

Ways to
Protolanguage
Book of abstracts



FACULTY OF LANGUAGE: DESCENT WITH MODIFICATION¹

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Hauser, Chomsky & Fitch, (2002) (henceforth HCF) identify recursion as a unique mechanism of human language. Although there are other species that show semantics, or articulated sounds, the mechanism for combinations of both seems to be uniquely human. In this work we will raise three questions regarding this issue: a) Recursion is not unique to human language. b) The Faculty of Language in a Narrow sense (FLN) not only exhibits recursion but also Duality of Patterning; c) HCF's recursion hypothesis not only modifies but adds more problems to the evolution of language studies. We will discuss whether recursion is an inner component of the Language Acquisition Device (LAD) or if it instead joins LAD to contribute with the benefit of recursive procedures.

The supposed uniqueness of recursion in humans.

Since Gentner et al. (2006) published their results on the ability of starlings to make use of recursive patterns based on the principles of Context-Free Grammars, the necessity of reviewing this question in the light of evolutionary studies has arisen.

We argue that what makes human language special is not a single component, rather the sum of different linguistic micro-abilities appeared in very different moments during evolution. Recursion should be added to the set of language-related abilities attested until now in other species — e.g. categorical perception in *Sanguinus oedipus*, *Chinchilla* and *Mus* (Toro, Trobalon, & Sebastián-Gallés, 2003). Therefore, we argue that none of them are the key, but rather all of them contributed to the final product.

At least two components in FLN.

We claim that the distinction between humans and starlings at the linguistic level is not uniquely because they do not make use of recursion naturally, as humans (they require training), but also because they are unable to produce meaningful utterances. In this sense, we agree with Rosselló (2006) when she claims that Duality of Patterning in Hockett's sense should be included in FLN. In the original sense, it is named *duality* because it is the union of a phonological system plus a morphological system. However, for Hockett, syntax remains out of it.

We propose to include now Duality of Patterning into FLN. As a consequence, maybe the distinction between FLN and FLB becomes weak for evolutionary studies. However, we maintain the principal role of this two mechanisms situated at the core of FL, the combination of which triggers and connects the inner linguistic system with the externalizing linguistic system.

Problems and modifications for the evolution of language issue.

Accepting HCF's theory about recursion requires some nuances in order to address the evolution of FL. Is recursion an inner element of the Language Acquisition Device (LAD)? Or is it instead a component that joins LAD?

We hypothesize a scenario in which recursion, emerged in the form of a spandrel. It would rewire the cognitive system of *H. sapiens* in such a manner, that the use they made of the already present proto-language input, was not the same as that made by a conspecific lacking recursion. We take inspiration from genetics, which has contributed with several impressive theories about the

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unified origins of the modern humans, the split, expansion and evolution of some molecular aspects of Neanderthals. Although, by definition, the existing proto-language was not recursive, the rewiring of the cognitive system caused by recursion (already including all language-related micro-abilities) could obtain a greater benefit from the input, leading the next generations to make the great linguistic leap.

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PROTOSYNTAX: A THETIC (UNACCUSATIVE) STAGE

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Based on evidence from child language, second language acquisition, aphasia, pidgin languages and ape research, Jackendoff (2002) has proposed that the formation of compound nouns such as snowman and rules found in Klein and Purdue's (1997) Basic Variety such as 'Agent First' and 'Focus Last' could be considered protolinguistic 'fossils.' Progovac (2008) has extended the fossil analysis to what she calls Root Small Clauses of modern languages (e.g. Problem solved. Me first! Him worry?!), arguing that these are "half clauses," lacking at least one functional layer, TP (Tense Phrase), and showing no evidence of tense, agreement, or structural case.

In this paper we introduce an additional consideration relevant to understanding the initial stages of protosyntax. We show that so-called thetic statements (Kuroda 1972, Sasse 1987), which could be subsumed under the 'Focus Last' principle, even though they are more accurately characterized as Focus-Only (Lambrecht's 1994 Sentence-focus) are more primary than 'Agent First' constructions, which necessarily involve more complex structures such as subject-predicate or topic-comment sentences. Thetic sentences are simple nonpredicative assertions of states of affairs (Sasse 1987) such as those in (1)-(4) and contrast with categorical statements which contain a subject or predication base and a separate predicate, as in (5)-(8). As opposed to typical subject-predicate assertions, thetic statements involve a single intonation unit and often involve verbs of appearance or change, so-called unaccusative verbs (Perlmutter 1978, Burzio 1986, Levin and Rappaport 1995). As noted in Allerton and Cruttenden (1979), predicates in these thetic statements are often semantically predictable (empty), serving only to introduce the focus of the assertion.

Further, thetic statements tend to be marked either by a particular particle as in Japanese or by a different word order (VS) in Spanish, Serbian, Russian, Hungarian, Modern Greek, and many other languages. (Sasse 1987). Moreover, thetic statements may have their verbs occur in non-agreeing forms, followed by the 'subjects' in non-canonical case forms as in (3b). While thetic statements are typically single intonation units, double accent in categorical statements signals separation of an element denoting an individual and an element denoting an event.

In sum, we suggest that thetic assertions are evolutionarily primary, and that syntactic evolution progressed from a stage with thetic statements (typically with unaccusative verbs), to more complex categorical assertions, such as topic-comment, which can be shown to be syntactically, informationally, and intonationally more complex. Further reinforcing the evolutionary argument, thetic assertions are also typically deictic in the sense that they pertain to the here-and-now situations, and are often introduced by emphatic deictic particles (Sasse 1987).

Our proposal finds some corroborating evidence in language acquisition studies (according to e.g. Studdert-Kennedy (1991), Rolfe (1996), Locke (2009), present-day views of ontogeny/phylogeny warrant the use of ontogeny, development in children, to corroborate hypotheses about phylogeny, development in species). A preference for VS structures over SV structures has been observed for early child Italian (Bates 1976) and also for languages which do not allow for postverbal subjects like French (Lightbrown 1977, Clark 1985, Peirce 1992, Friedmann 2000). Although claimed to be rare (Brown 1973, Pinker 1984), their presence has also been noticed in child English (O'Shea 1907, Gruber 1967, Peirce 1992). Interestingly, as Peirce (1992) notes, most of the postverbal subjects in child English occur with unaccusative verbs, the typical verbs of thetic utterances. Thus there is some evidence of early production of thetic statements (see also Larrañaga 2008). In addition, the well-known nontarget use of null subjects in languages like English and a delay in the appearance of appropriate

preverbal subjects in other languages (Grinstead 2004, Westergaard 2008, etc.) seems to point to difficulties with SV structures, those which express categorical statements.

Examples

Thetic (All-Focus Statement)

(1) It is raining./ Here comes the mailman.

(2) Ha transcurrido el tiempo (Spanish)

has passed the time

(3) a. Pao sneg (Serbian)

fallen-PASTPARTICIPLE snow

b. Nestalo struje.

disappeared-PAST PARTICIPLE.N electricity.F.GEN

(4) Inu ga hasitte iru (Japanese)

dog running is ('There is a dog running')

Categorical (Entity + Predicate)

(5) MArY is SINGING (two accents)

(6) María está cantando (Spanish)

(7) Marija peva (Serbian)

(8) Inu wa hasitte iru. (Japanese)

'The/a dog is running.'file

MANUAL DEPICTION: A 'NATURAL' WAY INTO LANGUAGE? THE EVIDENCE FROM SIGNED LANGUAGES

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Producing depictions is often assumed to be somehow easy and natural; its acquisition unproblematic, its decoding cognitively unchallenging. Within the linguistics of signed languages, for example, certain signed forms which are difficult for children to acquire (appearing late in acquisition, and taking as long or longer to master than most complex grammatical structures) were long argued *therefore* to be governed by grammatical rules rather than principles of depiction (Newport 1981). In the field of language evolution there seems typically to be a greater understanding of the sophistication of the depictive process, yet one still finds apparently influential the assumption that, for example, if linguistic (grammatically-governed) communication is present, then depiction can be assumed to accompany it (e.g. Noble and Davidson 1996). The discovery of neurons that fire, not only on the performance of a manual action, but also on seeing that manual action performed (Gallese *et al* 1996), offers a powerful mechanism by which at least one kind of manual depiction can give our species a 'leg up' into communication. From all this may flow the idea that, in the evolution of human communication, depictive gesture could be expected to dominate the early history of human communication, with abstract symbolizing a later and more sophisticated development.

