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The pivotal role of metaphor in the evolution of human language

Abstract: There is broad agreement among evolutionary linguists that the emergence of human language, as opposed to other primate communication systems, is characterised by two key phenomena: the use of symbols, and the use of grammatical structure (Tomasello 2003). In this paper, we show that these two defining aspects of language actually emerge from the same set of underlying cognitive mechanisms within the context of ostensive-inferential communication. We take an avowedly cognitive approach to the role of metaphor in language change, setting out how general capacities such as the recognition of common ground, the inference of meaning from context, and the memorisation of language usage, can together lead to the conventionalisation of metaphors, and thence to systematic changes in language structure, including the development of grammatical linguistic units from formerly meaningful elements through grammaticalisation (Hoefler and Smith 2009). We show that the relevant cognitive competences are general-purpose mechanisms which are crucially not specific to language; they also underpin non-linguistic communication, where the same processes lead to the emergence of apparently arbitrary symbols.

1 Introduction

The fundamental problem of human language evolution is concerned with providing explanations of how a linguistic communication system emerged from a non-linguistic state. Although there are deep and ongoing controversies over the precise nature of human language (Chomsky, 1995; Hauser, Chomsky, and Fitch, 2002; Jackendoff, 2002; Langacker, 1987; Tomasello, 2003a), the wider evolutionary problem is almost always, even by otherwise bitter opponents (e.g. Bickerton, 2003; Tomasello, 2003b), operationalised into two distinct sub-problems, namely the emergence of symbolism and the emergence of grammar. Tomasello suggests, for instance, that:

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> [l]anguage is a complex outcome of human cognitive and social processes taking place in evolutionary, historical and ontogenetic time. And different aspects of language – for example, symbols and grammar – may have involved different processes and different evolutionary times. (Tomasello, 2003b, p. 109)

In contrast to this common bifurcation of the problem, we claim instead in this article that the cognitive mechanisms underlying metaphor can provide a *single* solution to the two evolutionary sub-problems. We thus suggest a unified explanation of how human language could have initially emerged from 'no language' and then developed complex grammatical structures. We further argue that these mechanisms actually underpin all human communication, both linguistic and non-linguistic, from its pre-historical beginnings to the present. The paper is divided into three main sections: in section 2 we identify the two fundamental cognitive mechanisms on which metaphor is built, and which form the foundations of our analysis, namely ostensive-inferential communication and conventionalisation. We then apply these same mechanisms to explain both the emergence of symbols (in section 3) and of grammatical structures (in section 4), before presenting our conclusions in section 5.

2 The cognitive underpinnings of metaphor

Metaphor is a creative process in which an existing linguistic form is used to express a meaning similar, but not identical, to its conventional meaning (Kövecses, 2002). Individual metaphors are built on an inferable analogy between the original and the novel meanings, or the 'source' and 'target' meanings in Lakoff and Johnson (1980)'s terms. Importantly, however, metaphor is not a deviant special case of language use, nor is literal use the default setting for language; metaphorical language use is often speciously considered exceptional only because of the seductively erroneous assumption that language is a tool which enables the speaker to encode meaning and the hearer to decode it (Wilson and Sperber, 2012). Linguistic communication is, however, not simply an encoding-decoding process, nor is it even a process of reverse-engineering in which the hearer puts the speaker's original meaning back together again (Mufwene, 2002; Brighton, Smith, and Kirby, 2005); rather it is best characterised by the complementary processes of ostension and inference (Sperber and Wilson, 1995).

