approaches. The first one, conventionally attributed to Koheleth, the author of Ecclesiastes, is that life is vanity, entirely devoid of meaning or purpose. According to Macbeth, "life ... is a tale told by an idiot, full of sound and fury, signifying nothing" (Act 5, Scene 5). Perhaps the most articulate exponent of this position is Schopenhauer, but we find many thinkers expressing the same idea before and after him.

The other well known answer is the religious one, that the meaning of life is to serve God. Somewhat surprisingly, given the magnitude and importance of the problem, this answer is relegated to a subordinate clause of a longer story concerned with something else, hidden in a book generally regarded minor, Isaiah 43.6-7, wherein the standard Judeo-Christian approach is spelled out as follows: "bring my sons ... every one that is called by my name: *for I have created him for my glory*, I have formed him; yea, I have made him." Lest the reader feel disappointed we should emphasize at the outset that our primary interest here is not so much with exegesis as with lexicography. Instead of attacking the major problem posed by the student and many before him, we merely seek a technical approach that at least makes it possible to formulate the traditional answers sketched above.

We see in Partee's witty response a deeper truth, namely that Montague semantics lacks entirely the resources to approach issues of word meaning. The problem, from our standpoint, is not so much that we don't know the meaning of life; rather, the problem is that even if we did, we couldn't express it within the standard framework. Assume, for a moment, that the first answer is correct, that life has no meaning. Does this mean **life'** $= \emptyset$, and if so, how can this be derived along the lines proposed by Koheleth, from the observation that "All go unto one place; all are of the dust, and all turn to dust again"? Perhaps we need a subsidiary axiom that meaning is a permanent, unchanging and unchangeable thing, so that if something is not eternal it must be meaningless. But is it the object that must be eternal or is it its meaning, and how would we distinguish the two cases? Or assume, for the sake of argument, that the second answer is the correct one, that God has created Man for His glory. Really, what does this mean? Does it mean, on account of the masculine pronoun being used, that Woman is exluded? And what is *glory* so that even God cares to have more of it? The whole MG framework, which treats the meaning of everything other than a few function words as an unanalyzed set, is incapable of formulating, let alone resolving, such questions.

The issue is really not the meaning of the word *meaning*. The main question could be recast in many other ways, as an inquiry concerning the *purpose* of life, the *goal* of life, and so forth. The technical reconstruction of 'meaning' used by MG as the set of instances in this world or other possible worlds, is quite satisfactory. But what is the set of purposes, the set of goals, or even the set of living things? We do not wish to create a mystery where there isn't one, for there are perfectly reasonable commonsensical answers which accord well both with everyday and with philosophical usage, and every dictionary will have some version of these, stated in terms of a rather simple theory of lexical semantics wherein the meaning of nominals is conceived of as a bundle of properties.

Historically such a theory can be traced back to Leibnitz, the Schoolmen, and eventually to Aristotle. In contemporary semantics this idea is at the foundations of both the Semantic Web (there called Web Ontology Language or OWL) and of the influential WordNet approach to the lexicon (Miller 1983). Yet in contemporary philosophy such theories have little credibility since Russell's (1905) critique of Meinong, with (Parsons 1974) definitely remaining a minority view. The technical difficulty is in formulating inferences based on such dictionary definitions, because the theory that can sustain definitions for nouns such as *fox* composed of properties such as `animal, four-legged, red, clever` can also sustain definitions of inconsistent and/or non-existent objects, to which we now turn.

2.1 Hyperintensionals

Russell had two major objections: first, a technical one concerning the existence predicate. Let us take any nonexistent object of Meinong's Jungle, such as the gold mountain. Such an object doesn't exist, but if Meinong is right, and any combination of properties can be construed as an object, the existent gold mountain is also part of the Jungle, and as such it is not only gold, and mountain, but also existent, contradicting our earlier assertion that it was nonexistent. This objection is easily defeased by splitting the existence predicate in two, 'exists in the mind', and 'exists in reality', and exempting the second meaning from the class of predicates that can be used to describe (or in the mind, create) noun objects. Russell's second point, concerning inconsistent bundles of properties, such as triangular circles, was that they violate the law of non-contradiction. Before going any further, let us consider some examples.