Evidence from the literature on the acquisition of drawing, however, supports evidence from the acquisition of natural signed language systems in suggesting that for modern humans, depiction is difficult. In Western children, the acquisition of depiction via drawing begins only after years of cognitively-abstract symbol use, and is itself a lengthy and error-strewn process that approaches adult levels only in later childhood. More tellingly, as coming from a single natural communication system, children learning to sign also begin to venture in to manual depictions only after some years of using forms that, in online use, are processed as abstract symbols. Mastering manual depiction, too, is a lengthy, error-strewn process, with the adult level of competence reached only in later childhood. This evidence suggests that for our species, depiction generally, and manual depiction specifically, is not an 'easy', 'natural' mode.

But depiction is also not monolithic, either in type or in apparent 'naturalness'. Within the depictive subsystem of signed communication one can identify three broad substrategies (Cogill-Koez 2002). The first, often called 'handling', is that in which signers simply depict the action of someone's hands with their own. In 'modelling' the signer's hand stands, not for a hand, but for another object or part of an object. In 'tracing' the signer's hand traces shapes in the air, and it is the trace which is the depiction. 'Handling' appears earliest, and errors with this strategy are relatively uncommon. Modelling and tracing with the hands appear later, and present children with surprisingly serious problems as regards basic depictive accuracy.

Signed communication systems, then, don't only point specifically to 'handling' as being relatively easy and 'natural' to our species (a pattern appealingly congruent with the argued role of mirror neurons in the evolution of communication, cf. Arbib & Rizzolatti 1997); they also seem to point *away* from the rapid and easy emergence of manual depiction of other kinds. If depictive gesture had a role in the emergence of human communication, signed communication systems suggest that a 'handling' subtype may have dominated.

Nevertheless, the evidence of signed communication systems on the whole indicates that it is actually the cognitively abstract connection of form and meaning, unmediated by perception of correspondence of form between symbol and referent, which may be the 'easiest' or 'most natural' to our species. Child acquisition of the cognitively abstract system precedes the onset of manual depiction by years. Statistically, the same abstract system dominates the communication of adult signers. Forms which (historically) started life in the depictive subsystem can, if repeatedly used, be rapidly stripped of their mediating depictive representational supports and subsumed into the cognitively abstract system — that is, they come to be processed as abstract signs, not pictures. The reverse process, of once more 'seeing the picture within the sign', is typical of joking and poetic uses rather than daily conversation.

Despite their unique opportunities for representing via manual depiction, then, signed communication systems seem to suggest that in any early gestural communication, manual depiction may have played a relatively small, albeit important role. Based on how *Homo sapiens* communicates manually today, earliest manual depictions may well have been of only one subtype. If used repeatedly, consciousness of depiction would arguably have been quickly excluded from the cognitive processing of a form. As a result, even the earliest symbol-using stages of any gestural protolanguage were likely, it would seem, to have been numerically dominated by cognitively abstract symbols, with a Handling-style manual depiction functioning mainly as source for new forms.

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ACOUSTIC AND PERCEPTUAL EFFECTS OF AIR SACS

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All apes except humans have air sacs. Air sacs are large pouches that are connected to the vocal tract (figure 1A). Although there is debate about the function of air sacs, most authors agree that they have a function in vocalization. Their exact role in the evolution of speech has been identified by Fitch (2000) as an important open question. Air sacs are especially interesting, because in primates there appears to be a direct correlation between the shape of the hyoid bone (a small bone to which the muscles of the larynx and the tongue are connected) and the presence or absence of air sacs. When an air sac is present, the front of the hyoid bone has a distinctive concave shape, the *bulla*. In human hyoid bones as well as those of Neanderthals (Arensburg *et al.*, 1989) and *Homo heidelbergensis* (Martínez *et al.*, 2008) the bulla is absent, while in the hyoid bone of an infant *Australopithecus afarensis* (Alemseged *et al.*, 2006) it is present. Because of air sacs' potential relevance to vocalization, it is important to understand their effect on the acoustics and the perception of speech.

De Boer (2008) has analyzed the acoustics of primate air sacs. Air sacs have two important acoustic effects (figure 1B). The first is that the air sac creates an extra low-frequency resonance (around 200 Hz for the size of ape air sacs). The second is that the existing resonance frequencies of the vocal tract are shifted up and closer together. A priori, one would expect two effects: the extra low-frequency resonance might help an animal to sound bigger, and the shifting formant frequencies might make it harder to produce distinct speech sounds.

However, because of the extra resonance, the spectrum of a vocal tract with an air sac is qualitatively different from that of a vocal tract without an air sac and results from perception of human speech cannot be directly transferred to perception of signals generated with air sacs. This paper therefore presents first results of listening experiments that measure the difference between perception of signals generated by vocal tracts with and without air sacs. Three vocal tract models (corresponding to [a], [ə] and [y]) were constructed, and two sets of stimuli were generated, one with an air sac attached, and the other without. These stimuli will be presented to experimental subjects using adaptive threshold estimation (Kaernbach, 2001) to measure the signal-to-noise threshold for which distinctions between the signals can still be heard. Results of a first subject from a pilot study are given in figure 1C. It can be observed that the threshold for signals (calculated as the average over the last 20 trials) with an air sac is about 5dB higher than for signals without an air sac, indicating reduced distinctiveness.

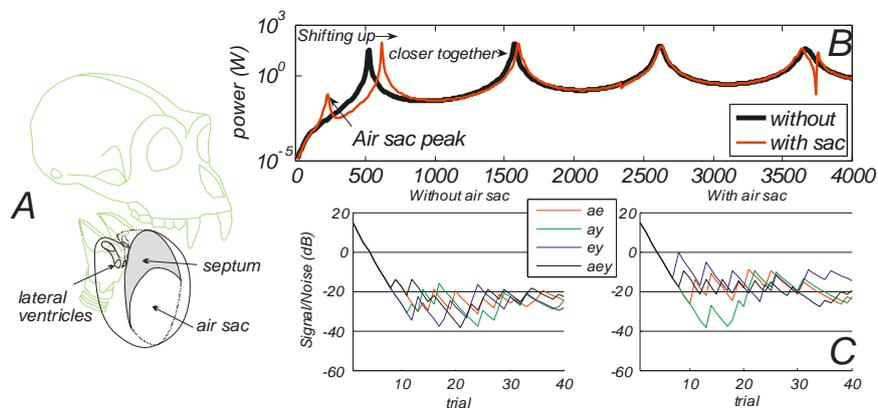


Figure 1. Schematic air sac anatomy of a gibbon (A), the acoustic effect of an air sac (B) and the threshold shift caused by the presence of an air sac (C).

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LANGUAGE AS A NOTION PHILOSOPHICALLY PROBLEMATIC. THE CASE OF N. CHOMSKY'S THEORY

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The methodological assumptions as well as preliminary answers that were introduced by Noam Chomsky as he was laying the foundations for 20c linguistics have long been considered a classic element of the reflection on the basic problems in the philosophy of language. In particular, whenever the questions of language acquisition, language innateness or methods of the study of language are raised, his theories are customarily quoted either as a starting point for further discussion or, at least, as a reference point for the author's own views. Nevertheless, the classic status of Chomsky's texts is no help in their lecture. Numerous comments, both by his supporters and opponents, together with the evolution of his standpoint make the tasks of clarifying the basic notions and sorting out its theses all the more difficult. Chomsky's works and the problems addressed therein have been of significant importance from the point of view of the philosophy of language, and the philosophical efforts for putting Chomsky's linguistic conception in order derive from the enormous interest generated by these works and problems. Consequently, a critical examination of his approach is a result of the desire to understand his conception that is fundamental for further study of natural language. Thus, it appears all the more important to pin down those of Chomsky's assumptions regarding language that seem to be either incompatible with the larger body of his theory or not fully sound.

