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The origin of noun phrases: Reference, truth and communication

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Abstract

This paper argues for an alternative answer to Carstairs-McCarthy's (1999) question "Why do all languages distinguish between NPs and sentences?" While agreeing on basic philosophical points with Carstairs-McCarthy, such as the lack of a distinction between truth and reference independent of grammar, I argue that the S/NP distinction is rooted in the basic communicative distinction between Topic and Comment. In the very earliest mental processes, long antedating language, binary structure can be found, with components that one can associate with the functions of identifying or locating an object and representing some information about it. When private thought went public, the earliest messages in any code with rudimentary syntax were of similar bipartite structure, with one part conveying information presumed to be already known to the hearer, and identifying the object that the message is about. The other part of the bipartite message conveyed information presumed to be new to the hearer. This bipartite structure, with its concomitant distinction between types of expression that could fulfil the respective roles, was so central to the main function of public language, namely communication, that it was never eroded away, and is the basis of the bipartite structure found universally in languages today.

Keywords: Evolution; Grammar; Bipartite structure; Topic; Comment

Carstairs-McCarthy (1999) poses an intriguing question: why do all languages exhibit a clear grammatical distinction between whole sentences and noun phrases? Why do **all** (he claims, and I will demur) languages provide parallel NP and S structures to express essentially the same proposition, as in the following examples?

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[$_S$ The S/NP distinction is universal]
[$_{NP}$ The universality of the S/NP distinction]

CM doubts that the S/NP distinction serves any useful function. Finite subordinate clauses and their NP nominalizations are often functionally equivalent. Thus *I hoped that John would succeed* paraphrases *I hoped for John's success*. Why, CM provocatively asks, do languages not dispense with this distinction at the main clause level? Why should there be an S/NP categorical difference between *John arrived* and *John's arrival*?

CM's proposed answer is phonological, and his reasoning is based on form rather than function. The distinction and relationship between whole sentences and noun phrases derives from the formally parallel distinction and relationship between whole syllables, whose nucleus is a vowel, and their onsets, which consist of consonants or consonant clusters. In CM's view "the neural organization underlying syllable structure was co-opted to provide a syntax for strings of 'words'" (148). Negative arguments, telling against CM's phonological hypothesis, have been marshalled by Tallerman (2005a, b), who lists many clear structural differences between syllables and sentences. Uriagereka (2001) has also expressed misgivings about the phonological/syntactic parallelism that CM claims. I will not rehearse these negative arguments here.

I will concentrate here on positive arguments for an alternative hypothesis. This hypothesis has two parts. One part is formally (but only formally) similar to CM's phonological explanation, in that it claims that the grammatical distinction to be explained builds on a deep-seated pre-existing structural dichotomy in neural organization which was co-opted for syntax. In my case, the explaining deep pre-existing dichotomy is semantic, rather than phonological. It is the fundamental semantic distinction between predicates[1] and their arguments. The other part of my rival hypothesis is that the original private semantic function of predicate/argument structure, which did not evolve for purposes of communication between individuals, is very readily co-opted to serve a central pragmatic function in communication between individuals, namely distinguishing between **asserted** and **presupposed** information. In sum, I argue (1) that the pre-existing formal and neurally real distinction co-opted by syntax is semantic rather than phonological, and (2) the syntactic distinction in question now serves an essential communicative (pragmatic) function. The similarity and differences between my position and CM's are itemized below:

CM's hypothesis:

- a pre-existing structure was co-opted;
- that structure was phonological;
- the S/NP distinction serves no communicative function.

My alternative hypothesis:

- a pre-existing structure was co-opted;
- that structure was semantic;
- the S/NP distinction now serves a pragmatic communicative function.

[1] Beware the insidious ambiguity in the term *predicate*. It is used by logicians to encompass terms corresponding to common nouns, verbs, adjectives and prepositions, such as *woman*, *give*, *happy*, and *under*. It is used by linguists to refer to part of a sentence coupled with a subject, as in "Subject–Predicate structure". Logical predicate–argument structure is not the same thing as grammatical Subject–Predicate structure (though I claim a distant evolutionary relationship). In this article, context should make the intended sense of *predicate* clear.

But first a digression is necessary; perhaps it is merely a terminological digression, but it will clarify the main question involved. CM's unquestioning claim for the universality of the S/NP distinction must be seriously doubted, as I will argue. But this does not imply the disappearance of CM's core explanandum; it indicates, rather, that the distinction he has in mind should be re-labelled, and I will re-label it the S/XP distinction. 'NP' means 'phrase headed by a noun'. If a language has no nouns, it can have no noun phrases.

> "According to Tchekhoff (1984), Tongan is a language which completely lacks a noun/verb-distinction. After a detailed analysis of the data, the present paper will arrive at the same result." (Broschart, 1997:128)

This is not an isolated case. Rijkhoff (2003) mentions studies of seven languages and language families[2] for which serious claims have been made that they lack a distinction between nouns and verbs in the lexicon. If these authors are correct about these languages, and they indeed make no lexical Noun/Verb distinction, then there cannot be noun phrases in these languages, since 'noun phrase' is a phrasal syntactic category dependent on the existence of the lexical category Noun. It would follow, of course, that the S/NP distinction is not reflected in the lexicons of these languages.