The mutual recognition of common ground between interlocutors is the crucial cognitive mechanism which underpins ostensive-inferential communication; it both forms the foundation for the key processes of ostension and

inference, and enables the use of existing conventions in novel ways. Common ground, the knowledge the interlocutors assume they share with each other, has a number of key aspects, including: shared recognition of each other as potential interlocutors; shared understanding of the goal of the communicative episode, built on an understanding of the other's intentions (Tomasello, Carpenter, Call, Behne, and Moll, 2005); the recognition of relevant content from the context of the shared communicative episode; and shared conventions, including existing form-meaning mappings. On the basis of this shared knowledge, communication can be established as follows. The speaker[1] executes an ostensive act whose deliberate and atypical nature marks it as potentially relevant, and thus establishes the speaker's communicative intention. Furthermore, the ostensive act also invites the hearer to inferentially construct a relevant meaning, using as evidence the ostensive act itself, the context in which the act is performed, and the existing conventions shared by the interlocutors. This inferential construction of meaning by the hearer is a fundamentally uncertain and approximate process, which relies on highly idiosyncratic systems of knowledge, individually created by the interlocutors from their different cognitive representations of the world and of the context in which the ostensive act is made, and from their different representations of existing linguistic and cultural conventions. In such inexact circumstances, non-conventional (i.e. metaphorical) use of language is inevitable and ubiquitous, and this leads inexorably to the fluidity and variability characteristic of language.

Metaphors are defined by the analogical connections which can be drawn between the source and target meaning, and are interpreted in the same way: the hearer infers the parts of the source meaning relevant in the communicative context, and constructs an ad-hoc interpretation based on these relevant semantic fragments. The simple metaphor "John's a real pig", for instance, might be interpreted in various ways, depending on the context in which it is uttered: it might suggest that John is very messy, that he is very fat, that his eating habits are messy or gluttonous, or that he behaves very badly, among many others. The actual meaning constructed by the hearer would depend on which of these properties, which are conventionally associated with the source (pigs), appear most relevant and appropriate to the hearer in the current context. The use is clearly metaphorical because the inferentially constructed meaning is only similar, rather than identical, to the conventional meaning of 'pig'. In metaphorical usage more generally, the conventional meaning con-

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1 Note that we use the terms *speaker* and *hearer* in a general sense to denote the communicator and the addressee, independently of whether the mode of communication is vocal or gestural.

tains more information than the meaning which is intended to be communicated; its less relevant meaning components (for instance, having a curly tail or four toes) must be ignored for the communicative episode to succeed. This very abandonment of the less relevant parts of the conventional meaning during the ostensive-inferential process, of course, is the key action which renders the use metaphorical. This ostensive-inferential view of metaphor leads to two interesting conclusions. Firstly, as Deutscher (2005) points out, there are almost always some aspects of conventional meaning which are ignored in a particular communicative episode, because they are irrelevant in the context; metaphor is therefore effectively ubiquitous in human communication. Secondly, we can see that every instance of language use can be placed on a figurative continuum, which runs from true literalness to traditional poetic metaphor (Sperber and Wilson, 1995). This continuum from literal to figurative, metaphorical language use also encompasses phenomena such as metonymy, in which an object may be identified by one of its most salient properties, e.g. reference by a waitress to a particular diner as "The ham sandwich", cf. Sag (1981). In such cases the appropriate non-conventional meaning, namely the identification of a specific individual, is inferred by the hearer as the most relevant use of the metonymic expression, while the conventional, less relevant, components of its meaning must be ignored (Papafragou, 1999). The figurative continuum can therefore be defined in terms of how much of the conventional meaning is disregarded, and how flagrantly these disregarded components clash with the actual meaning communicated.

Successful metaphors, though, are not ephemeral, but rather repeatedly used and adopted by other speakers. A vital part of our account of the evolution of both symbols and grammar, indeed, is the process of *conventionalisation* through which the originally novel usage of a form becomes conventional through repeated use. The cognitive process underlying this transformation is the simple assumption that interlocutors can remember their language use: whenever a form is used metaphorically, both speaker and hearer can add the novel form-meaning mappings to their linguistic repertoire. This memorisation of usage has two important effects: the entrenchment of the new association between form and meaning in the interlocutors' individual linguistic knowledge, and the establishment of new common ground between them. Expressions become entrenched in people's knowledge in proportion to their frequency of use: the more often a form-meaning mapping is used, the more readily accessible it becomes to the user, so that it can become invoked without the potentially complex reasoning which allowed its creation in the first place (Langacker, 1987). A successful metaphorical usage is also new information which can itself be added to the common ground shared by the interlocutors

