Attention-Based Syntax

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ABSTRACT

The commonsense understanding of meaning as reference has dominated grammatical thought for thousands of years, producing many paradoxes while leaving many mysteries about language's nature. The paradoxes wane if we assume that meaning comes by directing attention from one phenomenon to another. This transfer of meaning from objective reality to subjective experience breaks with the objective grammatical accounts produced by many philosophers, lexicographers, and teachers through the ages. The bulk of this paper introduces a formal system for parsing sentences according to an attention-based syntax. The effort proves surprisingly fruitful and is capable of parsing many sentences without reference to predicates, nouns or verbs. It might seem a futile endeavor, producing an alternative to a system used by every educated person in the world, but the approach explains many observations left unexplained by classical syntax. It also suggests a promising approach to teaching language usage.

I. Introduction

A) *Meaning*

Aristotle taught that language consists of sounds plus meaning (McKeon; 1946), and the definition has stuck, although we no longer limit language to sounds. Languages can be written or tapped out on jungle drums; they can be expressed with hand signs, or they can be thought. So language is meaning plus… plus what? We might say words, but a typical dictionary definition of a word is something "that symbolizes and communicates a meaning," bringing us back to where we started. A word is a physical something with meaning, just as Aristotle told us.

Naturally the definition leads us to wonder what meaning is. The commonsense notion is that meaning refers or points to something. The word "Paul" refers to Paul, "barn" refers to a barn, and "run" refers to the act of running. This idea works well when we say something like, "A cat ran into the barn," but what about, "The unicorn metamorphosed into an abominable snowman?" None of those things exist, so how can words point at them? Apparently meaning can refer to imaginary things as well as real ones. Here is another sentence, "My trust shattered." *Trust* is not imaginary, and not concrete either. Meanwhile, *shattered* is concrete but in this sentence it is metaphorical. The references in this sentence do not seem to be straightforward pointing. So, while meaning as reference sounds right, it also seems a little off target.

Another problem with talk of meaning is the modern distrust of the immaterial. We can show one another the words, but where is the meaning? Is it something associated with a sound, or something that emerges from a sound? Is it something in the sounds or something carried by the sounds? Do we

unpack it or pick it up? Let's embrace a modern cliché and say we unpack meaning. That gives us a clear image of language at work: a speaker packs meaning into sounds. The sounds travel through space and time to where a listener receives them and unpacks the meaning. It seems perfectly reasonable and can be modeled on a computer, but it explains nothing about what is packed and unpacked.

For example, it tells us nothing about generating language. Our vocal system forms the sounds. Where does the meaning that is packed in come from? As to language origins, it gives us no hint as to how people ever found some meaning to start packing. It also explains nothing about what experienced editors pack or unpack when they sharpen a clumsy paragraph. Nor does it provide even a starting point for thinking about what might be going wrong when children's language does not develop normally. Most people would say it is mad to take the idea of "packing meaning" so literally, but that is the point. Meaning is not a physical thing, so what is it?

A modern view of reference arises from artificial intelligence. What do we do when we think? Personally, I manipulate words. Duke Ellington seems to have manipulated musical notes (Green; 2014). Einstein manipulated images (Bolles; 2004). Computers manipulate electric signals and since brains too are electric, we can say that thinking for Duke Ellington, Einstein or me comes down to electric events in the brain. It is likely true, but that process still does not tell us how meaning gets into our language. One thing goes on in the brain and out comes a different, meaningful thing. Call them what you will—thoughts, concepts, words, references, representations, ideas—when it comes down to meaning, it seems we are painfully ignorant of the nature of what we are talking about and must regretfully conclude that Aristotle has led us into a dead end.

B) Attention

Over the past several decades a new approach to meaning has been growing (see Appendix A) that proposes to eliminate meaning as a direct reference and say that words take their meaning by piloting attention. So, if we are standing by a farmhouse and I say, "A cat ran into the barn," your attention turns to the barn. Suppose, however, you ask me, "How's your script about the unicorn going?" and I reply, "The unicorn metamorphosed into an abominable snowman." I'm directing your attention toward vague stuff, but you can follow me because you are comfortable attending to mixes of the imaginary and the real. Or we can be discussing politics and our disappointment in this or that politician, and you say, "My trust shattered." I understand because, it seems, I can attend to metaphorical phenomena.

The difference between meaning as reference and meaning as attention is that reference is objective, pointing to things in the real world, while attention is subjective, directed toward conscious phenomena, or perhaps attention gives rise to consciousness (Marchetti, 2012). The reference theory of meaning suffers from a naïve realism. It takes our conscious experience as the direct perception of what is

out in the physical world. Naïve realism's classic example is the study of light. Aristotle supposed our conscious experience of hue to be physically real and it took a long time to determine that hue is the way our visual systems present light frequencies. Similar confusion can be inspired by language. We naturally assume that concrete sentences refer to something out there, part of physical reality, but consider:

1.

a. Jack gives Fred the ball.
b. Jack surrenders the ball to Fred.
c. The ball moves from Jack's fingers to Fred's palm.
d. Fred takes the ball from Jack.

Each of these statements seems to be about the same event, but they reflect different points of view. According to classical analysis, they have different verbs while the nouns switch roles as subjects, objects and indirect objects. Naïve realism takes sentences like these as propositions that are either true or false, but sentences 1a-d differ in their interpretations of an event. They present a psychological reality, not a physical one and not a logical one either.

Or consider an abstract sentence: *Justice rolls down like waters*. Justice is plainly not a material thing that literally rolls like a river. Justice is a hope, a dream, an ideal. These days linguists are apt to call it a concept. Whatever name we use, abstractions are psychological realities we impose on a physical world. By finding meaning in subjective attention rather than objective reference, the meaning/attention paradigm has brushed aside many a paradox associated with the old view of meaning. But two and a half millennia of inquiry are not to be dismissed in a moment. We have inherited a huge wealth of scholarship and analysis based on the reference theory of meaning. Can all that simply be imported into a theory of attentional meaning?

Can, for example, classical syntax make sense if we say that meaning draws attention to a psychological reality? Classical analysis is full of hidden assumptions about language referring to physical things. Nouns, for example, are commonly said to name persons, places or things, which are all found in the physical world. Attention, however, does not look at a thing directly. Light travels to the eye, which sends a signal to the brain, which somehow becomes a group of visual sensations that we are aware of and pay attention to. Would syntax be different if it described language in terms of attention to conscious phenomena instead of symbolic reference? This essay asks if it is possible to describe syntax in terms of psychological realities instead of physical ones. And if it is, will attention-based syntax be any better at explaining meaning than the old system?

C) Consciousness

My approach does not imply that I am abandoning all hope of scientific objectivity. Syntax is the study of how words are combined to form grammatical sentences. The sentences themselves are objective things, part of the physical world. We are still going to examine sentences and their parts, but we are going to assume that these parts are the product of a psychological reality.

The classical approach has been to assume that sentences are objective in both their ends and their origins. That method reflects a kind of inverse naïve realism. Whereas ordinary naïve realism imagines that the subjective experiences of color, sound, smell, taste, pleasure and pain are really "out there," classical syntax has taken objective words, phrases, and sentences and assumes that nouns, verbs, and prepositions are really "in there," rattling about inside our heads. We can call that kind of thinking naïve idealism.