CM's S/NP distinction is not the same as the Verb/Noun distinction.[3] CM argues (90–91) that a pre-existing Noun/Verb distinction would not inevitably lead to sentence-NP syntax. In fact even a language whose lexicon makes no distinction between Nouns and Verbs still organizes its typical sentences into two parts, in one of which such markers as determiners (typically modifying lexical nouns in other languages) are found, while the other part contains such elements as tense and aspect markers (typically modifying lexical verbs in other languages). The structure of clauses, it would seem in all languages, requires the combination of two distinct phrasal types; in English these are commonly known as NP and VP. And as CM accurately notes, NPs can carry essentially the same propositional content as whole sentences. For Tongan, Broschart labels the two distinct constituents of a clause a 'TAM [tense/aspect/mood] syntagm' and an 'ART [article] syntagm'. Interestingly, Broschart's aptly chosen terminology parallels the move in generative grammar to speak of DPs [determiner phrases] rather than NPs, and of IPs [inflection phrases] rather than S [sentences] or VPs. That is, the top-level phrases constituting clauses are regarded as headed by functional categories (Det and Infl), rather than lexical categories such as Noun and Verb. If we grant the generative reanalysis, which could offer the prospect of unifying accounts of some Noun/Verb languages and some Noun/Verb-less languages, then CM's central question might be re-labelled "Why do all languages make an IP/DP distinction?" But not all languages have determiners or articles, or verbal inflections or tense/aspect/mood markers, so this terminology is not very appropriate to a universal claim, either. I will conservatively and neutrally re-express CM's central question as "Why do all languages make an S/XP distinction?"

[2] Rijkhoff cites the following studies: on Salishan languages (Czaykowska-Higgins and Kinkade, 1998; Kinkade, 1983, 1976; Kuipers, 1968; Thompson and Thompson, 1980; Nater, 1984; Demers and Jelinek, 1982, 1984; Jelinek, 1993, 1995, 1998; Jelinek and Demers, 1994), Nootka (Sapir, 1921; Hockett, 1958; Mithun, 1999; Swadesh, 1939), Mundari (Hoffmann, 1903; Sinha, 1975), Santali (MacPhail, 1953), Tongan (Broschart, 1991, 1997; C. Churchward, 1953), Tagalog (Himmelmann, 1991; Sasse, 1993), Samoan (S.Churchward, 1951; Mosel and Hovdhaugen, 1992). But see Jacobsen (1976) and Schachter (1985) for counterarguments on Nootka.

[3] There may be some confusion on this point in Hinzen's review (2003) of CM's book, at least to judge by a section heading 'The Noun/Verb Distinction as an Exaptation' (772).

Note here a basic similarity between the two ways of partitioning sentence structure, as S/NP in many languages, and into TAM and ART syntagms in a Noun/Verb-less language such as Tongan. The familiar Noun/Verb languages have settled on fixed conventions whereby certain concepts normally permit elaboration by tense, aspect or mood, and do not normally permit elaboration by determiners or possessive markers 'without further measures being taken' (to adopt Hengeveld's (1992) useful phrase). In these languages, a complementary set of concepts are conventionally fixed as normally permitting elaboration by determiners, but not by tense, aspect or mood markers, without further measures being taken. The small number of Noun/Verb-less languages have simply not become so conventionally fixed[4]. But both types of language divide the labour of a sentence into a part that typically deals with the dimension along which things change, namely time, and another part dealing with things which can be located or identified somehow. I will return to this theme later.

Noun/Verb-less languages still observe an S/XP distinction. Certainly Tongan does. Broschart reports:

> ''There are also so-called 'syntactic nominalizations' which replace the TAM-marker by a preposition followed by a determined expression, and where the formerly absolute participant is expressed in a possessive phrase.'' (134)

Broschart glosses his examples of such constructions as 'the laughing of the man' and 'his laughing'. Clearly Tongan provides an S/XP distinction. Why, CM would validly ask, should a language have these non-sentential alternatives, which express essentially sentential meanings?

CM's discussion takes a radical and, I believe, mostly correct, turn, in that he argues strongly against the validity of any distinction between the classical notions of **reference** and **truth**, independent of grammatical structure.[5] Both truth and reference are traditionally held to be relationships between linguistic expressions and more or less complex elements of an extralinguistic world. The philosophically hallowed distinction between truth and reference is nothing more, CM argues, than a distinction between the kinds of linguistic expression anchoring one end of this relationship. Sentences may be true or false, noun phrases may refer or fail to refer. Imagine that you overhear a scrap of conversation in a strange language, whose structure is opaque to you, and an interpreter tells you that it would be legitimate to conclude from this sequence of sounds that John had arrived. Without knowing more about the utterance's structure, you could not give a satisfactory answer to the question ''Did that utterance **refer to** John's arrival or was it **true of** that event?'' Even if the overheard utterance gave signs of completeness, by being clearly and confidently pronounced, with definite pauses before and after, you would still have no way of judging, without a grammatical analysis, whether the utterance referred or was true. Thus, we cannot appeal to any extralinguistic distinction between truth and reference to