and thus be used as background knowledge in future interactions: this not only allows the metaphor to be subsequently more easily interpreted, but more importantly it may also allow the metaphor to be used without its original licensing context. Both entrenchment and the establishment of new common ground, therefore, can allow specific metaphorical mappings to become increasingly independent of the context in which they were created. This is equivalent to the linguistic phenomenon of context-absorption (Kuteva, 2001; Traugott and Dasher, 2005), in which a meaning which originally had to be inferred pragmatically from the context comes to be semantically encoded. Once the meaning is part of the conventional meaning, we can regard the original metaphor as having been conventionalised; clear examples of this abound throughout language and are often dubbed 'dead metaphors' (Deutscher, 2005, p.118). Our claim in this article, however, is that *all* linguistic constructions derive from conventionalised metaphors; they are the culmination of originally ad-hoc ostensive acts whose meanings were inferred from context, memorised and subsequently entrenched through repeated use.

3 The evolution of symbols

Metaphor is usually considered as a linguistic phenomenon, as the use of a linguistic symbol in a non-literal manner. We agree with this characterisation of metaphor – metaphor can act on linguistic symbols – but argue that metaphor actually pre-dates symbolism. In this section, we intend to show that metaphor is involved in the processes of ostensive-inferential communication that lead to both (i) the emergence of iconicity and (ii) the emergence of symbolism.

3.1 Iconicity

In a first step, we intend to show that the cognitive mechanisms underlying the ad-hoc creation and use of an icon in an episode of ostensive-inferential communication are the same as the ones employed in the creation and use of an ad-hoc metaphor in present-day linguistic communication. To this aim, we will first have a closer look at the cognitive mechanisms involved in ostensive-inferential communication.

The most basic mode of ostensive-inferential communication is that of *direct ostension*. In this mode, the speaker creates a physical stimulus that allows the hearer to acquire the information that the speaker intends to communicate. If it is understood between the speaker and the hearer that, in the given situa-

tion, it is relevant for the hearer to know whether A or B, then the speaker, who knows that A, can provide the hearer with the information she requires simply by showing her that A. If, for instance, a father asks his daughter, upon her leaving the house, whether she has got her keys, then the daughter can provide her father with the required information simply by making him see how she takes her keys out of her pocket and puts them back in.[2]

Direct ostension does not require that the hearer recognises the communicative intention of the speaker: the hearer will acquire the information that the speaker wants to pass on to her by observing the speaker's ostensive act anyway. The speaker, on the other hand, does need to have an understanding of the hearer's communicative needs if he is to produce the right ostensive stimulus under the right circumstances. Note that in some situations, more than one ostensive stimulus may be available to make the intended information available to the hearer. If, in such situations, one of these stimuli is chosen more frequently than the others, the association between this particular stimulus and the respective meaning may become entrenched to a point where the stimulus will become the conventional way of communicating that meaning. The deeper the entrenchment becomes, the less important the original connection between the produced form and the communicated meaning will be: "association [which has] become habitual ceases to be association" (Keller, 1998, 110). The conventionalisation of the use of a particular ostensive stimulus for conveying a particular meaning – possibly accompanied by a frequency-induced change in the form of the stimulus – is one path that can lead to the emergence of symbolic form-meaning associations. However, this path alone would not allow a simple communication system to become much more expressive over time; for a communication system to reach the level of expressivity that one finds in present-day human language, the cognitive mechanism of metaphorical extension, as it can be first observed in the emergence of iconicity, has to be in place.

In the *iconic* mode of ostensive-inferential communication, the speaker produces a stimulus that does not provide the intended information directly but whose form shares some conceptual properties with that information: "[t]he relation between an icon and its denotatum is that of similarity" (Keller, 1998, 102). Suppose, for instance, a young woman asks a fellow student if this week's sports practice will include jumping or football, and that fellow student responds by drawing a circle in the air with his hand. The young woman will soon realise that a "literal" interpretation, i.e., taking the fact that her friend

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2 Keller (1998) calls stimuli that are used for direct ostension *symptoms*, Deacon (1997) refers to them as *indexes*.