The task that I have set myself is as follows: I would like to identify selected implicit or not fully explicit assumptions that are made by Chomsky, as well as isolate the basic notions connected with language and look into the consequences of their use in different contexts. This pertains to the philosophical assumptions, which I take to include the theses related to the terms that are deeply entrenched in the philosophical tradition, but also the theses that concern well-known philosophical problems. My aim, as a philosopher interested in the problems of the philosophy of language, is to identify in Chomsky's theory coherent solutions to two fundamental questions: the question of methodology (which includes the author's awareness of his assumptions, as well as setting forth his theoretical objectives), and the question of the ontological status of language. Determining what language, as an object of one's study, actually is has vital consequences not only with respect to the clarity of the theses put forward within the framework of one's own theory, but also with respect to the possibilities for arguing about specific aspects of the properties of language; and such controversies can be cognitively productive only on condition that the parties are agreed on some basic description of language. (Chomsky is well known as an ardent polemicist and a critic of opposing theories. Suffice it to mention here his polemic with F. B. Skinner or W. Van Orman Quine, as well as with the Wittgensteinian version of the argument against private language.). In other words, it is important to ask whether the questions that a given controversy generates can be fitted into a common cognitive structure, since only then will the disputing parties respect each other's arguments.

I would like to emphasize that the objective behind the analyses conducted here is more than just to report. My goal is to place Chomsky's theory on the axis of the controversies regarding the notion of language. In my opinion, the lack of agreement on the basic issues of ontology and methodology, observable in debates in a variety of research areas, stems largely from the parties' entering the discussion with certain implicit metaphysical assumptions already taken for granted. By "metaphysical assumptions" I mean such theses that are accepted on the strength of an arbitrary decision (mostly resulting from the person's more general philosophical outlook) as clear and self-evident, and that concern the most fundamental phenomena in a given theory. Frequently, they are

treated as statements that have to be accepted by the opponents of the theory as well. Such assumptions are necessarily found in all theories (as there is no theory without assumptions); however, the more of them are made explicit by the researcher, the more mature the theory. It must be emphasized here that the fact that certain philosophical assumptions are implicit need not mean they should be rejected. Still, making them explicit makes it possible to reveal the actual cognitive means and ends that inhere in the complex formulas of every conception that attempts to describe the phenomenon of natural language. It also makes it possible to demonstrate the relativity of the theory in regard to its presupposed theses. This concerns in particular those theories that proclaim neutrality and objectivity, understood as a "purely empirical" or "purely rationalist" starting point, where the notions of rationality and "empiricality" are taken to be absolutely unequivocal. I will not answer here the question of whether tracking down implicit metaphysical assumptions or inconsistencies in the use of basic notions disqualifies Chomsky's theory or merely casts doubt on its peripheral statements.

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FROM APE TO HUMAN, AND HOW EARLY LANGUAGE TRANSLATES INTO ARCHAEOLOGY

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This paper tries to present a broad view of early evolution of language based on data from mammal and primate ethology, animal learning, developmental psychology, archaeology and cognitive psychology. In the first part of the paper we establish what mental characteristics are needed for language and we examine the living human primates (especially the chimpanzee) as a model of pre-human behavior. We conclude that there are three main characteristics that are needed for the evolution of language.

First, a set of connection rules that monitor the relationships of objects and agents between themselves (object-object, object-agent, agent-object and agent-agent). We identify two related sets of rules (for objects and for agents). These rules are a pre-requisite for grammar.

Second, every important feature or change outside the organism must be represented as a core mental image (a pre-requisite for naming). Those mental images may then be connected by the sets of rules mentioned above.

Third, agents must be represented as minded entities with wishes, knowledge and the capacity of understanding messages about the world. In the second part of the paper we try to find diagnostic features of these three aspects in the archaeological record. We analyze the usual archaeological fossil indexes of “behavioral modernity” and we try to establish exactly how they relate to the evolution of connecting rules, clear mental images and minded entities. On the bases of this analysis we cautiously suggest that an early form of language might be present in the authors of at least some Acheulian cultures.

THE MUTUAL RELEVANCE OF G. H. MEAD'S SOCIAL PSYCHOLOGY AND THE STUDY OF LANGUAGE EVOLUTION

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Introduction

Mead (1934:6) criticizes theories of language origins for portraying the pre-linguistic hominid as a “prisoner in his cell of consciousness,” who “knowing that there are other people so imprisoned, attempts to devise a means of communicating with them.” Mead’s social psychology reverses the trajectory of evolution by beginning with the process of social interaction and moving “inside” to individual consciousness using language as the key to this transition.

The problem Mead’s social psychology poses for a theory of language evolution is how to account for the emergence of language without relying on a self-conscious agent who is conscious of other minds. This challenge is doubled-edged, however, since Mead’s reliance on language in his theory begs the question of language’s origin.

Mead’s Theory of Mind

Rather than locating meaning in the individuals’ minds, Mead argues that it is “objectively present” in the interaction process: in the relation between the organism’s gesture, the response of an “other,” and the culmination of the act. Emphasizing the complementary nature of these elements, Mead (1934:14) refers to this process as a “conversation of gestures.” He carries this dialogical perspective over into his treatment of mind and self. Mind consists of an awareness of this process in its entirety. Language as a “vocal gesture” provides the key to this awareness by calling out the same response in the sender that it does in the receiver. Human thought represents the “internalized conversation of gestures.” To “think” is to talk to oneself.

Mead develops these ideas further in his treatment of the self. Focusing on the self as an object or “me,” Mead argues that the self arises in the internalized conversation of gestures due to the fact that the vocal gesture makes us take the attitude of the other towards ourselves. The Gardners’ observations of Washoe’s signing to herself—particularly the word “quiet” as she moved to a part of the yard that was off limits—nicely illustrates this process (Gardner and Gardner, 1974:20 cited by Lieberman (2006:54). The question this illustration raises is whether Washoe developed a concept of self concept as a consequence of signing just as Helen Keller’s self-concept emerged due to her learning to sign?

The Concept of a Proto-Self

Mead uses the concept of play and the game to distinguish early and later stages of the child’s development of a self concept. In the early stage the child *plays* the role of a *significant other*. In the later stage the child *takes* the role of a *generalized other*. In play the child becomes an object to himself or herself by shifting back and forth between the complementary roles of ego and the significant other. Play is unstructured and free of rules. The game, in contrast, is organized; it has rules. In playing a game, we maintain our position but see ourselves from the standpoint of both the other players and the structure of the game.

The differences the play and the game in the relative structure and specificity resemble the difference between proto-language (words without syntax) and full language (words with syntax) (Bickerton, 1995). Drawing on the possibility that “ontogeny recapitulates phylogeny,” I conclude by suggesting that the shift from selves who play the roles of significant others to selves that take the role of a generalized other influences and is influenced by the move from proto- to full-language.

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THE NECESSITY OF COMPUTATIONAL SIMULATION IN EVOLUTIONARY LINGUISTICS

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Ever since the advent of the computer in 1945, *computational simulation* (CS) has become pervasive in many new as well as traditional fields. Recently, it has joined the endeavor to tackle problems in evolutionary linguistics (Hauser et al., 2007). It provides a necessary means of exploring language evolution, which manifests itself in the following three aspects:

First, CS can assist empirical studies of language evolution. The critical difficulty in evolutionary linguistics is the lack of direct evidence of language development in its prehistoric states. There are some ways to try and overcome this difficulty: a) studying language ontogeny, but the “ontogeny recapitulates phylogeny” analogy (Bickerton, 1990) has to be applied cautiously in language phylogeny (Mufwene, 2008); b) evaluating the communication systems of other animals, but the complexity of these systems is incomparable to that of human language, which makes this comparative approach (Oller & Griebel, 2004) of only limited usefulness; and c) examining the performance of normal or deficient human subjects in linguistic or cognitive tasks, but the scarcity of language-deficient subjects and the crucial differences between modern- and proto- languages restrict this approach as well. Unlike these means that rely heavily on empirical findings, CS offers a new perspective: by abstracting processes and manipulating parameters, it can recapitulate the histories of language evolution, evaluate the effects of various factors on this process, examine the internal coherence of linguistic theories, and compare in principle the simulation results with the empirical data.

Second, CS can study language as a *Complex Adaptive System* (CAS, the ‘five graces’ group, 2008). Human language, consisting of multiple interacting entities that are constructed in a hierarchical way, is adaptive; that is, personal experiences, social interactions, and cognitive processes can all trigger language evolution. CS provides an efficient way to handle human language and its evolution. It adopts a synthetic, bottom-up strategy, and builds up a foundation to implement theoretical scenarios that involve multiple components and complex interactions among these components. By arbitrarily isolating various components, it can systematically analyze particular factors and their collective effects on language evolution. Such delicate control over various conditions is necessary for studying a CAS like human language, but it is usually impossible in empirical studies.