[4] A reviewer remarks ''If having no lexical distinction between nouns and verbs merely [sic] means that the same word, without phonological or morphological alteration, can function either as a noun or verb, English is pretty close.'' The objection is loosely worded; to avoid circularity, ''can function either as a noun or verb'' should be rephrased in terms not mentioning nouns and verbs, such as ''can occupy all core sentence positions, and accept all inflectional markers''. The point about English coming pretty close needs quantifying. Certainly many English words are very versatile, but what proportion of the vocabulary do they represent? The same reviewer writes of ''the purely accidental fact that English contains some verbs reluctant to behave like *lock* [which is versatile in the relevant way, JRH]''. Well, major typological differences between languages may in some sense be accidental, but the striking statistical imbalance between Noun/Verb languages and non-Noun/Verb languages certainly calls for an explanation.

[5] CM follows up the arguments from his 1999 book in Carstairs-McCarthy (2005), where he again, convincingly in my view, attacks the common philosophical identification of assertion with grammatically complete sentences. Stainton has also critically discussed this assumption in several publications (e.g. Stainton, 2004a,b).

explain the difference between sentences and noun phrases. Even though this goes against centuries of philosophical opinion, it seems to me that CM's discussion of this issue in the philosophy of language, as reflected in the works of Frege, Wittgenstein and Strawson is correct in many central respects.[6]

CM's argument locates his natural sympathies in a particular tradition in semantics, which emphasizes the centrality of the truth conditions of sentences. CM actually barely mentions the central figures in this tradition (e.g. Tarski, Russell, Montague), but his discussion on the lack of any obvious function for the S/NP distinction reveals a tendency to assume that the paramount function of language is to relate linguistic expressions to an external world. Granted, he mentions pragmatics, and the Topic/Comment dimension, but these are not considered as thoroughly as the matters of truth and reference. CM's discussion of the meanings of sentences and NPs reminds one strongly of the classic Russell/Strawson debate (Russell, 1905; Strawson, 1950), a debate which CM mentions once in passing, but does not relate to his own arguments. In fact, CM seems to be a clear Russellian, in this area at least. CM describes several possible syntaxes lacking S/NP structure, making the point that all the semantic distinctions that one might reasonably demand of a human language can be achieved in these hypothetical S/NP-less languages. He might also have used Russell's style of logical representation, which renders *The King of France is wise* as a conjunction of assertions. Russell's contention is that this sentence has the same meaning as the more long-winded *There is exactly one X who has the King-of-France property and X is wise.* Russell, using a bound variable, has translated a sentence containing a referring NP into a formula containing no equivalents of NPs, and maintains that nothing is thereby lost.[7] Apart from proper names, Russell reduced all NPs to non-referring expressions. This was, of course, exactly the nexus of the disagreement between Russell and Strawson. Strawson claimed that a different kind of meaning, distinct from truth, is involved in definite NPs such as *The King of France.* The key difference between Russell and Strawson is that Russell was content to analyze the meanings of sentences independently of the context of communication between a speaker and a hearer. Russell was only concerned with the truth conditions of sentences. Strawson, on the other hand, was concerned with how sentences are interpreted on particular occasions of utterance, which is why he emphasized the difference between sentences and statements. If you don't consider the differential effects of Ss and NPs in actual communication, and only the contextless correspondence of linguistic expressions to the world, you are probably right that the S/NP distinction serves little or no function. I will develop this idea of the communicative, not strictly truth-conditional, function of the S/XP distinction further below.

Russell probably would not have agreed with CM's radical doubt about the distinction between truth and reference, because, in Russell's view, proper names do refer, and are not true. I am able to follow CM most of the way in his abolition of the distinction between reference and truth, because I hold that semantic representations do not contain rigidly designating proper names.[8] With my (not CM's) position on proper names, I can claim that they are not rigid designators, and that *John*, for example, should be analyzed as an X with some (arbitrary) property of Johnness, and that *Niagara Falls,* to give another example, means something with the

[6] Leech (1969), working in a framework conceived independently from these philosophical traditions, uses the insightful term 'downgraded predication' to describe the semantic content of phrases smaller than whole sentences.

[7] A very recent treatise (Pietroski, 2005), strongly in the truth/reference tradition of semantic analysis, also, like Russell, reduces semantic representations to conjunctions of (one-place) predications. As long as we are only concerned with truth/reference, I can go along wholeheartedly with such an analysis.