Tab. 1: Comparative schematic analysis of pre-symbolic metaphor and symbol-based metaphor.

	Pre-symbolic metaphor	Symbolic metaphor
Example		
Communicative Situation	A gesture drawing a circle in the air with one's hand is produced in a context where a type of sport (football or running) needs to be identified.	The utterance "Sally is a chameleon" is produced in a context where one refers to a girl named Sally.
Analysis		
Signal (form)	round manual gesture	/kəˈmiːljən/
Signal meaning	round manual gesture (by ostension)	small appearance-changing reptile (by convention)
Relevant aspect	round	appearance-changing
Ignored aspects	manual gesture	small reptile
Inferred speaker meaning	football	appearance-changing person

has made said gesture at face value, does not provide her with any relevant information: communication, in this case, does not happen via direct ostension alone. However, as the young woman also realises that her friend would be co-operative (Grice, 1957), and that he knows that she realises this, she can assume the produced cue to be there to point her to a relevant bit of information. In the present case, she may come to the conclusion that the shape of her friend's gesture resembles the shape of a football (they are both round) but does not resemble anything related to jumping; she will thus infer that the meaning her friend intended to communicate is the concept of football rather than that of jumping.

In an episode of iconic ostensive-inferential communication, the concept represented by the produced cue does not itself constitute the meaning intended by the speaker; it is rather transferred, by means of analogy, to the domain of potentially relevant meanings. An icon is thus an ostensive stimulus used metaphorically: some aspect of the signal meaning (here, the signal meaning is the concept represented by the signal itself: a manual gesture in the shape of a circle) is ignored because it is mutually recognised as irrelevant by the two interlocutors, while some other aspect of it also occurs in the speaker meaning and thus serves as a cue that helps the hearer identify the meaning that the speaker intends to communicate. The schematic comparison given in Table 1 illustrates that icons are pre-symbolic metaphors, i.e., metaphors created be-

fore the produced signal has been paired, through entrenchment, with a conventional meaning and thus become dissociated from the immediate information its form conveys. This analysis suggests that metaphor is a capacity that pre-dates symbolic communication: as it is grounded in the cognitive mechanisms of ostensive-inferential communication, its use is not limited to symbolic communication.

3.2 Symbolism

In a second step, we now turn to the role that metaphor plays in the emergence of a symbolic communication system. Symbols have frequently been described as conventionalised associations between forms and meanings where the relationship between form and meaning appears to be arbitrary.[3] We have already discussed how conventionalised form-meaning associations come about: they emerge if a particular signal is repeatedly used to express a particular meaning, so that the respective communicative behaviour becomes ritualised and entrenched in the collective memory of a population of interlocutors. The question that remains to be answered then is how form-meaning associations can become arbitrary. We contend that metaphor plays a crucial role in this process.

In principle, there are two pathways along which a non-arbitrary form-meaning association can be arbitrary: either the form changes or the meaning changes. Metaphor is the key to the second pathway: the mechanisms of ostensive-inferential communication make it possible for a speaker to use an extant form-meaning association to convey a novel, metaphorical meaning. The example given in Table 1 illustrates the difference between the use of a non-symbolic and a symbolic metaphor: while in the case of the former, the signal meaning that the metaphor exploits is created by means of ostension and thus coincides with the conceptual properties of the produced signal itself, in the case of the latter, it falls from an extant convention that associates the produced signal with a specific meaning. The actual metaphorical process, however, is the same in both cases: the hearer observes that the speaker has expressed a signal meaning which, if taken literally, does not seem to contribute in a relevant way to the present interaction. The hearer, presupposing the speakers' co-operativeness, then realises that some aspects of the signal mean-

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3 We say that the form-meaning association *appears* to be arbitrary because it is evidently not arbitrary from a diachronic perspective, i.e., if one knows the causal chain of events that has led to a symbolic form-meaning association.

ing do also occur in a potential speaker meaning that would be relevant in the given context. She thus ignores all irrelevant aspects of the signal meaning and uses the relevant aspect to infer the presumably intended speaker meaning. In the given example, the hearer observes the speaker stating that a human girl called Sally is a chameleon. She realises that, Sally being human, the fact that chameleons are small reptiles cannot constitute relevant information in the present context. She then infers that the speaker rather intends to point to some characteristics that chameleons and Sally share, namely that they both frequently change their appearance or that they easily blend in with their surroundings.