Finally, CS can be validated in many respects. Many simulations adopt objective mechanisms and follows traceable procedures to obtain replicable results. The assumptions and scenarios adopted in these behavioral or mathematical models can be supported by empirical findings in linguistics and other disciplines, and the mechanisms used have been broadly discussed in evolutionary computation and artificial intelligence. The simulations that are equipped with these mechanisms can provide both qualitative and quantitative understanding of human language and its evolution.

These arguments point to the necessity of adopting CS in evolutionary linguistics research. They also reveal the multi-disciplinary nature of this field, whose future development will rely greatly on the collaborations between linguists and scholars from a number of relevant disciplines.

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A FRAMEWORK TRIGGERING DISPLACEMENT IN HUMAN LANGUAGE

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Although many species can communicate in a limited way about things that are physically present, only humans can narrate displaced events occurring outside the here and now (MacWhinney, 2008). *Displacement* (Hockett, 1960) is a crucial feature of human language, and the development from communications with non-displaced reference to those with displaced reference is a general trend in language ontogeny (Givón, 2009). However, due to lack of direct evidence of the intermediate stages from no language to a protolanguage, the emergence of displacement during language phylogeny remains puzzling to evolutionary linguists. In this paper, we propose a theoretical framework that could trigger displacement in protolanguage, and evaluate it in a simulation study.

The framework (see Fig. 1 (a)) is based on inexplicit meaning transference; an indirect feedback is adopted in communications. We assume that early hominids in primitive communications were exchanging information about frequent, integrated events occurring in their environment, and nonlinguistic information acquired from other sensory channels, such as visual cues, must have assisted comprehension of exchanged utterances. However, since the ability of intentionality sharing (Tomasello, 2003) in early hominids is limited, those nonlinguistic cues are *unreliable*; they may not always contain the speaker's intended meanings. Therefore, linguistic knowledge is also required in comprehension. Comprehension of protolanguage in this stage relies upon both linguistic and nonlinguistic information, and the unreliability of the latter could trigger the development of the former. After a number of communications like this, a set of linguistic knowledge capable of describing these events and withstanding the interference of misleading cues could eventually emerge among individuals. Then, a transition from initially relying on nonlinguistic information to later relying on linguistic information occurs. In other words, a displaced protolanguage has emerged.

We implement this framework as the communication scenario in a multi-agent model that explores language emergence (Gong, 2009). The simulation results illustrate that a not-necessarily-high level (around 0.5) of cue reliability is enough to trigger a communal language out of holistic utterances. The emergent language, consisting of a set of lexical and simple syntactic rules, is *displaced*; it has a high value of understandability (the solid curve in Fig. 1(b)), and can be efficiently used in communications with misleading cues (the dashed curve in Fig. 1(b)). The proposed framework reveals a close connection among individuals' multiple sensory channels during the early stage of language phylogeny, and illustrates that mutual understanding in communications is an underlying driving force for displacement, in addition to other linguistic features.

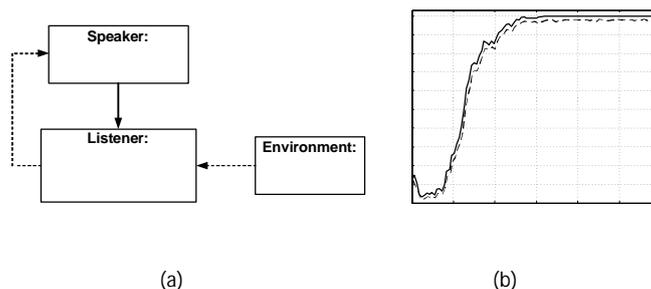


Figure 1. (a) The framework triggering displacement. It involves three components: the speaker, the listener, and their environment. The dashed lines indicate unreliable information; (b) the simulation results (the cue reliability is 0.6): the solid curve traces the understandability of the emergent language without cues, and the dashed curve traces the understandability with misleading cues.

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THE CONTRIBUTIONS OF STORAGE, COMPUTATION AND PRAGMATICS TO THE EVOLUTION OF SYNTAX

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Syntax has occupied a central place in linguistic theory. Within mainstream syntactic theory, little thought has been given to the communicative function of complex syntactic constructions. The main driver of syntactic complexity is pragmatic. People need to communicate thoughts, making clear what they assume hearers know and don't know. From this basic function arises the Topic/Focus distinction found in all languages. From that distinction, by processes of grammaticalization, the Subject/predicate partition arises, with concomitant rise of progressively elaborate categorization of words into nouns, verbs, and so on. Grammaticalization also yields, in time, function words and inflections.

Humans have massive capacity for storage of detailed knowledge. In language, this is applied not only to storage of words, but also to storage of many complex constructions of varying degrees of idiomaticity. Each such construction, beside its syntactic structure and semantic denotation, has specific pragmatic force, such as indicating humour, irony, sarcasm and fatalism. Storage of syntactic information is somewhat redundant. Grammaticalization is driven by competing pressures to strike several balances -- between storage and computation, and between reliance on pragmatic inference and a conventional code.

Given a theory postulating a massive store of more or less idiomatic constructions, the computation required in language use is reduced in comparison with derivational theories of syntax. From the viewpoint of language evolution, we need no longer imagine a catastrophic leap from a state with no syntax to a state with syntax. Early languages grew incrementally from simple beginnings by expansion of the set of constructions (including words). In human prehistory there has been gene-culture co-evolution. Languages have grown in size (how much is stored) over many generations; and the biological capacity for massive storage and fast computation has evolved with it. The co-evolutionary process was exponential, which can give a false impression of catastrophic change.

THE BIOLOGICAL BASIS OF SOUND SYMBOLISM

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The question of the relation between a sound and its meaning has been posed many times in the history of linguistics and it has been answered in plenty of ways including numerous approaches and theoretical prerequisites. The exploration of the broad issue of sound symbolism reaches far beyond linguistic studies and it extends to other scientific fields such as anthropology, ethology and neurology. Nevertheless, there still remain areas within the study of sound symbolism that require deeper analysis as there have been no satisfactory solutions offered to the problem of biological basis of sound symbolism in human and non-human communication, as well as cross-species and cross-language universal tendencies in sound distribution. This paper aims at revealing certain controversial aspects of the study of sound symbolism and postulates further consideration of the contentious theories.

The introductory part of this paper will briefly discuss the nature of sound symbolism, and to be more specific, it will describe all the phenomena usually recognised as sound-symbolic. The question to be answered at this point is what all of the sound-symbolic phenomena have in common biologically and whether they have the same origin.

This will be followed by a broad presentation of the studies of vocal characteristics of animal communication with reference to theories proposed by such researchers as Eugene S. Morton, Charles T. Snowdon and Fernando Nottebohm. The presented results of the detailed study of sound symbolism in non-humans will be juxtaposed with different approaches to sound-symbolic forms in human communication. This part will be concluded with the presentation of universal approaches to sound symbolism including the views of Philip Lieberman and John Ohala. The skeptical arguments against these universalistic tendencies will also be provided and discussed in details.

The final part of this paper will confront the findings of sound-symbolists with the theory of language evolution raised by Vilayanur S. Ramachandran based upon the concepts of synesthetic cross-modal abstraction and built-in preexisting cross-activation of the adjacent areas of the brain.

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SIMULATING THE BENEFITS OF LANGUAGE

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The current revival of the debate on the origins of language can be seen as moving towards the synthesis of empirical evidence, formal models, and simulations, which put the models to the test or serve as a substitute for observations of processes that have happened in the past. All three need not necessarily be combined: a good, parsimonious model can be very convincing when derived from a strong body of evidence. By its nature though, the investigation into the origins of language has to rely on indirect evidence. While it is difficult to treat the results of a particular simulation as hard facts, they can provide a valuable insight. There are several hypotheses about the role of language at its birth. At its most general, it is fair to say that language was a tool for information sharing. Assuming that information was not completely worthless to the recipient would mean the speaker performs an altruistic action with every communicative act. Let us consider the mechanisms that could promote such altruism on the example of food calls, a behaviour that is well spread and not limited to our species. It is well known that altruism directed to relatives can be promoted by kin selection, but the attempts to simulate the process reveal some important gaps in the theory. For instance, Hamilton's '*help in proportion to the degree of relatedness*' (Hamilton 1964) quantifies the altruistic act in terms of genetic similarity, but ignores the actual needs of both speaker and listener, or, indeed, the fact that often the perceived degree of kinship does not reflect the true situation. We have studied both issues through simulations (Turner; Kazakov 2003), and shown that not all sharing functions providing aid in accordance with Hamilton's principle promote altruism, especially when information about kin is incomplete or uncertain.