[8] CM and I have crossed pens on the issue of proper names before (Hurford, 2003a,b; Carstairs-McCarthy, 2003).

properties that we recognize as distinguishing an instance of Niagara Falls. (There could be a Niagara Falls on Twin Earth.) In other words, I am happy to treat *John* and *Niagara Falls* in the same way as Russell treated *the King of France*. CM does not discuss the most prototypical proper names, such as *John*, here, but if he wants to keep their status as rigid designators, he has to argue that this rigid designation is not a distinct relation to the world from the truth of sentences. I am not sure that he would be able to uphold this argument, even despite his (again radical) skepticism about the ontological distinction between objects and events, with which I also agree. (Objects are just slow events.) But for me, there is a final clear sticking point in the slide toward a total collapse of the truth/reference distinction, and this is in deictic expressions, especially pronouns, like *this* and *that*. These do not rigidly designate any particular entity, but are used to pick out specific referents on particular occasions of use. It would seem wrong to claim that *This* in *This is a pen,* for example, is **true.** My line of argument on proper names is not available for genuine versatile deictic expressions. To the extent that deictic expressions have only demonstrative, as opposed to descriptive, content (to use Austin's useful terms), deictic expressions must be counted as purely referring, and not capable of bearing truth or falsity. CM's argument for the collapsing of reference and truth only works for expressions, like all sentences and almost all NPs that have some descriptive content. Pure deictic expressions have no descriptive content. To amplify, another way of putting this is that *this* cannot involve a true/false distinction, because *this* is purely indexical, not symbolic; *John* and *The King of France* are symbols and can stand in place of what they refer to, whereas *this* is meaningless unless there is something being pointed at or otherwise indicated in the speech event that includes it.[9] I will claim below that this tiny toehold of genuine reference, as distinct from truth, in deictic expressions, has a very ancient evolutionary origin.

In what follows, I will suggest an evolutionary sequence, starting with simple creatures who can notice things about the world, but not necessarily make any long-term cognitive use of such impressions. For such creatures, I will argue, something like the distinction between truth and reference, but not inhering in any relationships between **linguistic expressions** and the world, did pre-exist syntactic structure, and indeed pre-existed language itself by a long margin. After that, I will speculate about more advanced creatures for whom some distinction between focused-on information and incidental (or accidental) information may have been useful in a kind of private internal predecessor of public communication between individuals. Finally, I will come to public communication between individuals, and it is here, I will argue, that the proper function of the S/XP distinction should be located.

It is argued at some length in Hurford (2003a,b) that the neural basis of predicate–argument structure is present in many non-human mammals, and that this neural dichotomy forms the basis of the semantic representations eventually coming to underlie linguistic expressions. Our ancestors had private predicate–argument ways of representing the world long before these representations became associated with any public signalling system, such as language. The structure of these mental representations was *PREDICATE(X)*.

Here *X* is one of a small number (about four) of mental variables (call them *W*, *X*, *Y*, *Z*) that an animal can assign to any object that catches its attention. Such a variable does not have constant reference, but can be assigned to different objects at different times. An animal can typically manage to keep track of about four separate objects at one time. If new objects catch its attention, the variables are re-assigned to the new objects:

[9] I thank a reviewer for suggesting this paraphrase, using *symbolic* for my *descriptive,* and *indexical* for my *deictic*.

> ‘‘The idea of objects of attention as the temporary instantiations of mental computational variables has been developed by Kahneman and Treisman (1992), Ballard et al. (1995, 1997), and Pylyshyn (2000), drawing on earlier work including Kahneman and Treisman (1984), Ullman (1984), Agre and Chapman (1987) and Pylyshyn (1989). The idea behind this work is that the mind, as a computational device for managing an organism’s interactions with the world, has available for use at any time a small number of ‘deictic’ or ‘indexical’ variables.’’ (Hurford, 2003a:277)

Did you notice any infelicity in the use of the term ‘reference’ earlier in this paragraph (‘‘Such a variable does not have constant reference . . .’’)? These mental variables are (somehow) inside the animal’s brain, but their function is to relate to objects out in the world. The term ‘reference’, in some non-linguistic sense, seems appropriate, and indeed neuroscientists often use the term ‘reference’ for the relation between attentional mechanisms and the external objects of attention. Hurford (2003a,b) identifies a well-studied neural pathway, the so-called dorsal stream, as responsible for mediating this attentional reference. Reference in this sense (which is not the sense discussed by CM) is ‘primitive’ insofar as its emergence preceded **linguistic** reference (involving NPs) by millions of years. Several researchers, as noted above, have felt it appropriate to apply the usually linguistic term ‘deictic’ to this ancient prelinguistic form of reference.

Coming now to the *PREDICATE* component of the *PREDICATE(X)* formula, this schematically represents any categorical judgement that an animal may make about the properties of an object of attention. The act of directing attention to an object is carried out by the dorsal stream, and involves no attribution of properties to the object. Once an object is in focal attention, a different pathway, called the ventral stream, delivers judgements about the properties of the object. (See Hurford (2003a,b) for more detailed argumentation.) These judgements may be more or less veridical. In poor light, for instance, an animal may be deceived in coming to some judgement about an object. In this sense, a mentally represented formula such as *GREEN(X)* could be said, by an omniscient objective observer, to be true or false. Here again it is important to realize that there can be a non-linguistic sense of truth. The silent beliefs and judgements of non-linguistic creatures can be true or false.

The *PREDICATE(X)* representation embodies, it is claimed, an ancient and pre-linguistic mental division of labour, correlated with a well-substantiated neural (and non-linguistic) division of labour. Non-linguistic versions of the relations of reference and truth can be associated with the two components of this representation. Mentally referring to an object, in the sense of directing focal attention to it, was and is distinct from forming true or false judgements about it. Note also the temporal relationship between the coming into focal attention of some object (corresponding to the activation of the variable X) and the subsequent application of some mental predicate to it.