Once an extant form is used in the same metaphorical sense frequently enough, the association between that form and its new, metaphorical meaning will itself become entrenched and conventionalised. The new convention can then serve again as the starting point for the creation of yet another metaphor. Repeated metaphorical extension and conventionalisation may thus ultimately lead to an obfuscation of the original link between the form and the meaning it is associated with: the relationship between form and meaning becomes arbitrary. Metaphor thus allows interlocutors to use extant form-meaning associations as stepping stones to reach meaning spaces that were so far not covered by their communication system. In this way, the repeated conventionalisation of originally metaphorical extensions makes ever new meaning spaces accessible. This cumulative application of metaphor to conventionalised associations allows the expression of meanings which could potentially not have been reached in a single inferential step, thus greatly expanding the communicable meaning space. Even though in present-day linguistic communication, the use of an ad-hoc metaphor may most often not be motivated by the problem that the intended meaning could otherwise not be expressed but rather by pragmatic factors such as a need for brevity or social aspects such as the wish to attract attention, establish prestige by displaying one's eloquence, or avoid committing oneself (Pinker, Nowak, and Lee, 2008), in the evolution of human language, the creative function of metaphor has played a pivotal role. Without it, the emergence and evolution of a symbolic communication system as expressive as human language may not have been possible.

In summary, our analysis so far suggests that the cognitive and communicative mechanisms involved in metaphor not only pre-date symbolic communication, but that they also constitute key prerequisites for (i) conventional form-meaning associations to become arbitrary over time, (ii) for new meaning spaces to become expressible and thus (iii) for originally simple symbolic communication systems to eventually reach the expressivity that we find in present-day human languages.

4 The evolution of grammar

Our analysis has taken an avowedly cognitive approach to language, which ultimately relies on two principal assumptions, commonly called the symbolic and usage-based theses (Evans and Green, 2006). The symbolic thesis holds that language has a fundamentally symbolic function, and therefore that the central unit of language is an association or mapping between a form and a meaning, and that an individual's linguistic knowledge can be described as a "structured inventory of conventional linguistic units" (Langacker, 2008, p. 222). The usage-based thesis considers that there is no distinction between linguistic 'competence' and 'performance', rather that knowledge of language consists simply of abstractions of these form-meaning associations from the situated instances of their use in language. Crucially for our account, the symbolic thesis assumes that meaning is central to *all* linguistic units, including not only lexical items, but also grammatical schematic constructions such as 'the passive construction' or 'the intransitive construction'. The idea that both grammatical constructions and lexical items are inherently meaningful leads inevitably to the fact that the lexicon and grammar should not be considered as distinct entities, as in traditional generative grammar, but rather that they are, in a fundamental sense, the same. Given their common symbolic nature, it might also therefore be parsimonious to assume that their origins might be similarly accounted for by the same set of cognitive capacities.

Although there is no fundamental distinction between grammatical and lexical items in cognitive linguistics, they can nevertheless differ *qualitatively* in both form and meaning: whereas a prototypical lexical item has a monomorphemic form expressing a concrete, basic-level meaning (such as 'cat'), grammatical items typically have abstract schematic forms which express functional, schematic meanings. The passive construction, for instance, has its own abstract form which specifies both the types of its components and the order in which they are put together (X be VERB-ed by Y) associated with its own very general meaning, roughly focusing attention on the PATIENT (X) affected by the action described by the verb rather than the AGENT (Y) who actually carries out the action. The linguistic process through which grammatical structure is created is traditionally called grammaticalisation, and involves a number of changes through which lexical items gradually lose their independence of use and their meanings become more functional (Givón, 1979; Haspelmath, 1998). If we accept the symbolic thesis, then grammaticalisation can be conceptualised simply as a process of a symbol moving towards the grammar end of the lexicon-grammar continuum. The continuum itself is often conceptualised in traditional grammaticalisation theory using the metaphor of a cline, or a