Some readers will wonder how anything as mysterious as our psychological reality—or to speak plainly, consciousness—can be studied. There is no need to despair. The discovery of light frequencies did not put an end to the study of color or color perception. We can talk about mixing color X and color Y to get color Z in perfectly clear, scientific way. We can still ask for a red car, even though the redness is psychological rather than physical. It is also true that what you experience as red may not be what I experience as red, but so what? Language gives us an intermediary. I hear *red* and pay attention to something. You hear *red* and pay attention to something. Whether those somethings attended to are identical is beyond scientific knowledge, but scientists can agree on what *red* is.

Consciousness is mysterious only in the sense that we do not know how our material bodies can produce sensual awareness. It is not mysterious in a functional sense. We know at least some of the processes that result in conscious experience (Bolles; 1991):

- **Sensory input**: a variety of organs generate sensations;
- **Attention**: we select some group of sensations (a percept) for closer examination;
- **Memory**: we either recognize the selected percepts or we do not;
- **Binder**: we integrate the percepts into a unified perception.

The essay will make no attempt to explain how these processes are possible. It takes as its patron muse the German scholar Georg Bauer who in 1556, writing under the name Agricola, issued a useful book on metals (*De Re Metallica*), despite his complete ignorance of geological and chemical explanations of the processes that produced metals. By ignoring the many mysteries of his subject and taking their processes for granted, he was able to produce a valuable guide to metallurgy. It was a first step toward scientific understanding. This essay too aims at making the first step on a long journey

toward understanding the organization of sentences in terms of the subjective processes that produce them. I will limit myself to discussing English syntax, although plainly I expect its principles to apply to other languages as well. Those other languages offer a treasure trove of tests for whatever I say in this essay.

II. Bound Perceptions

Let's begin by hypothesizing that sentences are constructed in a manner that is analogous to the neurological creation of a unified perception. The starting point of language is the word, not a sensation, but words can evoke sensations. A word like *rose* can evoke a color, or a smell, or an image. How about a word like *justice*? The evocation will be more personal, more varied. It might be an emotion, an image or a memory. Take another word, perhaps *socialist*. You can look it up in a dictionary, but perhaps the evocation has nothing to do with the dictionary definition. Perhaps it conjures up a picture of Mao Tse-tung or an emotion of fear or the sound of rioters. And if a word inspires no associations, evokes no sensations whatsoever? Then, it is as meaningless to the listener as a word in a foreign language.

Attention is a reflexive response to sensations. An animal may hear a sound and focus its attention on the sound. Words do the same thing; they direct attention to evoked phenomena—images, sounds, emotions, etc. Memory then generates further associations, enriching the original phenomena evoked by a word.

Finally, the attentive animal may organize phenomena into an integrated experience, what some psychologists call a gestalt. That is to say, the various phenomena are bound into a pattern that cannot be summarized by listing the parts. Sentences too are bound together. If we recall sentence 1a, *Jack gives Fred the ball*, and list the parts in some random way—say alphabetically: *ball Fred gives Jack the*—we can see the mystery. Alphabetical listings are just words, and the phenomena they evoke do not form anything larger. The job of syntax is to manage attention and memory in such a way that their phenomena bind into a whole. This paper's ambition is to propose a way that syntax might succeed at its task.

As there is always some difficulty in discussing subjective experiences, this essay will always use subjective terms in a technical way:

- **Phenomenon**: general name for any conscious experience. Used when not referring to a more specific conscious experience.
- **Sensation**: a minimal part of awareness, such as a hue, tone, flavor, etc.
- **Percept**: a grouping of sensations such as a loud noise, red shape, etc.
- **Bound perception**: a grouping of percepts that form a unified experience.

The bulk of this paper is devoted to the problem of how separate percepts can be bound together linguistically.

A) Single words

There is a natural experiment that lets us see the working of language before it binds single percepts into whole ones. Children between about 12 months and 18 months of age typically use single words. Common words are *juice*, *mama*, *up* (as in 'pick me up'), *eat*, *go*, [*ba*]*nana*. Parents are tempted to read fuller meanings into these words, but taken as they are, they do not present listeners with bound perceptions. They identify phenomena.

There is no need to assume any special intellectual evolution was required to get to the single-word stage. Sign language experiments with chimpanzees and other apes have shown that they too can use words like "apple" or "hug" although they do not use the words in the manner of infants. At the single-word level there is also only a theoretical difference between attention and reference. Children sometimes develop words of their own and perhaps they mean something personal by them, but as no one else understands these words we are left with the fact that all first words tell us about the physical world. It is only when we start combining types of phenomena that the reference/attention distinction becomes important; that is when s[1] begin telling us how they see the world.

B) Two-word utterances

At about 18 months children begin combining words, grouping sensations into single percepts, but they still do not express bound perceptions. They say things like *biggie doggie* or *more cookie* which clarify something about a phenomenon rather than unify it. Toddlers at this age are beginning to use phrases, which we can define as words that combine to clarify a phenomenon. The phenomenon specified in a phrase is the sum of its parts. *Big dog* tells us more than the word *dog* alone, but it does not fundamentally alter the scene.

The simplest bound perception is a two-word sentence that weds two different types of phenomena.

2.

a. Jesus wept.
b. Etna erupted.
c. Click OK.
d. Enter password.

[1] This essay uses the word *speaker* to identify anyone who generates words: speaker, signer, writer, drummer. *Listener* identifies anyone who pays attention to what the "speaker" generates.

Sentences 2a-d each name two perceptible phenomena—a thing and an action. Depending on whether the thing acts or is acted on, the action can be named first or second. The result is the wedding of two distinct phenomena into one coherent event. When we add a third party to the scene, the sentence presents a point of view.

3.

a. Jim kicked the football.
b. The football flew off Jim's toe.

The speaker has the rhetorical option of deciding where to pilot attention and how the scene is to be understood.

C) Elementary Syntactic Structures

This essay's theory of language allows for only three word types that can combine to build syntactic structures:

- **pilots** that direct attention to phenomena,
- **clarifiers** that sharpen the attention's focus, expand it, or specify a relation between pilots,
- **dummies** that look like pilots but do not actually direct attention.

The bulk of this paper discusses how to parse sentences into types of words; however, it does not argue that brains parse these sentences in this way. Parsing is an analytic process, a way of investigating objective data, and in this case sentences are analyzed. Actual listeners are not trying to analyze what they hear, but synthesize its parts into bound wholes. They manage this feat by directing their attention from one focal point to another and binding the points together. Thus, the breaks in syntactic structures mark shifts in attention.

i) Pilots

Pilots direct attention to phenomena and phenomena can either change or not. Thus, there are two possible pilots: those that direct attention to static phenomena and those for dynamic phenomena. The words children use in the single-word stage are all pilots—e.g., static: *mama*, *juice*, *doggie*; dynamic: *eat*, *falldown*, *up*.