The relationship between such prelinguistic predicates and arguments is structurally similar to the linguistic relationship between Ss and NPs in certain ways. Firstly, just as Ss may contain one or more NPs, logical predicates can take as their arguments single objects or groups consisting of more than one object.[10] Secondly, just as Ss are traditionally held to be grammatically ‘more complete’ than NPs, a nonlinguistic predicate can be activated on its own, without the need for any nonlinguistic argument or particular focus of attention. This occurs when an animal senses some property in the ambient environment, not stimulated by any particular object of focal

[10] This is my own preferred way of stating the matter, rather than saying, as is traditional, that a predicate may take one or more ordered arguments. This idea needs development, but nothing crucial hinges on it here.

attention. An example would be ambient temperature – the animal may simply make the judgement *HOT* (non-linguistically, of course) of the ambient environment. Other examples would be *DARK* (the animal notes the effect of night falling), or *ROTTEN-SMELL* (the animal notes a smell around it, not knowing where it comes from). Logically zero-place predicates, such as weather predicates (e.g. *RAIN, SUNNY, WINDY*), are equivalent to whole propositions, whereas predicates which require arguments are not equivalent to whole propositions unless accompanied by their arguments. These formal or structural similarities between nonlinguistic predicate–argument structure and S/NP structure show that predicate–argument structure has the appropriate formal properties that should be found if one is to make a case that it later became co-opted for sentence structure. Meanwhile it is interesting, and supportive of the universality in language of the S/XP distinction, that languages use dummy subjects for weather verbs (as in English *It's raining,* or Arabic *iddunya bitmattar* 'the world is raining') or dummy verbs for weather nouns (as in Polish *deszcz pada* 'rain falls').

Now, how did our species get from a primitive prelinguistic asymmetric dichotomy between referring deictic variables (*W, X, Y, Z*) and predicating judgements liable to truth or falsehood to modern language structure in which there is an S/NP distinction? I have agreed with CM that both Ss and (almost all) NPs can carry the same sort of truth-conditional/referential information. Labelling the semantic difference between the NP *John's arrival* and the S *John arrived* as a difference between reference and truth does not identify different relationships between linguistic expressions and the world; it identifies the same relationship with the world, applying to expressions of different grammatical type. The evolutionary route to S/XP needs to take into account several interacting considerations going beyond truth and reference. These are: (1) the world changes, and some parts of it change much faster and more often than others; (2) advanced animals need to keep mental track of such changes in efficient ways; and (3) language is used not just for private mental representation, but for communication between individuals, mainly about changes in the world.

So far, we have left our hypothetical animal making simple judgements about objects it attends to. Some very simple animals no doubt roam the world doing nothing more than this, and reacting on the spot to their judgements. Perhaps a snail – it registers darkness and humidity and ventures out from under its rock; it follows trails laid by other snails; it eats what smells good to it; it avoids prickly surfaces; it withdraws into its shell when touched roughly.

Such a very simple animal would have a memory for certain types of things, and instinctive reactions to them, but it would have no remembered 'map' of where certain things that it had met before could be found again, nor any record of the condition they were in. A more advanced creature can take advantage of such memory, but this requires storage of the perceptual predicate–argument representations taken in from moment to moment and, importantly, an effective regime for ordering and managing this memory store. Recall that there are only about four variables available for keeping objects in attention at any one time. A completely unordered store of judgements about past objects of attention would be of little use. An unordered store would have possibly thousands of piled-up memories like 'Something green, something smelly, something hard, something brown, something warm, something brown, . . .', perhaps with many repetitions of the same predicate, but without any method of grouping them according to the experiences which caused them, or of retaining important information and discarding inessentials. Advanced animals can take advantage of specific contingent, but not entirely predictable, sets of circumstances, recalled from past experience. Any usable information store needs an indexing scheme, so that the most useful information can be readily retrieved from it. In living organisms, as in computing, the most effective terms

to use for indexing purposes are those which are most stably associated with particular objects, and most distinctive of them.

Imagine that a predator observes a prey animal grazing at some distance. At this moment, it is in a position to register many properties of the prey – its ear-twitching movements, its cud-chewing movements, its tail-flicking movements. There is no reason to doubt that the predator can perceive such movements. But it need not remember them. To catch the prey, the predator needs to get closer, involving a stealthy approach during which it loses sight of its prey. As the predator occasionally peeps out from cover to check up on the prey, the single property that it checks for is *PREY(X)*. For this episode, the predator is keeping track of the external world indexed under the heading *PREY*. The other observed but incidental properties of the prey (twitching, chewing, flicking, etc.) have not been retained as index headings guiding the predator's behaviour in this episode. Many other things twitch and flick, such as blades of grass and nearby birds, but although the prey when first observed was twitching and flicking, the predator has not set as its goal something (anything) satisfying the formula *FLICK(X)* or *TWITCH(X)*. Here I use *PREY* to indicate whatever complex property the predator's brain uses to ensure that it chases just what it first stalked and is not distracted by other things in the environment that may happen to share some of the prey's less distinctive or more transient properties. Some mental predicates are much more important for guiding an animal's long-term behaviour than others. Other things being equal, these tend to pick out the more distinctive and less ephemeral properties of objects important to the animal.