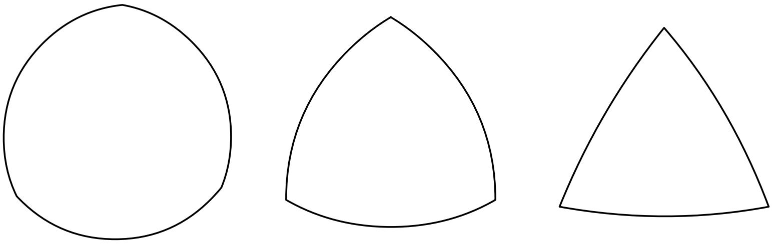

Figure 1. The Reuleaux triangle and its cousins

The figure shows on the left a slightly triangular circle, and on the right a slightly circular triangle. Whether the object in the middle, known as the "Reuleaux triangle", is considered a triangle, a point of view justified by its having three distinct vertices, or a circle, a point of view justified by its having a constant diameter, is a matter of perception.

What is clear from the linguistic standpoint is that adadjectives like *slightly, seemingly, very* attach to adjectives like *circular, triangular, equal* that have a strict mathematical definition just as easily as they attach to adjectives like *red, large, awful* that lack such a definition. Clearly, what these adadjectives modify is the "everyday" sense of these terms—the mathematical sense is fixed once and for all and not subject to modification. Just as we were interested in the everyday sense of *all* and *every* and found that these are distinct from the standard mathematical sense taken for granted in MG, here we are interested in the ordinary sense of *circular*. Working backwards from typical expressions like *circular letter, circular argument*, we find that the central aspect of the meaning is not 'a fixed distance away from a center' or even 'fixed diameter', but rather 'returning to its starting point', 'being cyclic'.

In these examples, the morphologically primitive forms are nominal: the adjectival forms *circular, triangular* are clearly derived from *circle, triangle* and not the other way around. Since derivations of this sort change only the syntactic category of the expression but preserve its meaning, we can safely conclude that *circle* in the everyday sense is defined by some finite conjunction of essential properties that includes 'being cyclic' and that the mathematical definition extends this conjunction by 'staying in an (ideal) plane, keeping some (exact) fixed distance from a point'. Similarly, *triangle* simply means 'having three angular corners' rather than the exact configuration of points and lines assumed in geometry. Taking these notions together, the predicate bundle of *triangular circle* will contain the properties `curve, cyclic, has(three vertices)` and all three shapes depicted above will fit this definition.

A more general example of the same mechanism is provided by the adjectival modification of proper names. Who is *the Polish Shakespeare* that the *"Looking for the Polish Shakespeare" Contest for Young Playwrights* wants to find? Clearly, not some British subject born in Stratford-upon-Avon but a brilliant playwright who is a Polish national. Once we recognize that adjectival modification is not simply a conjunction of some new property to the set of essential properties, but one that may interpose a higher predicate that is only implicit (as is `nationality` in this case), a whole range of otherwise puzzling constructions become transparent. Altogether, English proper has far fewer hyperintensional constructions than hitherto assumed: certainly triangular circles and immaculate conceptions do not give rise to logical contradictions. This renders the well-known problem with hyperintensionals in the MG account of opacity far less urgent, as we now only have to deal with cases in which the essential meaning of the adjective is in strict contradiction to the essential meaning of the noun it modifies, and the latter is given by a single conjunct. Thus we need to consider examples like

(6) *Mondays that fall on Tuesdays*

(7) *Mondays that fall on Wednesdays*

Does it follow that a (rational) agent who believes in (6) must also believe in (7)? While the matter is obviously somewhat speculative, we believe the answer to be negative: if we learn that *Peter believes Mondays can be really weird—he actually woke up to one that fell on Tuesday* it does not follow that he also believes himself to have woken up on one that fell on Wednesday. Since he has some sort of weird experience that justifies for him a belief in (6), he is entitled to this belief without having to commit himself to (7), as the latter is not supported by any experience he has. If this is so, the hyperintensional problem is still relevant, and the intensional treatment of opacity cannot be maintained for all cases. But if it cannot be maintained for all cases, there does not seem to be a compelling reason to maintain it at all, since a simpler alternative treatment, based on structured meanings (Cresswell 1985), is available (see (Ojeda 2006) for detailed argumentation why a non-intensional treatment is to be preferred both on grounds of simplicity and grounds of adequacy). Being algebraic, the structured meanings we use (see (Kornai 2009)) are somewhat different from those used by Cresswell, but all the reasoning that leads to structured meanings remains applicable. In particular, the theory presented here puts fiction on a par with factual discourse: when we assert truthfulness we do this relative to a particular model, so that *Anna Karenina commits suicide* can be true while *Jan Valjean commits suicide* is false, relative to their respective models.