natural pathway along which linguistic items 'travel' as they become grammaticalised (Hopper and Traugott, 2003). With this idea in mind, the focus of our enquiry now shifts to *how* items move towards the lexicon end of the lexicon-grammar continuum: in particular, how do schematic forms emerge, and where do abstract, functional meanings come from? We suggest that the cognitive capacities which enable metaphor also play a pivotal role in both these issues.

4.1 Schematic forms

The defining characteristic of schematic forms is that they contain variable slots which can be filled by multiple possibilities, such as the variables X, VERB and Y in the form of the passive construction described above. Schematic forms arise from the process of memorisation, the way in which constructions are stored, analysed and compared with each other. When a linguistic form is interpreted, the hearer constructs a meaning from context, and remembers the connections between form and meaning. These connections can be of essentially arbitrary complexity, depending on how form and meaning are analysed: the whole form may be mapped to the whole meaning; individual components of the form may also be mapped to individual semantic components.

But linguistic forms are inevitably structured in a linear fashion with items being expressed in sequence: this structure itself (the order of the items being produced) can also be mapped to parts of the constructed meaning. For example, the expression of one form *a* followed by another form *b* to invite the inference that the speaker wishes to draw attention to a state of affairs A and provide further information B about A allows the hearer to infer not only the mappings $a \leftrightarrow$ A and $b \leftrightarrow$ B but also that in a form containing two components, the first component refers to the topic of communication and the second to comment about that topic. It is, of course, no coincidence that the resulting construction in this case is the basis of the topic/comment and subject/predicate structures which are so pervasive in human languages.

Complex forms (those with multiple components) allow not only this kind of internal analysis of their own structure, but also external analysis in comparison with other complex forms. Two forms *ab* and *ac* sharing a sub-component *a* can easily be reanalysed with the shared component as a fixed item, combined with a variable slot which can be filled with either *b* or *c*. Tomasello (2003a) describes how children's language emerges in exactly this way, as children construct their language from analyses of the language they hear, with their emergent languages passing through a number of distinct stages. Initially, children's two-word combinations contain two roughly equivalent words under

one intonation contour (e.g. *ball table*), but they soon develop a more systematic pattern, or pivot schema, in which one fixed item determines the function of the utterance and the other fills in a variable slot (e.g. *more juice, more milk*). These basic schemas develop into item-based constructions, frequently based around verbs, where the roles played by the participants are marked (by word order, morphology or syntactic markers), but only for individual items; there are no generalised 'thematic roles' like agent or instrument, rather a particular role might be marked with a preposition in one verb construction, for instance, but by word order in another verb constructions. Tomasello (2003a) suggests that more general constructions are then created by children from these item-based constructions, as cross-construction patterns are found and analogies made, yielding abstract, adult-like constructions such as the transitive (X VERB-s Y), where the AGENT carries out the action of the verb on the PATIENT. Such abstract schemas can only be constructed because of humans' prodigious ability not only to infer the meaning associated with ostensive linguistic behaviour, but also more generally to find patterns and make analogies between existing symbols: these are the very cognitive capabilities which underlie the creation of metaphor.

Although the examples given show the emergence of relatively simple schematic forms, there is no reason to doubt that the same process is not implicated in the emergence of more general syntactic patterns from discourse strategies. We thus agree both with Tomasello (2003a) that similar processes, underpinned by the same cognitive capacities, are likely to have occurred in the evolution of language, and, more generally, with Hopper (1987)'s suggestion that all grammatical structures emerge from the pragmatic strategies employed by speakers in discourse.