An animal knows the important objects in its environment by their reliably distinctive and relatively unchanging properties. In planning its actions, representations involving such reliable stable properties of the important objects will be formed. During the execution of a particular plan, such properties form the core content of the animal's thoughts. They are what is on the animal's mind – what, in a non-perceptual sense, it is attending to, or currently thinking about. But the best-laid plans of mice and men often meet with surprises. Along the way, the animal may encounter unexpected properties of the objects figuring in its plan. The waterhole may be drying up, or brimming over. The path home may be blocked by a fallen tree, or be unusually muddy due to rain. Such incidental eventualities are of course noticed by an animal, and for a while also occupy its mind, alongside the more lasting representations involved in its overall plan. I will not prolong this tale of animal life, but point out that it leads naturally to a conclusion that the predicates entertained at a given time by an animal's mind may reasonably be expected to fall into opposed categories. Those predicates by which the animal indexes its environment for purposes such as planning are functionally distinguished from other predicates which the animal is certainly capable of registering, but which are ephemeral, or not greatly distinctive of important objects in its life. This opposition may be a cline, rather than a strict dichotomy.

Now note that, although communication has played no role in this tale, and the mental processes involved are all completely private to one animal, the functions of the opposed types of predicate are somewhat like the functions of Topic and Comment in a sentence. One kind of mental predicate serves as given background information about the thing concerned, while the other represents new information about it. Some mental predicates may be foci of attention to mentally represented objects, held in mind over some time, while others are invoked to make on-the-spot judgements about these objects, as the passing show dictates. The devices used in modern languages to indicate discourse distinctions such as Topic/Comment are subtle, complex and varied, and I do not claim that these terms exactly fit the prelinguistic case. I will coin the cumbersome terms 'Already-in-Mind' and 'New-to-Mind' to distinguish the roles that predicates play in a cognitively advanced non-linguistic creature.

Proposing a formalism to represent the relation between such Private-Topic and Private-Comment mental predicates in situations such as that described should not be undertaken lightly. It would seem difficult to do so keeping within the constraints of first order predicate logic. What would clearly be wrong, given the normal conventions of predicate logic, would be something like *MUDDY(PATH)*, which wrongly uses *MUDDY* as a second-order predicate, like *TRANSITIVE* or *SYMMETRIC*. If anything, the relevant second-order predicates are *ALREADY-IN-MIND* and *NEW-TO-MIND* themselves, since they represent, not properties observable in external objects, but the roles played by such properties in the creature's mental processes. Thus one might suggest something like

PATH(X) & MUDDY(X) & ALREADY-IN-MIND(PATH) & NEW-TO-MIND(MUDDY)

or perhaps

ALREADY-IN-MIND(PATH(X)) & NEW-TO-MIND(MUDDY(X))

All this is very speculative, of course, and needs further investigation, not least through empirical research on what actually happens in animal brains. But the story seems plausible to me, and it has led to a picture of mental processes pre-existing communication (and a fortiori language) in which there is an asymmetric binary structural division of a 'thought' into a part containing background information, using stable and distinctive predicates, and a part containing more ephemeral information, typically using other predicates.

Now we come to communication. What is the purpose of communication? It is the passing of information known to one organism to another to whom the information is new. The concept of purposeful communication is rooted in new information. Of course, it is possible to give utterly redundant messages. But communication cannot have evolved for the purpose of conveying redundant information. Some newness in messages is essential to the central and prototypical instances of communication. Let us make the assumption that somehow a conventional mapping between internal mental predicates and public signals has evolved in some species. We need not worry here about whether this conventional code is innate (as it seems largely to be with the vervet monkeys) or whether it is learned, as is the case with the vocabularies of human languages. Let us start with the simplest case of communication, involving just one atomic signal per message and (therefore) no syntax. For such signals to be useful and adaptive, they must in some sense convey new information to the receiver. The information explicitly conveyed by the basic, primeval, one-unit signal was, then, all new information.

What could such new information, conveyed in a one-unit signal, be **about**? There are three possibilities. One is that the predicate in question is a zero-place predicate, such as a weather predicate, applying to the ambient environment. I look out of the window and call to someone further inside the house "Rain!" A second possibility is that the predicate is one-place and the speaker draws the attention of her hearer to the existence in the near environment of something satisfying this predicate. David Copperfield's great aunt Betsy Trotwood cried out "Donkeys!" to alert her servant to the presence of these intruding animals on her lawn.[11] CM's own example "Gosh! A helicopter!" is of this type, and his analysis of such messages is the same as mine. The third possibility is of a one-place predicate, applied to some object already attended to by both

[11] This is Geoffrey Leech's nice example.

speaker and hearer, when the hearer draws attention to some property of this object that the hearer is unlikely to have noticed. I show a colleague a page of writing in an exotic script, and he pronounces ''Georgian''. In this last case, the common focus of attention receives no explicit label in the one-unit message. This is a case where speaker and hearer share the same Private-Topic, because they are both temporarily attending to the same object. In sum, with one-unit messages, there is always some new information, and what this information is **about** is known to speaker and hearer and needs no explicit identification.