(a) Static Pilots:

4.

a. Elizabeth, the Queen of England, spoke before the Canadian parliament.
b. England's queen, Elizabeth, spoke before the Canadian parliament.

c. Canada's parliament heard a speech from the queen.

Classical grammarians call most pilots for static phenomena nouns, pronouns, or noun phrases. We can call them just static pilots, or SPs. The SPs in 4a are *Elizabeth*, *the Queen*, *England*, and *the Canadian parliament*. We can parse the SPs by putting them between vertical lines ||; e.g., |**Elizabeth**| |**the Queen**| **of** |**England**| **spoke before** |**the Canadian parliament**|.

Two of the SPs indicated—*the Queen* and *England*—although separated by the non-SP *of*, seem to be parts of a single expression, so we can add two more vertical lines to show that ||**the Queen**| **of** |**England**|| combines into a single SP.

Another peculiarity of 4a is that both Elizabeth and Queen of England pilot attention to the same phenomenon. We can indicate this identity by placing an equal sign between the two SPs and adding still one more set of vertical lines to show that the whole set of phrases pilot attention to a single, static phenomenon: ||**Elizabeth**|=||**the Queen**| **of** |**England**|||**.**

A fundamental principle of attention-based syntax says the speaker must keep attention focused on one SP until it has been specified. In many sentences, this principle is obeyed automatically because the SP consists of only a single word. In a two word SP, there may be some rhetorical freedom.

5.

a. Jack Johnson went up the hill.
b. *Johnson went up the hill Jack.

Sentence 5a has two SPs: |*Jack Johnson*| and |*the hill*|. Neither SP can be broken up, as was tried in 5b. Classical grammar has long recognized a rule like this, but in this essay the reason for the rule is subjective rather than objective: it breaks up attention.

The first SP in 5a can be reordered, however, as in |*Johnson, Jack*|. In some circumstances that reordering might be preferred; |*hill the*|, however, is never allowed. When it comes to an SP as complex as |*Elizabeth Queen of England*|, this partial rhetorical freedom to organize SPs in different ways allows for many different possibilities. The two top SPs can be reversed: |*The Queen of England Elizabeth*| and then the second subSP, |*Queen of England*| can be reversed to |*England's Queen*|.

The presence of so many rhetorical options makes the production of a sentence more than a computation of the correct syntactical structure. Rhetorical concerns lie beyond the scope of this essay, but they are at play throughout the production of sentences.

English allows many unusual words to be transformed into SPs. In 6a-b we see a brand name (Xerox) that has been turned into a classical verb, and then the verb turned into a classical gerund which is said to be a classical noun, although *xeroxing* is neither a person, place nor thing. In attention-based

analysis we would say that the brand name was turned into the name of a dynamic process (see 6a) and then the process was stripped of its dynamic quality, converting the word back into an SP (6b).

6.

a. I xeroxed the entire manuscript.
b. Xeroxing destroyed the mimeograph industry.

(b) Binders:

Verbs and verb phrases are the classical word-types that name actions. In attention-based theory, we could call them dynamic pilots, but because they bind one or more SPs into a unified perception I will call them binders. When we parse sentences, we can mark the binder with slash marks //. Thus, we can parse 4a: **||Elizabeth|=||the Queen| of |England||| /spoke/ before |the Canadian parliament|**.

In English, binders are usually placed after the first SP (the subject), so sentences 7a-b are not proper. Even so, if someone addressed an English speaker, especially if the address was accompanied by a foreign accent, the listener could probably discern the meaning. That intelligibility follows from the way the sentences maintain the integrity of the SPs.

7.

a. *Spoke Elizabeth, the Queen of England, before the Canadian parliament.
b. *Elizabeth, the Queen of England, before the Canadian parliament spoke.

Elementary English sentences contain only one binder, although the binder may consist of several words expressed one after the other. Creole languages do allow multiple consecutive binders, as in *He walked held the ball* (Bickerton 2008), but English syntax does not use that form, saying *He carried the ball* instead. The instability of the *walked-held* form is easy enough to grasp if you think in terms of binders instead of verbs. *Walked* does not bind *the ball*, whereas *carried* does bind both SPs to the same event.

ii) Clarifiers

There are a number of small words in sentence 4a that we have not yet examined: *the*, *of*, and *before*.

(a) Sharpeners

Sharpeners are words that clarify something about the pilot word; it can sharpen either an SP or a binder. In classical grammar they are usually called adjectives or adverbs, but we will also see that classical articles, nouns, and pronouns can serve as well. Their task is to sharpen the focus of attention from, say, *dogs* to *big dogs*, or from *any dog* to *the dog*.

Sentence 4a uses *the* twice: *the Queen*; *the Canadian*. They specify the SP's singularity. We can parse them by placing parentheses () around sharpeners; e.g., **|(the) Queen|**. In this structure we can call

the a sharpener and *Queen* a head. The same process applies to the other SP with two sharpeners: |**(the) (Canadian) parliament**|. Notice that *Canadian* is also parsed as a sharpener. The word *parliament* is the SP's head.

A head is the minimal part of the SP needed to pilot attention to a phenomenon, e.g., ~~*the*~~ *Queen* and ~~*the Canadian*~~ *parliament*. Using that guide, we can look at the whole of the compound SP, ||**(the) Queen**| **of** |**England**||. As it was the Queen and not England who spoke, we can declare Queen as the compound SP's head and *England* as a sharpener: ||**(the) Queen**| **of (**|**England**|**)**|.

We can even generalize and say that in compound SPs formed this way—e.g., *the limb of a tree*; *the title of the book*; *the Jack of spades*; etc.—the SP before *of* is the head of the compound SP. Meanwhile, the head of the reverse of these forms—*England's queen*; *the tree limb*; *the book's title;* etc.—is the compound SP's last word. Thus, reversing a sentence's compound SP does not change its head.

In the even more complex SP, |*Elizabeth = Queen of England*| the subSPs on either side of the equal sign have a head. We could collapse the whole thing to a single-headed SP, |Elizabeth of *England*|. Again we see that rhetorical freedom makes the production of a sentence more than a syntactical computation.

Sharpeners may be required by a language's grammar, but an utterance without any sharpeners remains intelligible: *Elizabeth Queen spoke before parliament*. Utterances without heads are not so easy to decipher: *The of England spoke before the Canadian.*

Sharpeners clarify pilot words. They do not sharpen other sharpeners. In sentences 8a-b, *red* sharpens *book*. Sentence 8b then tries to sharpen *red*, but it breaks the attention focus on *book*, and we have seen that SPs must be unified. 8c shows the solution, turn the sub-sharpener into part of the SP's sharpener.

8.

a. Mao's little red book was once owned by every Chinese citizen.
b. *Mao's little red like a fire-engine book was once owned by every Chinese citizen.
c. Mao's little fire-engine-red book was once owned by every Chinese citizen.

(b) Joints

Joints connect two phenomena by showing a relation between them. The relations are typically spatial or temporal. In classical English grammar, joints are typically called prepositions or conjunctions. Sentence 4a has two such words: *of* and *before*. We can parse these joints with less-than/greater-than signs <> and are finally able to parse 4a completely: ||**Elizabeth**|=||**(the) Queen**| **<of> (**|**England**|**)**||

/spoke/ <before> |(the) (Canadian) parliament|. The first joint links two SPs: |*Queen <of> England*|. The second links a binder and an SP: /*spoke*/ <*before*> |… *parliament*|.