It is difficult to measure the amount being shared (and therefore follow Hamilton's empirical law) when the resource in question is information. Again, we have demonstrated through simulations that there are naturally occurring situations in which both the maximum value of the information and its time validity are capped, which proves sufficient to support the classical mechanism of kin selection. In addition, we studied the circumstances in which sharing information about the location of resources (*e.g.*, a food call) outperforms sharing amounts of the resource itself or selfish behaviour (Bartlett; Kazakov 2005). Support for the evolution of communication through kin selection can be drawn from examples ranging from the behaviour of condors to that of Australian aboriginal people. The latter case also supports an alternative mechanism, that of reciprocal altruism. Finally, evidence from primates suggests that sexual selection may also be involved, *e.g.*, food calls by alpha males can be seen as a convincing evidence of fitness. Language is usually associated with complex social structures, and the ability of its speakers to exercise a level of personal choice, two observations, which do not sit well with the simple and fixed behaviour that seems to be prescribed by kin selection. We have modelled the cooperation dynamics of agents where one can opt in and out of dynamically formed groups of agents, in which behaviour (readiness to cooperate) varies according to whether the partner is a group member or not (Kazakov and Hall). The results show that certain equilibria are reached despite the individual freedom to choose, as long as the agent is rational, *i.e.*, guided by its best interests. Language is not only a means of communication, but its dialects and professional jargons can also serve as a substitute for kinship or social membership markers. We simulated small talk between agents, whose only purpose was to identify the degree of '*linguistic relatedness*' as proportional to the degree of mutual understanding, in an environment where agents' lexicon evolved over time (Kazakov; Brennan). The results confirmed that kin selection could also work in this setting and promote sharing information (in other words, language). This self-promoting nature of language has also appeared in our earlier simulations as agents used language to direct their kin to the same places they frequent, making subsequent conversations with them more probable (Kazakov; Bartlett 2004).

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APPLYING RECAPITULATION THEORY TO LANGUAGE

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Introduction

“*Ontogeny recapitulates phylogeny*” is the brief summary of the idea that the stages in the growth and development of an individual organism evoke past stages in the evolutionary history of the species [ref]. This so called recapitulation theory dates back to the first quarter of the 19th century, during which it enjoyed great popularity; it has since been rejected in its over-simplified, deterministic form, but has a persisting influence on the scientific discourse in modern-day biology (Gould 1977). Another idea that dates back to the early years of Darwin's Theory of Evolution is the notion that languages undergo natural selection the way species do: “*A struggle for life is constantly going on among the words and grammatical forms in each language. The better, the shorter, the easier forms are constantly gaining the upper hand.*” (ref.: Max Müller, *Nature*, 1860?). Darwin found this idea sufficiently important and plausible to include the above quote in *The Descent of Man* (Darwin 1871). One could read it to suggest certain evolutionary pressures on language, although with varying degrees of clarity. The proposed strife for brevity seems unambiguous, and could be linked to cost of communication and individual constraints on memory and information processing. ‘Easier’ could refer to either constraints imposed by the vocal apparatus, or how the word or grammatical construct lends itself to being memorised, *e.g.*, a word form composed out of two familiar constituents would arguably be easier to remember than one that is completely new.

It is also not clear from this quote whether the selective pressure is applied to language as a social phenomenon, or as an evolutionary trait that directly influences the survival of its speakers. The former interpretation is behind much of the work on cultural transmission of language (ref.: Kirby). Here, in line with our previous work (Bartlett; Kazakov 2005), we focus on the latter case. We propose to apply the *onto-phylo* theory to language, and use child language as a window to the processes that were already at work when language started to emerge. Computational simulations of linguistic models reproducing relevant aspects of linguistic behaviour have been used to support the plausibility of these models, from the evolution of a shared lexicon (Steels 1996) to the emergence of compositional syntax (ref.: Kirby). Similarly, computational models reproducing aspects of child language could be seen as providing an insight into the underlying processes in children, and through the *onto-phylo* conjecture, into the past of language as well.

As an example of the approach we propose, let us consider the question of child acquisition of word morphology. It is a well known fact that young children learn frequently used, irregular, synthetic word forms (*e.g.*, *went*, *gave*), only to start using the ungrammatical overgeneralisations of other, regular paradigms (**goed*, **gived*) when these become better established. The process of producing regular word forms *by analogy* can be described by a simple rule, illustrated here: sleep-s : sleep-ing / walk-s : walk-ing. In the example, four word forms are sufficient to demonstrate that all proposed word constituents (morphemes) are productive as they appear in at least two different word forms, in combination with other valid constituents. Already Saussure had suggested that word forms change with time to form such patterns (ref.); Pirelli and Yvon have both used this as a computational bias to suggest word segmentations and propose likely pronunciations by analogy (ref.). Using the pattern in an inductive manner to hypothesise about unseen word forms: laugh-s : laugh-ed / leap-s : ?**leap-ed* produces the same result as seen in children. The same overgeneralisations were observed in another attempt to learn operational rules from

examples of English past tense in the form of an ordered list of rules where the first applicable rule overrides the rest. The resulting list starts with 'exceptions' (irregular cases), followed by rules with an increasingly larger scope, e.g., {*sleep-slept, eat-ate,...*, <...e>-<...e>+d, <any_stem>-<any_stem>+ed}.

The acquisition of word forms as either atomic entities or the result of the use of word-syntax rules is a known dichotomy supported by evidence from neuroscience. Applying the recapitulation principle would imply that the ability to add words to the mental lexicon predates the faculty to produce regular word forms through the use of rules. Looking at the known ways of implementing (and integrating) the two as computer algorithms, we can discuss the relative benefits of memorisation *vs* use of rules (Daelemans *et al.* 1999) in terms of their demands on knowledge representation and the complexity of the process involved to see what may have promoted the latter mechanism. The results then can be compared again with evidence from child language.

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CONTRASTING EARLY CRY AND EARLY BABBLING: RESULTS FROM A PILOT STUDY

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Introduction

Striking acoustic differences mark cry and both early and late babbling (Lenti Boero & Bottoni 2006, Longhi & Karmiloff-Smith 2004), as testified by different response parents and non parents give to them: early and later babbling is reported as "pleasurable" and "music like" by parents, listeners and researchers (Papoushek 1992); oppositely, infant cry might actually enhance fantasies of abuse and even killing in mothers of children with excessive colic cry (Levitzky & Cooper 2000), or elicit the "baby shaken syndrome " whose outcome might be cerebral oedema, and even death (Barr 2004), or prime infant abuse (Frodi, 1985, Frodi & Senchack,1990, Wiesenfeld et al. 1981, Zeskind e Lester, 1978). In a recent study, we tested the "intrinsic musicality" (Lenti Boero & Bottoni, 2008a) of the infant cry and found that, in a group of expert musicians, the infant cry might induce anxiety, and other negative emotions (Lenti Boero et al. 2008b). The present pilot study was conducted in order to test preference choice between early human babbling and cry in a more general public.

Methods.

Early infant cries (from new-borns aged 1-4 days) and early babbling (from infants aged two-seven months) from the archive of Laboratory of biotic and abiotic sounds (Université de la Vallée d'Aoste) were mounted on an Ipod. Seventeen subjects (12 F; 5 M) aged from 20 to 50, participated in this study. They carefully listened the sounds, and compiled a five items questionnaire relating to semantic definitions of sounds, vowel dominant, aesthetic evaluation and aroused emotions. Data were analyzed with SPSS.

Results and discussion. As in the infant cry study (Lenti Boero et al. 2008) females and males did not differ in any item. Subjects did not indicate different vowel dominants between cry and babbling, and as in the previous study "a" and "e" were the more frequent vowels reported. Instead, a great difference was found in the acoustic definition of sounds: 14 over 17 subjects (82%) defined the infant cry "aggressive" or "harsh", but only 3 over 17 (18%) defined early babbling with the same words. On the opposite, 11 over 17 (65%) told early babbling "warm" or "sweet", while only 3 subjects (18%) used those terms for early cry. In terms of "intrinsic musicality" those results might be ascribed to loudness difference (sounds were played in accord to their naturalistic loudness, and cries are much louder than babbling), or to the presence of aperiodic segments embedded in cries (Lenti Boero et al. 1998), but not in babbling. Indeed, further experiments are needed to better understand the intrinsic musicality of early human sounds, that might help clarifying the evolutionary background of the hypothesized parental selective pressure for language (Locke & Bogin 2006).