(I assume as a null hypothesis that the earliest communicative signals explicitly conveyed only single units of information; this assumption does not deny that the receiver of a one-unit signal may well understand the message in terms of other components implicitly known to both sender and receiver from the ambient situation, or other shared experience, mentally constructing, for example, a two-part predicate–argument structure on receiving a signal which only explicitly identifies the predicate. An alternative hypothesis holds that the earliest single-unit signals conveyed complex multi-unit messages. The debate concerns alternative 'synthetic' and 'analytic' routes to semantically compositional syntax. See Wray (2000), Arbib (2005), Hurford (2000, 2005) for discussion.)

Now consider two-unit messages. Least likely, and only possible in abnormal situations, is the case where no new information is expressed (directly). The most common case is where just one of the predicates conveys new information about some object, while the other serves to identify which object (in the given context) this information is about (''Lunch ready!'' or ''Teddy broken!''). (Sasse (1987) calls these 'categorical' statements.) Such messages, with their Topic–Comment structure, I claim, are the prototypical, central cases of two-unit messages. And conversely, the prototypical case of a message is the two-unit Topic–Comment message. In prototypical cases, a subject NP is the Topic and the VP is the Comment, as in these examples[12]:

The pig	*is in the garden*
Topic	Comment
NP	VP

The pig's being in the garden	*amused the neighbours*
Topic	Comment
NP	VP

A less common type of two-unit message is the case where both predicates draw attention to objects or properties to neither of which the hearer has been attending (''Martians landed!''). Here the whole utterance represents NEW-TO-MIND information, and is thus like a comment without a topic. Sasse (1987) calls this a 'thetic' statement. Thetic statements also support the relevance of Topic–Comment structure to the S/NP distinction, in that patterns of grammaticalizing theticity generally involve some way of demoting the subject, thus weakening the bipartite structure of the sentence. For example, English presentational sentences displace the argument of the main predicate out of sentential subject position, as in:

[12] Expansion with these examples and the subsequent discussion of thetic statements and presentational sentences was suggested by a referee, whom I thank.

There | is a pig in the garden
Comment (No Topic)

(Compare also French *il y a,* Chinese *you,* Arabic *fiih,* and German *es gibt,* etc.) Presentationals are thetic, and so a canonical Subject–Predicate structure is inappropriate, and avoided. This is consistent with the correlation between a canonical Subject–Predicate sentence and a ALREADY + NEW (or categorical) information structure. That is, roughly, Subject + Predicate means Topic + Comment, so if you don't have a Topic, avoid or weaken the Subject. (See Ladusaw (1994) for discussion of presentationals and thetic statements.)

I have sketched out a series of scenarios from private perceptual processes in animals, through private cognitive processes (such as planning) in animals, to public communication in a kind of Bickertonian protolanguage with two-unit messages. The evolutionary route to S/XP structure that I propose is summarized in this table.

Stage	**First component**	**Second component**	**The whole**
1. Simple perception (private)	A mental variable (e.g. *X*) assigned to an object in focal attention	Application of a mental predicate to the variable	A two-part predicate–argument representation, *PREDICATE(X)*
2. Cognitive operations (e.g. planning) (private)	A salient stable predicate, distinctive of the object held in mind	A less stable or less distinctive predicate applicable to the object, and new to the mind	A two-unit thought, with distinguished functional parts, e.g. *ALREADY-IN-MIND(PATH(X)) & NEW-TO-MIND(MUDDY(X))*
3. Public communication	A salient stable predicate, distinctive of an object accessible to speaker and hearer	A less stable or less distinctive predicate applicable to the object in mind and new to the hearer	A two-unit public message, with Topic and Comment structure, e.g. *TOPIC(TEDDY(X)) & COMMENT(BROKEN(X))* "Teddy broken!"

CM discusses the possibility of S/XP structure being derived from Topic/Comment structure, but rejects it. I believe his grounds for rejecting Topic/Comment as a source for S/XP are insufficient. CM's discussion here is quite short, so there are not many points to take issue with.

Early on, CM presents a lively example involving a comparison between a normal English text composed of sentences and a semantically equivalent text composed of the corresponding nominalizations. The example and his argument, both abbreviated, are:

> (36) Bill. Hello. I was sorry to hear you had been ill. You're certainly looking a lot better now!
>
> (37) Bill. Greetings. My regret about news of your earlier illness. A definite improvement in your present appearance

> ''This dialogue sounds quaint and stilted. But once one has got over its strangeness, it is hard to find any reason why we could not communicate through Nominalized English just as effectively as through actual English. The objection that one is at first inclined to make – that it does not distinguish between mentioning and asserting – cannot be regarded as fatal.'' (29 and 30)

The distinction between mentioning and asserting is parallel to my distinction, for the non-linguistic animal, between Already-in-Mind and New-to-Mind. We modern humans are capable of interpreting CM's nominalized text above because we assume informativeness, assertion rather than mere mention. And this expectation of new information is at the heart of any genuine communication.