The goal of this parsing is to understand how the sentence pilots attention. At the highest level of analysis, sentence 4a parses: |SP| /binder/ <joint> |SP|. In other words, attention shifts from *queen* to *speaks* to *before* to *parliament*. Working memory allows *speaks* to bind the different focal points into a unit. Different languages will arrange these units in different ways and the units themselves can be organized in many ways. The greater a language's morphology, the greater the rhetorical freedom in organizing the words, but every language binds focal points of attention. If that hypothesis fails, attention-based syntax fails with it.

iii) Joints versus binders

Joints and binders are similar in the way they united other syntactic structures. A joint, however, connects only two syntactic structures, while a binder unites a complete perception. Sentence 9a shows the difference.

9.

a Elizabeth spoke <in> French <before> the Canadian parliament <about> her wartime memories.

Elizabeth and *spoke* are bound together for the whole of the sentence: Elizabeth spoke in French; Elizabeth spoke before parliament; Elizabeth spoke about memories. You can add or subtract jointed SPs as you please. The sentence will still work, so long as the binder works.

English offers a great variety of joints. *And* is a joint used to declare equal status between two structures of the same type:

- **SPs**: |Jack| <and> |Jill| went up the hill.
- **Binders**: Frieda /ran/ <and> /told/ her mother.
- **Sharpeners**: Ned wore a (black) <and> (orange) T-shirt.
- **Joints**: The ants crawled <in> <and> <on> the food.

Note that when joining two binders we move beyond elementary (one-binder) sentences. We will discuss this case more fully in section III, *Beyond Bound Perceptions*.

Or expresses uncertainty about the word to use, although, again, the type of words match:

- **SPs**: |Jack| <or> |Jill| fell down.
- **Binders**: Frieda /ran/ <or> /hid/ from the monster.
- **Sharpeners**: Her hat is (black) <or> (navy).
- **Joints**: The road passes <over> <or> <under> the mountain.

iv) Dummy Pilots

Dummy pilots make a sentence sound right to a native English speaker without doing the work of a real pilot. They do not steer attention to a phenomenon and their existence seems to challenge the hypothesis "every language binds focal points of attention." The hypothesis offers an out by describing a full language rather than every sentence, but a sentence composed of nothing but dummy words is a meaningless idiom—e.g., *It is what it is*. Dummy remarks are possible because not all intelligible thoughts require fully bound perceptions. A person waiting in line at a bus stop may step off the curb to peer down the street and say, "Coming." Commands like, "Hold that thought," do not say who should do the holding.

(a) Dummy Static Pilots

10.

a. It snowed in Brazil.
b. *Clouds snowed in Brazil.
c. Snow in Brazil!
d. Snow fell in Brazil.

I have argued that binders reveal the relation between SPs, but in sentence 10a, what is the relation between *Brazil* and *it*? What indeed snowed? Oddly enough, sentence 10b seems not to be correct English even though snow does come from clouds. We could speak an unbound utterance, as in 10c, but English syntax generally uses a dummy pilot that points to nothing; the utterance is disguised as a full sentence: **{|It|} /snowed/ <in> |Brazil|**. The wavy brackets indicate a dummy; the vertical lines indicate it is a dummy SP. The perfectly acceptable alternative, 10d, suggests the problem is with 10a's binder; however, 10a is a common expression and cannot be waved away.

(b) Dummy binders

Dummy binders do not direct attention to a dynamic phenomenon and do not bind SPs. Dummy pilots replace binders so often that classical grammar treats them like any other verb and typically makes room for them by saying that verbs express either actions or states of being. This generosity of definition obscures the fact that utterances with action verbs are dramatically different from utterances without them. Each of the dummy-binder sentences in 11a-f can be rewritten as an SP:

11.

a. Elizabeth {/is/} queen of England. (Elizabeth, queen of England,…)
b. That boy {/will be/} president of the United States. (That boy, future president of the United States,…)
c. George Washington {/was/} a proud man. (Proud George Washington…)

d. That book {/has/} a beautiful cover. (That book with a beautiful cover…)
e. Her hat {/had/} pink ribbons. (Her hat with pink ribbons…)
f. I {/do/} too. (I too … [whatever *do* replaces].)

The ability to rewrite dummy binders as SPs without changing meaning indicates that the difference between the two forms is rhetorical. Quite often, too, a speaker will have nothing to add and must be content with sharpening an SP.

Note that the most common dummy binders are also used as auxiliaries, i.e., the part of a multi-word binder that expresses tense but does not pilot attention to a dynamic phenomenon.

Table 1

Attention-Based Syntax: Names and Notation				
Structure	Symbol	Classical Correspondence	Function	Example
Pilot				
Static Pilot (SP)	| |	Noun, pronoun, n phrase	Direct attention	|cow|
Equivalence	=		Formal equivalence	|my friend] = |Bob|
Binder	/ /	Action verb	Bind SPs	/flew/
Clarifier				
Sharpener	( )	Adjective, adverb	Particularize pilots	(big) dog, ran (fast)
Joint	< >	Preposition, conjunction	Link two phenomena	flew <over> Kansas
Dummy				
Dummy static pilot	{| |}	Some pronouns	Mimic an SP	{|It|} snowed
Dummy binder	{/ /}	State-of-being verbs	Mimic binder	It {/is/} I.
Bound Perception				
Topic	[ ]	Clause	Name full perception	Yet [Jill came here]
Interrogative	¿ ¿		Seek information	Who ¿came here¿

D) The Elements Together

These elements can be combined in many ways to make a boundless number of statements, just as consciousness's workings allow us to encounter a boundless number of perceptions. When a group of words are organized syntactically into a sentence, the whole becomes more than can be discerned by listing its parts. This difference is one reason it has proven so difficult to program computers to use language effectively. They can process symbols much more quickly and accurately than humans can, but both speaking and listening harness our perceptual system in both its conscious and unconscious operations. We are unconscious of how the brain transforms either sensory or verbal input into

phenomena. We are, by definition, conscious of the phenomena we attend to. We are unconscious of the ways in which we recognize the phenomena, and are equally unconscious of how the things we attend to are bound into a whole. We are, however, quite conscious of the whole perception that is bound together.

Another unusual human trait is that we seem powerfully motivated to understand what someone means. We try to work out confusing and irregular sentences. We seem to have some sort of interpretive instinct that urges us to work out the meaning of obscure remarks. Thus, ambiguities, interruptions to rephrase a remark, and poor constructions can be overcome and digested.

(a) Ambiguity of type

We see that consciousness follows a spatial-temporal logic rather than a more mechanical computation. Part of the price of that logic is a lack of categorical certainty; ambiguity is built into the system and we cannot always insist on a taxonomy. The benefit of this taxonomical uncertainty is exactly the one that comes in the biological world: things can evolve that were impossible under the old logic. A purely mechanical world either works or breaks down. Language can adapt.