Following items in our questionnaire related to: 1) "aesthetic quality" of the sounds on a scale from 1 (worst) to 10 (best), result for early cry was 4.17, and for babbling 7.14, those ratings are significant,

F = 27.84, P = 0.034; 2) and 3) the potential for emotion arousal of the two sounds by means of two Lickert scale scoring + 3 for maximum and – 3 for minimum: gaiety/uneasiness, and serenity/anxiety, mean scores for early babbling were + 1.38 and + 1.31 respectively for gaiety/uneasiness and serenity/anxiety, mean scores for early cries were - 0.86 and - 1.6. Both results are significant F = 4.6, P = 0.058, and F = 26.83, P = 0.0005. In conclusion, the present pilot study confirm the hypotheses that early babbling sounds are preferred to infant cry, further research is needed to understand and compare the specific acousticity of both sounds for aesthetic and emotion arousal.

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LANGUAGE STRUCTURE IS PARTLY DETERMINED BY SOCIAL STRUCTURE

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Language structure is often considered separate from social structure—the environment in which a language is acquired and used (e.g., Chomsky, 1995). Just as an understanding of the how biological species adapt to different ecological niches can shed light on the evolutionary mechanisms underpinning biological change, so an understanding of how languages adapt to different social niches shed light on the cognitive mechanisms underpinning language as well as language origins.

It is generally believed that there are only spurious relationships between linguistic structures and the social environments within which languages are spoken. In the present work we challenge this assumption by conducting a large-scale statistical analysis of 2,236 languages, predicting linguistic structure from socio-demographic data. We reasoned that although the structure of all languages is constrained by what infants can learn (Christiansen & Chater, 2008; Deacon, 1997), languages with greater numbers of non-native speakers (adult learners) would be additionally constrained by the limits and biases of the adult cognitive system. Specifically, although complex morphological structure appears to pose little problem to infants and child learners, it is a major source of difficulty for adult learners. Hence, languages with more adult learners may come to have simpler morphological structure, and opt for lexical over morphological ways of encoding information (for similar ideas see Wray & Grace, 2007; Trudgill, 2001; McWhorter, 2001; Dahl, 2004).

In this analysis we quantified the relationship between 28 linguistic features emphasizing morphological structure (obtained from the World Atlas of Language Structures—<http://wals.info>) and 3 socio-demographic variables: number of speakers, geographic spread of the language, and number of linguistic neighbors. We predicted that having more speakers, larger geographic spread, and greater contact with other languages—proxy variables measuring the “exotericity” of a language (Wray & Grace, 2007)—would all be correlated with simpler morphology.

All of these predictions were confirmed at high level of statistical significance. Following Wray and Grace (2007) we identified two major ecological niches within which languages evolve. The *exoteric* niche stresses out-group communication and results in languages with a greater number of non-native speakers. The *esoteric* niche by contrast includes languages which are almost exclusively learned and spoken by native speakers and are rarely if ever used by outsiders (given that the median number of speakers of a language is only 7,000, the esoteric niche is far more prevalent than is typically assumed). Compared to languages spoken in the esoteric niche (smaller population, smaller area, fewer linguistic neighbors), languages spoken in the exoteric niche:

(a) Contain fewer case markings, have case systems with higher degree of case syncretism that further reduce the number of morphological distinctions. (b) Have fewer grammatical categories marked on the verb and are less likely to have idiosyncratic verbal morphology such as verbal person markings that alternate between marking agent or patient depending on semantic context. (c) Are less likely to communicate distance distinctions in demonstratives. (d) Are more likely to not possess noun/verb agreement or have agreement limited to agents. (e) Are more likely to make possibility and evidential distinctions using lexical (e.g., verbal) constructions rather than using inflections such as affixes. (f) Are less likely to encode the future tense morphologically or possess remoteness distinctions in the past tense. (g) Are less likely to have inflections that mark possession. (h) Are less likely to have definite and indefinite articles. (i) Are more likely to express pronominal subjects lexically than morphologically. Overall, languages with larger numbers of speakers, greater geographic spread, and more linguistic neighbors were much more likely to be of analytic/isolating than synthetic type.

Language structures appear to adapt to the environment (niche) in which they are being learned and used. As adults learn a language, features that are difficult for them to acquire, are less likely to be passed on to

subsequent learners. Languages used for communication in large groups that include adult learners appear to have been subjected to such selection. Conversely, the morphological complexity common to languages used in small groups increases redundancy and may facilitate language learning by infants. The proposed *Linguistic Niche Hypothesis* has implications for answering the broad question of why languages differ in the way they do and also makes novel empirical predictions regarding language acquisition capacities of children versus adults.

THE TWO STAGE LIFE-CYCLE OF CULTURAL REPLICATORS

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Language is the product of two interacting evolutionary processes; biological evolution shaping speakers and cultural evolution shaping the languages they speak. Biology provides a well developed theory of biological evolution, but currently no equivalent theory of cultural evolution exists. Dawkins` (1976) concept of memes provides one possible foundation for such a theory. However current definitions of what constitutes a meme are either imprecise or overly narrow. This paper proposes a definition of a meme as a replicator with *a two-stage life-cycle*, and then investigates the interaction between these two stages.

Dawkins proposed the meme as a replicating unit of cultural information, a cultural analogue of a gene. Unfortunately he failed to give a precise definition of what should be considered as a meme. Later authors have given a variety of contradictory definitions. For some memes are to be found solely in the mental representations of cultural information (Delius 1989), but for others they may also be found in its physical manifestations (Blackmore 1999). Some go even further, disregarding mental representations and define memes only in terms of physical artifacts (Croft 2000, Dennet 1991). The concept of meme phenotype further adds to the confusion (Rose 1998). Some claim it irrelevant, while others use it to label alternatively a meme`s physical or mental manifestations.

It is first shown that neither mental nor physical incarnations of a meme can be thought of as equivalent to a biological phenotype. Instead both are shown to form distinct stages in a meme`s germ line replication. Based on Chomsky`s (1986) distinction between i-language and e-language, it is proposed that memes present in the brain be called i-memes, while those present physically in the environment be called e-memes. These two stages are dependent on each other for replication, forming two parts of a common life-cycle. The only way an i-meme can replicate is indirectly via its expression as an e-meme, and vice versa.

The division of a meme`s life-cycle into stages also divides the process of replication into two distinct steps. Differing selection pressures can act at both of these and so we expect memes to adopt a range of alternative strategies to overcome them. The sorts of strategies likely to arise when faced with selection pressures produced by language transmission are investigated. It is argued that when e-memes are relatively easy to propagate, that i-memes are likely to be propagated by a process of *iterative replication*. A second possible strategy identified is for e-memes to improve their own fecundity, not by propagating additional i-meme copies, but by *promoting* the propagation ability of corresponding i-memes already present in their environment. Several ways whereby linguistic e-memes can be seen to achieve this are discussed.

Finally it is shown that Blackmore`s (1999) distinction between copy-the-product and copy-the-instruction memes has a natural representation in the life-cycle model. Both “products” and “instructions” can be seen as distinct e-meme counterparts of a single i-meme. The “instructions” specialize to replicate the i-meme with high fidelity, leaving promotion activities to the “products” e-meme. Blackmore`s distinction is linguistically relevant as it corresponds to differences between native first language learning and taught second language acquisition.

The two-stage life-cycle definition of a meme given in this paper recognizes the evolutionary importance of both the mental and physical aspects of cultural transmission. By explicitly distinguishing two different stages of a meme`s life-cycle it allows these stages and the interactions between them to be analyzed. Such an analysis suggests the possible importance of iterative replication, meme promotion and “instructions” e-memes. It is hoped that ideas in this paper will contribute to the development of a theory of cultural evolution, and that such a theory will lead to a better understanding of language change and origins.