4.2 Functional meaning

Although much of the literature on grammaticalisation refers to the idea of semantic loss or bleaching, e.g. "weakening of semantic content" (Givón, 1973) or "desemanticization" (Heine and Kuteva, 2002), it is probably more accurate to say that although concrete meanings are lost, there is also a somewhat compensatory gain of abstract meanings which provide more information about grammatical function, and which of course is the major result of grammaticalisation. Heine and Kuteva (2002)'s detailed analysis of grammaticalisation across a wide sample of the world's languages shows clearly that unambiguous patterns of grammatical development recur repeatedly in multiple unrelated languages. For instance, forms originally meaning BACK have independently developed into locational adpositions denoting BEHIND in languages as diverse

as Icelandic, Halia, Moré, Kpelle, Baka, Aranda, Welsh, Imonda and Gimira (Smith, 2011). Moreover, these developments are themselves instances of more general, frequent metaphorical shifts which use the human body as a basic template to express location; Heine and Kuteva (2002) present examples from various languages showing the development of adpositions from words meaning BELLY, BOWELS, BREAST, BUTTOCKS, EYE, FACE, FLANK, FOREHEAD, HEAD, HEART, MOUTH, NECK, SHOULDER and SIDE. Although the specific metaphors used vary from language to language (Heine, Claudi, and Hünnemeyer, 1991), the most striking feature of these networks is their overwhelming unidirectionality; the conceptual shifts are consistently from concrete to abstract, as the linguistic associations move along the lexical-grammatical continuum described above.

The emergence of such grammatical meanings has traditionally been explained in two different ways in the literature, either via metaphorical extension (Heine et al., 1991) or via reanalysis (Hopper and Traugott, 2003). We have, however, previously presented a unified account of grammaticalisation which characterises both the metaphor- and reanalysis-based approaches in terms of their underlying general cognitive mechanisms (Hoefler and Smith, 2009), the now familiar foundations of ostensive-inferential communication and memorisation. We now turn to probably the most famous example of grammaticalisation in the literature, the development of the English construction *be going to* (Heine et al., 1991; Kuteva, 2001; Hopper and Traugott, 2003; Evans and Green, 2006; Hoefler and Smith, 2009), and explore how metaphorical extension can explain the historical grammaticalisation it has undergone. The *be going to* construction's original transparent meaning was MOTION, but it has gained additional meanings through the centuries, from INTENTION to a grammatical marker of FUTURITY, as shown in Example 1. Similar changes (GO TO > FUTURE in Heine and Kuteva (2002)'s terms) are attested in many languages across the world and throughout history. They appear, moreover, to form part of another very general grammaticalisation process in which certain verbs come to be used to mark specific tense or aspect functions (Heine and Kuteva, 2002).

(1) a.   I am going to play football.
     b.   I am going to stay at home.
     c.   It is going to rain.

The historical development of *be going to* shown in Example 1 also clearly illustrates one of the consequences of metaphor conventionalisation, that of layering (Hopper and Traugott, 2003). When a metaphor is newly memorised, the

form inevitably becomes part of two competing conventions: the original association and the new metaphorical association. In addition to their different meanings, these competing layered associations may differ in their level of entrenchment and in their syntactic properties. Indeed, form-meaning associations are internal to individuals' linguistic knowledge, and thus only indirectly observable through usage. The existence of a truly new association is therefore only exposed through actualisation (Trask, 1996), when the construction is used in a context which is only interpretable using the new form-meaning mapping. Both layering and actualisation can clearly be seen in Example 1. In 1(a), *be going to* can be interpreted freely as any of the three historical meanings we are considering, as follows: (i) MOTION: 'I am moving somewhere to play football'; (ii) INTENTION: 'I intend to play football'; (iii) FUTURITY: 'In the near future, I will play football'. In 1(b), however, the clear contradiction between the meanings of *go* and *stay* ensures that the motion reading is unavailable, and only the latter two are possible; the inanimate dummy subject *it* in 1(c), meanwhile, renders both MOTION and INTENTION impossible, and obliges a FUTURITY reading. In modern English, therefore, we can consider that there is layering of three different *be going to* constructions, which differ both in their meanings and in the properties required of their subjects and associated main verbs. In the earliest, most lexicalised construction, *be going to* can be used only in conjunction with main verbs whose meaning is consistent with actual movement, and with subjects who represent animate beings. In the most recent, most grammaticalised construction, on the other hand, it is now solely a tense marker, and as such it can be used with any kind of subject and any main verb without restriction.