English is particularly prone to syntactical ambiguity because it is an analytical language; that is to say it relies more on word order and word combinations than on morphology to express grammatical relationships. For example, should we parse sentence 12a **/took out/** or **/took/ <out>**? The final SP in 12b suggests some people have combined the two words, although the binder *take* is a very old, solitary word.

12.

a. Mary took out a book.
b. Mary brought home some take-out.

The result of hearing joints as part of a binder is the way English binders can consist of long strings, e.g. *put up with* and *duck on out* or even complex conjugations like *I /am going to see/….* Sentence 13a parses as a sentence with a long binder: |**Fred**| **/is going to see/** |**that movie**|. It seems simple enough.

13.

a. Fred is going to see that movie.
b. Fred is going to New Orleans to see that movie.
c. *Fred is going to New Orleans see that movie.

But now look at 13b. Superficially, it looks like it should parse the same way 13a parses. On closer examination, however, we see that the insertion of *New Orleans* causes problems. The first part of the sentences parses: |**Fred**| **/is going/ <to>** |**New Orleans**|…. Not only is the long binder of 13a interrupted by an SP, but the *to* has become a joint. It may be easier to credit the transformation into a joint if we

change 13b's binder: *Fred is driving to New Orleans to see that movie*. In that case, **|Fred| /is driving/ <to> |New Orleans|**… is a standard attention-based analysis.

We still have trouble. In 13a, *to see* was part of a long binder. In 13b the binder has broken up, yet we still have *to see*. 13c, without the *to*, is unacceptable. What's more, we have two binders—*going* and *see*—in a single bound perception. This puzzle is not just some tangle from the long binder. It holds for the binder *driving* just as well.

The answer seems to be that *to see* is two categories at once, both oddities in their own right: a two-word joint and an unconjugated binder: *</to see/>*. It is a joint because it links two syntactic structures, |*New Orleans*| and |*that movie*|. It is a binder because it binds |*Fred*| and |*that movie*| into a dynamic relationship. Together, the two binders unite the whole sentence.

Classical grammar calls *to see* an infinitive form and they agree that it does double duty, only they say the form is part noun. That's because they say *to see* is the object of *going*. But attention-based syntax does not recognize nouns and *see* is a binder, not a static phenomenon. The term *infinitive*, however, is convenient and we can keep it.

We still have not come to the end of ambiguities involving the classical infinitive. Sentences 14a–b seem like further examples of the 13a-b type, but "want to give" is not a recognized conjugation of *give*. So is *want to give* a long binder or a binder with an infinitve: */want to give/* or */want/ </to give/>*? I will leave that one unanswered, but there are some phonological clues. Many people pronounce the *want to* of 14a *wanna*, suggesting that their attention does not break between the two words, making them part of a single syntactic structure. Meanwhile, in 13a where we have one long binder, *going to* is frequently pronounced *gonna*, while 13b, where *going to* was declared to consist of two structures, people do not say **gonna New Orleans*.

14.

a. I want to give Fred the ball.
b. I want Jack to give Fred the ball.

(b) Recursion

A typical English SP is structured **|(sharpener) head|**. The sharpener can be repeated, seemingly *ad infinitum*; e.g., *the loyal, honest, handsome, clever, young Lochinvar*. The head, however, is not subject to much elaboration; at best speakers can use a fuller title, e.g., *Lochinvar Q. Jones*.

Binders, like SPs, have a head-and-sharpener structure. Unlike the SP, the binder and its sharpener need not be placed together, as shown in 15a-c.

15.

a. Jim sat violently on a chair.
b. Violently, Jim sat on a chair.

c. Jim sat on a chair violently.
d. *Jim sat on a violently chair.
e. *Jim sat on violently a chair.

Part of this rhetorical freedom probably reflects the fact that binder sharpeners are indicated by the morpheme *–ly*, so there is usually no ambiguity about which syntactic element the word sharpens.

Sentences 15d-e shows there are limits to just how free the placement can be. 15d tries to place the binder sharpener inside an SP—|**(a) chair**|—which is not allowed because it interrupts the focus of attention. 15e tries to get between a joint and the element it joins—**<on>**|**a chair**|—and that act too disrupts the listener's attention.

(c) Rhetorical options

16.
a. Vesuvius spewed ash over Pompeii.
b. Ash from Vesuvius buried Pompeii.
c. Pompeii disappeared under Vesuvius's ash.

Recursion is hardly the only feature of language that removes formal limits to sentences. The relationships between a sentence's SPs can strike naïve readers as inevitable, but speakers have many choices. Even limiting ourselves to syntactic options, speakers have much freedom in creating sentences because they choose the binder that unites the SPs into a single perception. 16a-c each have the same SPs but they are in different relations to the different binders. In 16a *ash* is a direct object and *Vesuvius* is a subject: |**Vesuvius**| **/spewed/** |**ash**|…. In 16b, *ash* is the subject and *Vesuvius* its subordinate: ||**Ash**| **<from>** |**Vesuvius**||…. And in 16c *ash* is a property of *Vesuvius*: …||**Vesuvius**|**<'s>** |**ash**||. Such liberty is possible because bound perceptions are conscious phenomena. It is up to the speaker, not logic or Newtonian forces, to determine the order in which SPs will be attended to.

(d) Working memory

17.
a. Jackie walked out of the, ran out of the restaurant.
b. The political costs of the aftermath of the curse of the crime of the century ruined Nickelby.

Memory both limits and frees our ability to attend to utterances. Sentence 17a is intelligible even though it interrupts an SP, inserts a second binder without warning, and then repeats a joint. The listener probably parses the sentence something like |**Jackie**| **… /ran/ <out of>** |**(the) restaurant**|. We can parse

the sentence because our working memory is rich enough to let us remember *Jackie* even while the output is briefly confusing. Thus, memory lets us alter our sentences as we speak them.

At the same time, memory limits place a practical cap on recursions. A sentence like 17b seems to follow the process of creating an SP. It seems to be a recursive version of the same pattern that gives us the queen of England. The crime of the century parses: ||**the crime**| <**of**> |**the century**||. Two SPs are joined together to form one larger SP. Working memory makes it fully intelligible. We can then join .another SP to the structure to get a still larger SP: ||**the curse**| <**of**> ||**the crime**| <**of**> |**the century**|||**.** It still seems intelligible, yet simply repeating that process gives us the overwhelming 17b.

(e) Hierarchy and garden paths

When it comes to understanding a sentence, classical grammarians imagine a processing hierarchy, as sentences are broken down into phrases and clauses, which are broken down into simpler phrases and single words. Attention-based syntax is not hierarchical in the same way. There are plainly analytical hierarchies: e.g., sentences → phrases → words; bound perceptions → percepts → sensations. Classical grammarians, however, assume that the hierarchies play an active role in understanding utterances. For the past half century and more, classical syntax has used deep level tree diagrams to both describe syntactic structures and to explain how a sentence is both generated and interpreted. The process is said to include operations like move and embed which revise the sentence as it is being produced. Attention-based syntax makes no statements about how the structures themselves are assembled. How does an English speaker organize *the blue sky* while a French speaker (possibly the same person) says *le ciel bleu*? Those subjective processes (if "process" is more than a metaphor) are unobservable. The structures become physical as they are uttered in sequential form, like pearls on a necklace.