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DIRECT EVIDENCE FOR SHARED NETWORKS INVOLVED IN THE CATEGORISATION OF SPEECH AND BODY ACTIONS

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Among the many different theories of protolanguage, the Gestural Origins Hypothesis (Hewes 1973; Corballis 2002) is one that makes clear predictions about shared neural representations for body actions and language. There is growing evidence for multi-modal representations of actions and speech in the extended mirror neurone system (review: Pineda, 2008) encompassing ventral premotor areas (PMv), the inferior frontal gyrus (IFG), the inferior parietal lobule (IPL), and the superior temporal sulcus (STSp), but this evidence tends to draw on separate experiments in the language and action recognition domains.

We directly compared fMRI activation patterns for matched speech, body motion and scrambled nonsense signals within the same experiment (Figure 1).

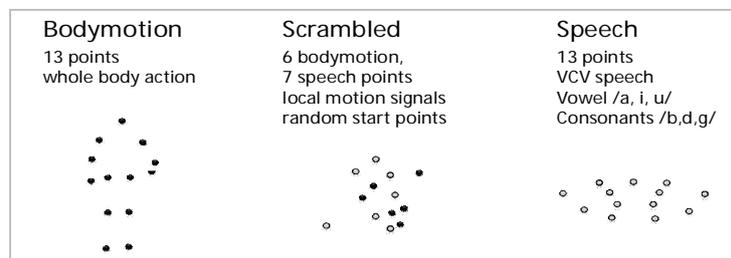


Figure 1. Schematic diagram of the three visual stimulus types. Signals can be visual point light displays or auditory representations of the signals.

In two fMRI experiments with 11 participants we identified areas that are activated by both visual and auditory observation of the three signal types –regions of interest for gestural origins hypotheses. Body motion and speech activate the classical mirror system, in particular STSp, PM, IFG and IPL as well as SMA. There is significant overlap in activation in bilateral STSp and PMd as well as left PMv, IFG, and SMA (Figure 2).

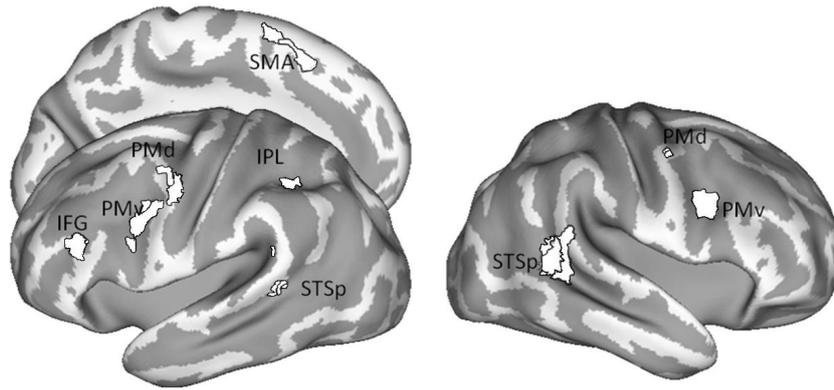


Figure 2. Regions of interest activated by visual and auditory speech (dotted outlines) and body action (continuous outline). All activations: global-null conjunctions with $p_{FWE} < 0.05$.

In a second experiment we presented listeners with semantically congruent and incongruent signals (e.g. visual speech and auditory body action). We found significantly more activation for incongruent meaningful signals in all areas except premotor cortex. No interactions were observed when the nonsense control was paired with a meaningful signal. The interaction shows that meaningful gestures are processed by the same systems, whether they are speech or non-speech body motion.

Our results provide direct evidence for a shared network for the recognition of speech and body actions that is a key requirement for the Gestural Origins Hypothesis. We will discuss the repercussions of our findings for the emergence of protolanguage and argue the imaging data supports the view that language co-developed with extended systems for the recognition and synthesis of complex body action sequences.

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THE ROLE OF SOUND SYMBOLISM IN PROTOLANGUAGE: SOME LINGUISTIC AND ARCHAEOLOGICAL EVIDENCE

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In this paper I will first sketch the role of sound symbolism in human protolanguage. Following some proposals by M. Swadesh, I will maintain that there are at least two phases in the early development of sound-meaning correlations. In the first phase, there are onomatopoeic or phonomimic speech sounds reflecting natural noises; in the second phase, speech sounds are associated to non-auditory aspects of the physical world: shapes, objects, movements and actions. In my view, this phenomimic or synesthetic sound symbolism should be related to the cognitive fluidity phase proposed by Mithen (1996) in his evolutive model of the human mind.

In the second part, I will explore one possible linguistic-archaeological correlation that could be considered as one of the most ancient recoverable *fossils* of the second stage of sound symbolism in protolanguage. I will base my exposition on two types of findings. On the archaeological side, I will rely on the well attested remains of Upper Paleolithic mobile art. On the linguistic side, I will take advantage of the phonetic structure of some proposed global etymologies, based on a certain phonetic similarity between words with the same or similar meaning observed across different linguistic stocks of the world. Although I do not endorse here the idea that such global etymologies can be considered as actual words from an alleged prehistoric mother-tongue (Proto-World), I assume that some of the sound-sense correlations suggested by these global etymologies are indeed extremely ancient and are based on some sort of natural sound symbolic association, laying the foundations of human language creation and evolution. I will show that such sound symbolic associations can be traced at least to the period in which most of the venus figurines and depictions of female sex are attested. In addition, I will try to show that at least one of the most usual forms and figures characterizing this prehistoric art can be directly related to the sound symbolic association suggested by some of the roots reconstructed by Bengtson and Ruhlen (1994) for their global etymologies, which have been reinterpreted as instances of sound symbolism (Campbell 2008: 88-90). I will concentrate in this paper on one of these etymologies: **puti* 'vulva'. Following Swadesh suggestions concerning the assumption that labial sounds (*p*, *m*) "give the effect of flat surfaces slapping together, dentals (*t*, *n*) the contact of a point" (Swadesh 1972: 208), I propose that **puti* 'vulva', can be associated with an abstract image symbolizing the feminine sex: an inverted triangle with a middle vertical line. This representation of the female sex is attested since at least the Aurignacian and Gravetian periods. Therefore, it has an antiquity of about 33.000 years. If we follow a proposal made by Nichols (1988: 136-139) for the dating of linguistic diversity, the antiquity of the **puti* sound symbolism can be estimated to about 30.000 years. This estimation is based on the observation that **puti* is attested, in the relevant meaning, at least in 15 linguistic stocks, following the proposal of Bengtson and Ruhlen (1994). We therefore obtain a very precise chronological correlation between a sound symbolic association attested in different linguistic stocks all over the world and some of the earliest remains of the symbolic behaviour of the human species. In addition, there is at least one historical example of this phenomimic relation. It is the *pictographic* symbol for woman of the Uruk IV tablets that serves as antecedent for the cuneiform spelling of the Sumerian word *munus* with a phonetic configuration predicted by Swadesh with a bilabial nasal ([m]) and an alveo-dental nasal ([n]) parallel to the reconstructed global root **puti* in which we find a similar phonetic form (a bilabial [p] plus an alveo-dental [t]):



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ORIGINS OF HUMAN GESTURES. A HYPOTHESIS BASED ON MESSAGES RELATING TO SPACE

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Assuming bipedal posture has freed the upper limbs from the tasks associated with resting of the body and locomotion. Paul Boissac (2006) assumes that relatively stable morphology of the upper limbs could be retained due to the fact that these were used for two new adaptations. The first adaptation is related to physiological processes, whereas the second is of a social character. When examined in terms of physiology, this adaptive value was supposed to consist in maintaining a larger body surface for draining the heat generated during long walks or running. Another reason, one of social nature, pertaining to males, was using the arms to present one's musculature and attract sexual partners. Boissac mentions also another function, namely gesticulation that might have served as a means to define and protect personal space. Nevertheless, it were the first two reasons that have determined the way in which the upper limbs have been marked out for adaptation and retaining their relatively unchanged morphology.

In addition to the functions of the arms listed by Boissac, the contribution of the upper limbs to the biomotorics of walking and running might also be mentioned. This contribution has undoubtedly had influence on the morphological features of the arms and, working the other way round, has shaped deportment. Still, the adaptive potential of the upper limbs turned out to be vast enough to allow them to be used for other purposes. One of these, is the contribution of the arms and hands to communication, defined as gesticulation. It is difficult to assume, however, that this involvement resulted solely from the upper limbs being free from the above mentioned tasks over long periods of time. An additional hypothesis might be put forward to account for this kind of adaptation. But before, a number of introductory observations need to be made.