So how does metaphor allow the creation of new associations and their entrenchment? Let us consider first how the construction which meant MOTION could be used metaphorically to mean INTENTION. We must assume that speaker and hearer already share the construction, including its conventional meaning of MOTION, and that they are aware that the convention is shared. The key additional properties of the situation which are necessary to make the metaphor interpretable are twofold: (i) that INTENTION is associated with MOTION; (ii) that MOTION is not relevant in the current communicative context. These are shown in the first column of Table 2. Because the interlocutors' shared contextual knowledge shows that MOTION is irrelevant, all aspects of the conventional meaning are ignored. Another meaning must be sought, which must be both sufficiently relevant in the context, and associated with aspects of the conventional meaning; this association allows the non-conventional (and thus metaphorical) usage to be successfully inferred through analogy.

The newly conventionalised INTENTION sense of *be going to* can then act as a stepping stone for further metaphorical derivation, in the scenario present-

Tab. 2: Comparative schematic analysis of the metaphorical derivations of, first, INTENTION, and then, FUTURITY meanings for *be going to*.

	Intention	Futurity
Example		
Communicative context	Meaning of main verb (e.g. stay) inherently contradicts motion meaning.	Subject is inanimate, so motion and intention meanings are impossible.
Analysis		
Signal (form)	/bɪɡoʊɪŋtu/	/bɪɡoʊɪŋtu/
Signal meaning	motion (by convention)	motion, intention (by convention)
Shared association	motion → intention	intention → futurity
Relevant aspect	intention	futurity
Ignored aspects	motion	motion, intention
Inferred speaker meaning	intention	futurity

ed in the second column of Table 2. This shows the increased grammaticalisation of *be going to* through the development of the abstract grammatical meaning FUTURITY. In this scenario, the same reasoning applies, but the interlocutors take advantage of slightly different contextual and shared knowledge: (i) that INTENTION is associated with FUTURITY, because the things we intend to do happen in the future; (ii) that INTENTION is not relevant in the current communicative context, because there is no intentional, animate being in the scenario. Again, all aspects of the conventional meaning (both MOTION and INTENTION) are ruled out, but another meaning (FUTURITY) is inferred. The inference of this meaning can take place because FUTURITY is both associated with an aspect of the conventional meaning and relevant in the current non-intentional context. This new, even more abstract, meaning is then associated with *be going to*, memorised by the interlocutors, and, over time, conventionalised.

We have argued in this section that the cognitive mechanisms required for grammaticalisation to take place are that interlocutors share common ground, and that they can memorise the linguistic usage they experience. If they entertain sufficiently similar assumptions about the constitution of their common ground, then they will make the same inferences about what is most relevant in the communicative context, and thus understand the creative meanings which are expressed metaphorically. If they remember these new associations, and use them sufficiently frequently, then the new associations can also become conventionalised, and potentially act as the source for further metaphorical extensions. The cognitive mechanisms required for the development of

grammatical structure, therefore, are exactly the same as those we described in section 3 as pre-requisites for the emergence of arbitrary symbols and their subsequent development into massively expressive communicative systems.

5 Conclusion

The problem of language evolution is generally divided into two distinct issues: the emergence of an arbitrary symbolic communication system and then the emergence of grammatical structure. We have examined these issues in detail in this paper, and have described in sections 3 and 4 how the same underlying cognitive mechanisms are required in both cases. These capabilities, namely the assumption of common ground between interlocutors, and the memorisation of experience, are the fundamental components of all ostensive-inferential communication, and provide the foundation on which the creative power of metaphor is built. We suggest therefore that metaphor, or rather the cognitive properties on which metaphor's creativity depends, may have played a pivotal role in enabling the origin and evolution of human language.

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