As the structures emerge, a listener understands by shifting attention as the words direct. For this system to work, the shift in attention from SP to binder and binder to joint must be clearly distinguishable. We have already seen that the ambiguity between joints and binder phrases leads to a certain movability that can turn joints into parts of a binder. English makes it easy for a second kind of confusion to develop as well. The speaker can shift attention from SP to binder while the listener is still attending to an SP. Spoken English reduces this problem by the speaker's prosodic hints, but written English lacks such clues and can lead to disjointed attention. Sentences that produce this kind of confusion are called *garden-path sentences*.

18.

a. The prime number few.[2]

b. The old man the boat.

In both 18a and b the normal tendency is to parse the first three words as forming a single SP—**|(The) prime number|** and **|(The) (old) man|**—whereas in reality the third word is used as a binder**: |(The) prime| /number/ |few**| and **|(The) old| /man/ |(the) boat|**.

This attention-based view of syntax implies that the full meaning of a sentence (the bound perception) derives from attending to sequential meanings; confusion arises at the point where attention can no longer find a focal point. Listeners must go back and work out the problem, if they can. Normally, speakers and listeners pay attention to the same thing. This joint-attention results automatically in the sharing of understanding.

III. Beyond Bound Perceptions

We have traced the growth of utterances from single words, to simple phrases, to bound perceptions. Each step along the way moves further from biological instinct toward cultural skill. Babies hit upon SPs and binders without special practice, but it takes them years to develop the pronunciation skills that make their speech widely intelligible. Similarly, they have to learn where the binder goes in a sentence and where to put the appropriate SPs. Clarifiers—sharpeners and joints—may require even more learning because they do not grab attention by themselves, and in this section we will examine how language can be used to sharpen a bound perception, or topic as it is called when it is only part of a sentence. At this point language may have taken speakers beyond the thought processes of other animals. Certainly we have gone beyond consciousness of the here and now.

A) Complex Perceptions

Complex perceptions in this essay are sharpened topics. That is to say they can be parsed as **(sharpener) [topic]** or perhaps **[topic] (sharpener)**. Topics are marked between [ ].

i) Word + Topic

Topics can be sharpened by a single word:

19.

a. (But) [Mary loved Peter].

[2] The garden path examples used in this essay come from John M. Lawler, University of Michigan, Ann Arbor (emeritus).

b. (Yet) [Jack stayed in Fresno].
c. (So) [Bill must have been in Las Vegas that weekend].

Classical grammarians tend to dislike 19a on the grounds that sentences should not begin with *but*. This essay is more forgiving. In classical grammar, *but* is categorized as a conjunction, so, logically, it should join two parts of a sentence. In 19a it is used as a sharpener, that is to say it is a word used to alter the topic's simple meaning. It is easy to imagine each of sentences 19a-c being spoken in response to a remark like, "Did you hear? Mary and Jack eloped?"

ii) Phrase + Topic

SPs can be combined with sharpeners and other words to put a topic in context.

20.
a. (In France), [cafés serve wine].
b. [Jack spoke endlessly] (during the trip).
c. (During the trip), [Jack spoke endlessly].
d. [Jack (during the trip) spoke endlessly].
e. (In all justice), [Jack deserves another chance].

Sentence 20a illustrates the basic workings of such a sentence, a sharpening phrase—*In France*—leads into a topic—*cafés serve wine*. The sharpener itself contains an SP and a sharpener. It parses: **((In) |France|), [|cafés| /serve/ |wine|]**. Sentences 20b-c show that the sharpening phrase can precede or follow the topic. 20d, which embeds the sharpening phrase inside the topic is dubious but intelligible; however, if the phrase goes between the binder (*spoke*) and its sharpener (*endlessly*), the result is still more confusing.

Sharpeners in elementary sentences are often overdone, whereas once we move beyond bound perceptions they do not seem to be used enough.

21.
a. (Speaking), [he entered the room].
b. (While speaking), [he entered the room].

Classical grammarians say that 21a has a dangling participle, and they disapprove. Attention-based syntax uses different terminology, but shares in the skepticism. Although the abruptness can sometimes be a valuable narrative technique, the sharpener (21b) clarifies where attention goes.

iii) Topic + Topic

Sharpener phrases can, themselves, be topics, but their role is still to put another topic in a sharpened context, as shown in 22a.

22.

a. (After [we ate a huge meal]), [an expert spoke to us about Tasmania].
b. (When [our family grew quiet]) [mother often sighed].
c. (When (in the course of an evening) [our family grew quiet]), [mother often sighed].
d. ((Once upon a midnight dreary), (while [I pondered, weak and weary, over many a quaint and curious volume of forgotten lore]), (while [I nodded, nearly napping])), [suddenly there came a tapping, (as of some one gently rapping), rapping at my chamber door].

Sentences 22b-c show that recursive separators are possible in these circumstances, and 22d offers a famous case of recursive sharpening phrases used to literary effect.

B) Narratives

A second way to move beyond bound perceptions is to provide a sequence of percepts that tell a story. In English sentences, these narratives require multiple binders. We can imagine narratives that add only an extra SP to a topic, e.g.:

23.

a. *Lion, [the man ran away].
b. *Chinese food, [the woman was hungry again].

We can understand the implied relation between the SP and the topic in 23a-b, but English normally demands a fuller syntax. The standard narrative form is to link two or more topics with a joint: **[topic]<joint>[topic]**.

The simplest joint is *and*, used to link isolated topics—e.g., *I went to town <and> I saw a fair lady <and> I asked her to marry me <and> she said, "No."* These joints could just as easily be periods, but strings of sentences are beyond the scope of this introductory essay.

The presence of two or more binders in a single sentence guarantees some form of narrative.

24.

a. [Jill ran off] and [told her mother].
b. [Jill ran off] and [Jane told her mother].

24a looks easy but has two topics. The second one—*told her mother*—is intelligible only because the listener's working memory recalls that it was Jill who told Jill's mother. (Classical grammarians typically say that a second *Jill* is "understood" as the subject of *told*, but of course the sentence itself understands nothing. Like talk about meaning, talk of things being understood is a way of slipping mind into a supposedly physical analysis.)

24b looks even easier, since the subject of the second topic is explicit, but *her* is ambiguous. Did Jane tell Jill's mother or her own mother? The speaker does not say. A confused listener can stop the story right there and ask whose mother, but uncertainty is built into written text.

Working memory sometimes makes joints rhetorically optional, as in 25a-c. In each case the joint can be omitted without confusion.

25.

a. [I dreamed] <that> [Jack gave Fred the ball].
b. [I hope] <that> [Jack gives Fred the ball].
c. [I know] <that> [Jack will give Fred the ball].

Be warned, however, that omitting joints can easily lead to garden-path confusions.

26.

a. Helen is expecting tomorrow will be bad.
b. I know the words to that song about the queen don't rhyme.
c. She told me a little white lie will come back to haunt me.

In each of 26's sentences, a strategically placed *that* would prevent much disjointed attention.