CM argues that there are many instances in relatively normal language where NPs are used to make assertions. The examples he gives are genuine, but all somewhat marginal to common conversation between individuals, examples, such as newspaper headlines, picture captions, and announcements of guests by a footman. The pragmatic context of all such examples makes it clear that they are assertions of new information, not previously (assumed to be) known to the receiver. And CM gives no examples, and I can find none either, of the converse phenomenon, of whole sentences being used simply to mention, rather than to assert. This is consistent with the claim that all communication involves new information (assertion). CM's discussion around this point makes it clear that he believes that there is a valid distinction to be made between mentioning and asserting. ''A newspaper that trumpeted *Cancer research breakthrough* over a report of a much more modest achievement would be treated with derision if it tried to excuse itself on the grounds that the headline, being nonsentential, did not constitute an assertion'' (31). What CM denies is that the mention/assertion distinction is correlated in any way with the S/NP distinction. But it surely is.

An expression used only to mention something would be incomplete, or be seen as redundant. Consider CM's examples (15)–(18):

(15) The Romans defeated the Gauls

(16) The Romans' defeat of the Gauls

(17) The Gauls were defeated by the Romans

(18) The Gauls' defeat by the Romans

''The topic/comment distinction might account for the contexts where (18) is used in preference to (16), but it does not account for why language has evolved in such a way that in actual English (17) exists alongside (18).'' (93)

Here there is a two-by-two contrast between actives and passives and between sentences and their nominalizations. One might possibly wish, for theoretical reasons, to reserve use of the terms Topic and Comment for the active/passive contrast, preempting its use for the sentence/nominalization contrast. But there nevertheless is a clear discourse-structural or information-presentational difference between the sentences and their nominalizations. If, say, George is known to you and me, and I enter your room and simply say ''George's illness'', you do not naturally take me to be telling you that George is ill. The message is incomplete, because, you expect me to continue to tell you something about an illness of George's that we both know about. If, on the other hand, I say ''George is ill'', the message is complete. CM's nominalized examples above differ from the whole sentences in their role in informative discourse just as clearly as the

actives differ from the passives. If the terms Topic and Comment are not deemed appropriate, for some theory-internal reason, then other terms might be used, and actually 'New-to-Mind' (for sentences) and 'Already-in-Mind' (for nominalizations) seem apt.

The 'Already/New' distinction relates to the Definiteness/Indefiniteness distinction. Most nominalizations of sentences are definite, as with all the examples cited here so far. Indefinite nominalizations do occur, as in *I once witnessed a stabbing*. And not all definite nominalizations indicate information already in mind, as shown by *I once witnessed the stabbing of a nurse by a patient,* though such examples are rather stilted.

Languages can be robust enough in their overall resources to downplay, or even do without, certain distinctions which are routinely made by other languages. Of the three subsystems (lexical category – Noun/Verb, syntactic function – Subject/Predicate, and discourse function – Topic/Comment), only two are nonexistent or significantly weakened in some languages. There may be languages with no Noun/Verb distinction, as discussed above. And there may be languages in which the syntactic function of Subject cannot be identified; at the limit, it is claimed that some languages, for example Acehnese (Durie, 1985:188–191), do not mark the syntactic function of Subject at all. But I know of no claims in the literature for any language lacking a Topic/Comment mechanism, or taking issue with Hockett's (1963) universal claim:

> 4.9 *Every human language has a common clause type with bipartite structure in which the constituents can reasonably be termed "topic" and "comment."* (Hockett, 1963:23)[13]

Modern languages, especially sophisticated written varieties, often take daring liberties with existing rules and patterns. A novel, for instance, may begin with *She*, although the reader will have no clue who this personal pronoun refers to. Such literary usage adds another layer of meaning to the simpler and more ancient conventions, by which, for example, new characters are introduced with grammatical indefinites, as in "Once upon a time, there were four little bunnies." Topics may be marked by various devices, including Topic-marking particles or constructions, word order, or intonation, but every known language does it some way or other, and very pervasively. I take the universality of the Topic/Comment distinction as a clue that it may explain the universality of the S/XP distinction.

To summarize, in the very earliest mental processes, long antedating language, binary structure can be found, with components that one can associate, *mutatis mutandis*, with the functions of identifying or locating an object and representing some information about it. When private thought went public, the very earliest messages in any code with the rudiments of syntax were of similar bipartite structure, with one part conveying information presumed to be, or treated as, already in the mind of the hearer, and serving to identify, or refer to, the object that the message is about. The other part of the bipartite message conveyed information presumed to be, or treated as, new to the hearer. This bipartite structure, with its concomitant distinction between types of expression that could fulfil the respective roles, was central enough to the main function of public language, namely communication, that it was never eroded away or dispensed with, and is the basis of the S/XP found universally in languages today.

[13] Hockett writes that this universal is "shaky in a special way. Although we tend to find these patterns in language after language, it is entirely possible that we find them because we expect them, and that we expect them because of some deep-seated properties of the languages most familiar to us." (Hockett, 1963:23) But in the four decades since Hockett wrote no challenge has, to my knowledge, been made to the universality of Topic–Comment structured sentences.

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