According to Thomason (1977) a heavy price must be paid for adopting a semantic theory based on structured meanings: in brief, such a theory is incompatible with a nontrivial theory of truth. In his discussion of Montague (1963), Thomason argues that any direct theory of propositional attitudes is bound to be caught up in Tarski's (1935) Theorem of Undefinability. However, as Thomason is careful to note, the conclusion rests on our ability to pass from natural language to the kinds of formal systems that Tarski and Montague consider: first order theories with identity, strong enough to model arithmetic. Tarski himself was not sanguine about this: he held that in natural language "it seems to be impossible to define the notion of truth or even to use this notion in a consistent manner and in agreement with the laws of logic". Russell held similar views, calling natural language "a rough and ready instrument incapable of expressing Truth with a capital T".

To replicate Tarski's proof, we first need to supplement natural language with variables. The basic idea—to formalize the semantics of a predicate like *subject owns object* by a two-place relation $\zeta(s, o)$—is fairly standard (although there are significant alternatives that do not rely on variables at all). But the proposed paraphrases for first order formulas, such as replacing $\forall x[\exists y\zeta(x, y) \rightarrow \exists z\zeta(z, x)]$ by *for everything x, either there is not something y such that x owns y or there is something z such that z belongs to x* clearly belong to an artificially regimented extension of English, rather than to English proper. Second, we must assume that the language can sustain a form of arithmetic, e.g. Robinson's Q.

The universality of natural language (or English proper) as a means of supporting logical or arithmetic calculi, is highly doubtful, and using Q we can pinpoint the source of these doubts more narrowly: several of the axioms in Q appear untenable for natural language. Interestingly, the key issues arise long before we consider exponentiation (a central feature for Gödel numbering) or ordering. Q comes with a signature that includes a successor s, addition $+$, and multiplication $\cdot$. By Q2 we can infer $x = y$ from $sx = sy$, Q4 provides $x + sy = s(x + y)$, and Q6 gives $x \cdot sy = xy + x$. All of these axioms are gravely suspect in light of the following Principle of Non-Counting:

$$\text{If } \alpha p^n \beta \in L \text{ for } n > 4, \alpha p^{n+1} \beta \in L \text{ and has the same meaning}$$

The notion that linguistic structures are non-counting goes back at least to Chomsky (1965, 55) and pervades every variety of syntax that we know of.[3] There are many ways we can *start* counting in natural language: we can look at quotations of quotations *(Joe said that Bill said...)*, emphasis of emphasized material *(very very...)*, but there is not a single way that takes us very far—whichever way we go, we reach the top in no more than four steps, and there Q2 fails. Since on this key point, the semantics of natural language expressions parts with the semantics of mathematical expressions, the empirical underpinnings of the Tarski/Montague/Thomason argument are missing: there is no loss entailed by the use of structured meanings, as there was no chance to maintain a Tarski-type theory of truth in natural language to begin with.

3 CONCLUSIONS

Historically, MG started out as an ambitious but quite reasonable research program, explicitly moving away from the stilted examples of an earlier generation of logic textbooks toward ordinary natural language. Indeed, many of the pivotal examples motivating much subsequent work, e.g. Bach-Peters sentences, have an immediate impact, clearly comprehensible to any native speaker. We believe that increasingly arcane examples with increasingly contrived readings reasserted themselves as the primary focus of interest simply because MG and its modern descendants, starting with Dowty (1979), concentrated on elucidating the semantic analysis of those expressions for which the underlying logic had the resources. Since Montague's intensional logic IL includes a time parameter, in depth analysis of temporal markers (tense, aspect, time adverbials) becomes possible. But as long as the logic lacks analogous resources for space, kinship terms, sensory inputs, or obligations, this approach has no traction, and heaping all these issues on top of what was already a computationally intractable logic calculus has not proven fruitful. The goal of this paper was to drastically realign the focus of formal semantics from interesting puzzles and a Turing-complete higher order intensional apparatus to data of the simple and frequent kind that is likely to dominate the language acquisition process. We must crawl before we walk, and if we cannot account for the data that is likely seen during language acquisition our account of more complex phenomena is in doubt.

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[3]Some limited counting, such as the building of binary (and perhaps ternary) feet, is generally assumed in phonology.

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