An alternative to joints is embedding topics within one another, as in 27b, but 27c warns us that this technique quickly overwhelms working memory.

27.

a. [The man ran].
b. [The man [the dog bit] ran].
c. *[The man [the dog [the cat scratched] bit] ran].

Because working memory is so readily swamped by embedded narratives, the heavy lifting of linking topics is managed by topic-to-topic joints. Suppose for example, we want to express the information in 27c. We could try sentence 28a.

28.

a. The cat scratched the dog that bit the man who ran.

The topics in 28a are:

- The cat scratched the dog…
- … the dog … bit the man …
- … the man … ran.

Each of these topics form a bounded perception, but the perceptions overlap. *The dog* is the object of *scratched* and the subject of *bit*. Meanwhile the man is the object of *bit* and the subject of *ran*. It is not enough for the joint to passively link topics as in a string of <and> joints. Listeners must retrieve the

preceding topic's final SP from working memory and link it to the following binder. By doing this extra work, the joints allow us to parse 28a without breaking up the bound perceptions:
[The cat scratched the dog] [<that> bit the man] [<who> ran].

C) Interrogatives

Classical syntax has found that questions of the *who*, *what*, *where*, *when* and *why* type are surprisingly complicated. The reason for this complexity is built into the oddness of the expressive task. In all the previous sentences examined in this essay, the speaker tells the listener something. That is, the speaker creates a bound perception for the listener to absorb. It is as though the speaker had taken a snapshot of something and handed it to the listener. Questions do not work that work that way. The speaker asks the listener to supply missing information that would normally appear in a bound perception. Therefore, interrogative sentences contain two parts, asking and telling portions, that work to ask a question, but do not form a perceptual whole. Since the asking part does not necessarily evoke a phenomenon, it can be marked as a dummy { }. Classical grammarians categorize the interrogative words as pronouns, but as they do not pilot attention to any phenomenon dummies are not true SPs. Since the telling portion does not form a whole, it cannot be marked like a topic and instead will be indicated with inverted question marks ¿ ¿ So, for example, interrogative sentence 29b can be divided into two expressive sections: **{Who} ¿clicks the button¿**. Attention shifts as the sentence moves from one portion to the other.

Perhaps because they do not need to form bound perceptions, speakers have some extra rhetorical freedom in placing the asking portion of the question. For example, sentences 29b-d offer a simple way of asking for information and each question can be answered with 29a. In each case the asking portion of the question replaces the answer found in 29a. Notice that the request for a binder in 29b uses a dummy binder in the asking portion. It parses: **¿|(The) user|¿ {/does what/} <to> ¿|(the) button|¿**.In this case the telling part of the question is split apart, separated by a dummy, and the second informative part is linked to the dummy via the joint <*to*>. We can be confident that *to* is a joint and not part of the dummy asker because the question could also be asked as *The user does what?* If there is nothing to join, the *to* disappears from the usage.

29.

a. The user clicks the button.
b. Who clicks the button?
c. The user clicks what?
d. The user does what to the button?

The most elaborate form of question begins with an interrogative dummy, stressing what a person wants to learn. Sentences 30a-b require a dummy binder as well as the interrogative *wh*- word. In both sentences the dummy binder takes on the work of an auxiliary and does the work of conjugation, resulting in *click* instead of *clicks* (as found in 29c) and *do* instead of *does* (found in 29d).

30.

a. What does the user click?
b. What does the user do to the button?

Despite beginning 30b with an interrogative dummy, a binder dummy, *do*, still is required at the point in the question where a binder would be expected in an assertion. Breaking up the telling portion of the question in this way calls for a joint that links asking and telling portions: **{|What| /does/} ¿|(the) user|¿ {/do/} <to> ¿|(the} button|¿**.

Interrogatives become even more complicated when an answer can have two topics. Sentence 31a, for example, contains two bound perceptions: **[I hope] <that> [Jack takes the express]**..

31.

a. I hope that Jack takes the express.
b. Who do you hope takes the express?
c. What do you hope Jack does with the express?

The simplest way to form a question from 31a is to leave the structure as is: *You hope that who takes the express?* or *You hope that Jack does what with the express?* If the interrogative dummy is moved to the front, the two topics must be compressed into one. The asking portion of 31b thus becomes more complicated: **{Who do you hope} ¿takes the express¿**. In this case *hope* is parsed as a dummy because it is in the asking portion of the sentence. It is immediately followed by the binder *takes* which is part of the informative portion. Still more complex is 31c, which asks for a binder and parses: **{What do you hope} ¿Jack¿ {does} <with> ¿the express¿**.

Classical analysis has made much of interrogative sentences such as 32b; however, it parses according to the same procedure as followed above for 31b and is less elaborate than the parsing for 31c. According to the attention-based system we can parse: **{Who do you want} ¿to give Fred the ball¿**. We needn't go into more parsing details here. The crucial point is that *want* is part of the asking portion and *to* lies in the telling. Therefore, a speaker should respect the boundaries and say *want to* instead of *wanna*.

32.

a. I want Jack to give Fred the ball.
b. Who do you want to give Fred the ball?

Classical syntacticians have noticed this absence of *wanna*, but they have not analyzed interrogatives in terms of attention and bound perceptions. Indeed, interrogatives that begin with *wh*-words have been analyzed as though they were unusually complex statements. To explain the missing *wanna*, classical syntacticians have appealed to what they call a MOVE operation. In essence, the argument is that before the question is produced, the sentence generator produces the rhetorically simpler *You want who to give Fred the ball?* Then, *who* is copied and moved to the front of the sentence and *do* is added, leaving the final computation as *Who do you want* ***who*** *to give Fred the ball?* The second *who* is dropped from speech for the sake of production efficiency. This argument may seem needlessly complicated and speculative, but the theory's defenders have pointed to *wanna*'s absence as evidence. Classical analysts say that this absence is due to interference from the unspoken *who*, and it has been one of their most daunting arguments for the reality of both the MOVE operation and the Universal Grammar that contains MOVE.

Attention-based syntax also expects separate pronunciations of *want* and *to*, because they are part of separate structures. Since both systems predict the same outcome, neither is decisive. At the same time, the argument from MOVE cannot be used against attention-based syntax. The choice for which syntax is superior will have to be made on other grounds.

IV. Conclusion

This introduction to the formal parsing of sentences in attention-based terms has been a demonstration of concept, and I believe it has been successful enough to suggest that the project is on to something. That success still leaves the question of whether there is any reason to pursue it. Every educated person in the world has been trained to speak of nouns and verbs. Why adopt an alternate system?

A) Explicable

Adopting this system would explain a great mystery. One of the persistent questions about syntax asks why syntax works as it does rather than some other way. During the past half-century linguists have learned an extraordinary number of facts about syntax. They have noticed that there is no automatic limit to the number of syntactic structures a sentence can hold. They have found that phrases are respected in all languages. They have also found that children do not have to be taught to respect phrases. When they begin putting nouns and verbs together beginners may say things like *doggie biggie want*, but they do not say things like *biggie want doggie*. They do not need to learn to keep a noun phrase together.

What syntacticians have not learned is why these rules apply. English syntax promotes ambiguity that could easily be avoided if the language used the kind of sharply defined syntax used for a computer

language like FORTRAN or C^{++}. The syntactical system for natural languages seems arbitrary, the product of an evolutionary kluge.

Attention-based syntax explains the basic facts of syntax, the reason syntax can be so varied from language to language, why classical syntax seemed arbitrary, and the reason a classical Universal Grammar is so abstract.

1. The basic facts of syntax arise from the need to pilot attention and bind the different focal points into a whole.
2. Syntax can vary enormously because there are no innate syntactic categories, and no inevitable binding priorities. Starting with the phenomena of consciousness, cultures are free to evolve any possible piloting-and-binding system.
3. Classical syntax seems arbitrary because it ignores the conscious processes that produce utterances.
4. The naïve idealism of classical syntax forces the assumption that objective syntactic categories and structures are innate, but the facts of variability force the universals to be general and abstract. Thus, the generalized universals can offer no help in understanding or predicting any particular syntax.

B) Utility

The new syntax is a more promising teaching guide. Critics and professional writers still like to ask if writing can be taught. On its face, it seems an absurd question. If mathematics can be taught, if acting can be taught, why not writing? At the same time, many tutors have found that teaching classical syntax is no help in getting their students to write clearly. Can it really be that writing well is some mysterious talent, a gift from the genetic or environmental gods?

A more likely explanation is that there is confusion over just what to teach. Classical grammarians teach rules, some good—e.g., *keep pronoun references clear*—and some less helpful—*never end a sentence with a preposition*. The weakness of this approach is that it does not tell writers why these rules exist, and rule-based language guides have usually included a caveat telling readers that one element of good writing lies in knowing when to disobey the rules. For this last bit of wisdom to make any sense, there must be a higher function of writing than following the standard rules. But classical syntax has never offered a hint into what that function might be.

The failure of rules to produce good writing, combined with the manifest absurdity of some rules has inspired a counter policy of advocating teaching writing without rules. That idea is reasonable if language is instinctive and requires no training, and many have tried to argue this point. Yet a preponderance of evidence affirms that people can produce bad writing. That is to say, incomprehensible

writing falls easily from the pen. Nobody who has ever had to judge the essays of 11 and 12 year olds is likely to believe that instinct is the whole story.

Attention-based syntax promises to help students, writers and editors to:

1. base syntactical decisions on an understanding of what the sentence needs to accomplish;
2. base rhetorical decisions on a fuller knowledge of the range of possibilities;
3. base prosodic decisions on an understanding of what can be dropped or added without eroding a sentence's meaning;
4. base unconventional decisions on an understanding of how language can stretch without losing the listener.

C) A New Approach

For all its explanatory power and promise of utility, this approach is bound to dismay many readers because of its grounding in consciousness. Physics, chemistry, biology, and medicine have all benefitted enormously from Galileo's ban on references to subjective qualities. The effort to apply the method to the study of human activities, however, has been far less successful. The humanities—literature, history, art, music, rhetoric, law—have scarcely been touched. It is true that those fields are complicated, but alchemy once seemed hopelessly mysterious and yet progress proved possible.

It is important to remember that Galileo's ban did not succeed because there is no such thing as beauty, pain, a claret-colored dye, or a perfumed scent. For us, these subjective experiences are as much givens as gravity or electricity. Those things, however, have nothing to do with physical actions and by excluding secondary qualities, Galileo chased naïve realism out of science. The approach gave us a way of investigating the natural world in natural terms.

Yet secondary qualities have not gone away. Anybody who attempts to speak only of physical things quickly discovers that most of the subjects that people talk about are out of bounds. Ernst Mach (Mach; 1975) wrote that he wanted to develop a way of talking that did not require him to speak one way about physics and another way about everything else. Einstein (Bolles; 2004) told the wife of his good friend Max Born that although he supposed it was technically true that everything could be reduced to physical measurements, the ambition was ridiculous because it missed all that was meaningful in one's life. Human sciences are not going to progress by pretending that secondary qualities play no role in human activity. Any science that cares to investigate the product of human behavior must face up to the facts that human artifacts have not been produced by physical laws alone. A clay pot dug up in an Athenian ruin is a physical artifact subject to physical laws, but physical laws cannot explain why the decoration is so different from a similar pot of about the same age dug up near Beijing. For those explanations, we need to study the culture and tastes of the two localities.

At this point we have reached a fork in the road. We can say either that there is much about human production that can never be understood scientifically, or we can say that science must include some recognition of the subjective experience that produces so many human artifacts. This essay chose the latter way. Its method differs from the traditional humanities in its inattention to subjective causes. It does not concern itself with any emotional, cognitive, or spiritual reasons for subjective experience. It takes its cue from quantum physics which is content to describe events without understanding their causes or even acknowledging that there are causes to be understood. My method says simply that there are subjective experiences which produce the physical reality of spoken, or written or signed words, phrases, sentences, paragraphs, and so on.

The method is not dualistic in the classic sense of maintaining that the world is composed of two substances, matter and mind. Neither is it dualistic in the more modern sense of conceding that that the world is made only of matter but that matter has two properties, physical and mental. It does not speculate on why we have physical givens like energy or psychological givens like pleasure. It takes the distinction between physical and psychological givens as the way things are and tries to understand them in terms appropriate to their type.

When speaking of artifacts, we should only attribute to them their physical properties. A sentence like, “I saw her and ran,” is a physical thing. We should not say there is some ghostly meaning riding along with it, nor should we say that the sentence contains a second, hidden *I*, that is understood. Take it for what we have, a group of markings on paper.

At the same time, there is no justification for attributing purely physical origins to those markings. Even if we had a brain scan of the neural activity that accompanied the process of writing and were able to determine from the scan exactly what words appeared on the paper, we would not be able to say, “Here is what the sentence really means.” The meaning is no more a ghost riding the brain waves than it is the secret soul of uttered sounds. Indeed, language has no meaning in the Aristotelian sense. That is, nothing physical—no matter, no energy, no information—is added to the sound. Language concerns sounds that evoke psychological phenomena, and consciousness binds the phenomena into wholes.

APPENDIX A: THE MEANING-AS-ATTENTION APPROACH

Although the technical elements of this essay use a notation and nomenclature developed by the author, the work owes much to the presence of an approach developed first by Silvio Ceccato and expanded by many others.

Writings by Silvio Ceccato:

Ceccato, Silvio (1964). *Un tecnico fra i filosofi*. Vol. 1, *Come filosofare*. Padua: Marsilio Editori.
— (1966). *Un tecnico fra i filosofi*. Vol. 2, *Come non filosofare*. Padua: Marsilio Editori.
— (1968). *Cibernetica per tutti*. Milan: Longanesi.
— (1987). *La fabbrica del bello.* Milan: Rizzoli.

He also edited: (1969). *Corso di linguistica operative*. Milan: Longanesi.

Writings in English from this period include:

— (1964). "Automatic translation of languages." *Information Storage and Retrieval* 2.3:105-158.
— (1965). "Operational Linguistics." *Foundations of Language*. 1:171-188.

Writings by others

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Simon Scheider http://www.researchgate.net/profile/Scheider_Simon/publications
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