Effective strategies for survival in a given environment require the knowledge of the space it occupies. Getting to know the spatial aspect of an environment consists in exploring it with the senses and then creating mental representations concerning direction, distance, spatial relations, shapes, height, width, depth and, say, the location of given objects. Formed in this way, spatial orientation is one of the basic conditions that enable humans to fulfill life-important needs. On the other hand, humans have lived in groups throughout the whole period of their phylogenetic development; developing a system of communication that would, e.g. allow to coordinate the actions of a group was a natural consequence of this form of co-existence. The exchange of information that in some way related to space must have constituted an essential element of that coordination. It is difficult to imagine an effective exchange of this kind of information to take place without an elaborate way to point to a direction or a place precisely. It is also difficult to imagine this kind of information to have been conveyed orally; in this way one could at best inform about an event, e.g. the occurrence of a predator, without indicating the place. The necessity to communicate spatial-related information directly has forced humans to find a means to make this kind of communication possible. The arms and hands were perfect for the task. A number of arguments grounding this hypothesis might be mentioned, namely 1) the arms have been used before for such communication purposes as attracting attention and expressing requests, 2) due to their anatomy, they have the most capacity to project the spatial features of objects, situations, relations, etc. in an iconic way, 3) they constitute a pair, which additionally increases their capacity for spatial projection e.g. formulating a three-dimensional message or formulating a message more quickly, 4) they are available due to the fact that bipedalism has freed them from locomotion tasks, 5) the arms may be used at the same time as vocal means of expression constituting a bimodal content of a message. This change must have occurred at the same time as the formation of specifically human cognitive skills (Tomasello, 1999, 2008).

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COMPOUNDS AND COMMANDS IN THE EVOLUTION OF LANGUAGE

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Verb-noun (VN) compounds of the kind *pickpocket*, *turncoat*, *daredevil*, *hunchback*, *wagtail*, *tattletale*, *sawbones*, *cutthroat*, *Shakespeare* have been noted to be exceptional in that they are exocentric (not headed), in the sense that a turncoat is neither a kind of turn nor a kind of coat (e.g. Selkirk 1982, Spencer 1991). According to modern syntactic theory, including the Minimalist Framework (e.g. Chomsky 1995 and subsequent work), Merge (combination of morpho-syntactic units) creates a phrase whose nature is determined by the nature of the head which projects. Without ascribing to them some invisible structure, these exocentric compounds fall outside of the realm of modern syntactic theory. In the spirit of Jackendoff's (1999, 2002) proposal that the evolution of syntax has preserved 'fossils' of its previous stages, I argue that VN compounds in particular represent an outstanding candidate for a protosyntactic fossil, for they involve (i) the simplest possible syntax: non-hierarchical/non-headed concatenation, with no functional categories (proto-Merge); (ii) verb in the ancient mood form (imperative); (iii) underdetermined (even vague) thematic role assignment (proto-predication); (iv) very basic vocabulary, often denoting body parts and functions; (v) derogatory (often coarse/vulgar) semantics.

In addition to their exocentric nature, another rather surprising property of VN compounds is that in some languages, e.g. Serbian, the verb indisputably surfaces in the imperative (command) form, with the distinct *i/j* ending (1) (Stevanović 1956, Mihajlović 1992, Belić 1949, Živanović 1904). The imperative analysis of VN compounds has been explored by many traditional grammarians and researchers, for English (e.g. Weekley 1916; Jespersen 1954), for Romance languages (e.g. Darmesteter 1934; Lloyd 1968), for Bulgarian (Andrejčin 1955), for Macedonian (Koneski 1954). Polish lost the imperative ending in *-i* by the end of the 16th century. Mirowicz (1946) maintains that one cannot exclude the diachronic imperative analysis for Polish compounds, while Klemensiewicz et al. (1964) conclude that VN compounds in Polish went through several stages, including an imperative stage (2). VN compounds are used for naming/nicknaming purposes both in Indo-European (IE) and non-IE languages, such as e.g. Chinese and Tashelhit Berber, with strikingly similar images, and with almost identical morphological make-up.

It has been proposed that naming was among the first uses of language for referential purposes, preceding the so-called epistemic stage, expressing propositions or statements. According to e.g. Rolfe (1996), humans initially used verbs to issue commands (imperative), even in the one-word (pre-syntactic stage), and much before they used verbs to make statements. Imperative in general is among the first productive verbal forms used by children (e.g. Bar-Shalom and Snyder 1999), and VN compounds themselves appear early in acquisition, much before their headed counterparts (Clark, Hecht & Mulford 1986). It is conceivable that imperative is a paradigm case of an unmarked mood form, and that for that reason it emerges early, whether in evolution or acquisition (according to e.g. Studdert-Kennedy (1991), Rolfe (1996), Locke (2009), present-day views of ontogeny/phylogeny warrant the use of ontogeny to corroborate hypotheses about phylogeny). Imperatives also provide some continuity with animal calls, in the sense that they are calls for action. If imperative is a protolinguistic form, and if compounds in general are protolinguistic fossils (e.g. Jackendoff 1999, 2002), then imperative VN compounds are doubly significant in this respect: they incorporate both. If VN compounds started to be coined at an ancient stage of protolanguage for (nick)naming purposes, then it is plausible that they would have been tinkered from what was already available at this stage, the imperative/command form.

VN compounds also involve rather basic predication: the noun is interpreted as an argument of the verb, but whether it is an internal argument (object) or external argument (subject) does not seem to be structurally determined. For example, a *killjoy* is somebody who kills joy, with

the noun *joy* acting as the internal (object) argument of the verb. Most VN compounds are of this type. However, in compounds such as *crybaby* or *copycat* the noun is an external argument (subject). Moreover, nouns in some VN compounds can be dually interpreted: e.g. a *daredevil* is someone who dares a devil (object interpretation) and can also be a devil who dares (subject interpretation), at the same time. This will be argued to follow from impoverished syntactic structure.

Formation of thousands of these compounds, many of which are expressive, humorous and playful, may have been encouraged by ancient naming rituals, which rewarded originality and coarse humor. If proto-language initially operated with a limited, concrete vocabulary, this compounding strategy, with its striking metaphors, would have augmented its expressive power enormously.

- (1) Serbian: *ispi-čutura* 'empty-flask, drunkard'; *muti-voda* 'muddy-water';
vrti-guz 'spin-butt, fidget'; *jebi-vetar* 'screw-wind, charlatan,' *guli-koža*
 'peel-skin' who rips you off,' *Kosi-noga* 'skew-leg, lame person
- (2) Polish: *hulaj-dusza* 'roister-soul, reveler,' *mąci-woda* 'muddy-water,
 troublemaker,' *pali-woda* 'burn-water, madcap,' *pasi-brzuch* 'pasture-belly,
 glutton,' *pędzi-wiatr* 'drive-wind, madcap,' *wierci-pięta* 'wiggle-heel, fidget'

GESTURE LANGUAGE AS A PREREQUISITE TO SPEECH

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The aim of this presentation is an analysis of the language evolution path with an emphasis on the manual manner of communication. Since the evolutionary nature of human language creation cannot be neglected, the inevitability of mutations in search of selective advantages seems highly plausible. Certainly, an undeniable social aspect is to be taken into consideration while discussing the bases of language. Linkages between gesture and vocal communication are the point of interest in this paper; thus, adaptations to the environment, together with bipedal hominid locomotion and hands application, constitute the passage from the manual to the oral representation of thoughts. Contemporary usage of gesture language and its role in the process of socialization is to be presented through the model of language and culture acquisition which forms the core of the given process. Using the tactile sense in relation to the brain division is yet another example of the evolutionary influence on the development of the language faculty. Therefore, the anatomical symmetry, size attribution and hemispherical power are at stake when analyzing handedness and its connections with linguistic abilities and skills.

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THE IMPORTANCE OF PRAGMATICS TO A PROPER UNDERSTANDING OF PROTOLANGUAGE

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Broadly speaking, two approaches to the study of linguistic communication can be identified. In one communication is described by the twin acts of encoding and decoding. Speakers take the meaning they intend to communicate, encode it in language, and then transmit the signal. Receivers then follow a similar process in reverse. This *code model*, inspired by the Shannon-Weaver account of information, is the basis for much work in linguistics (especially within generative grammar), and is implicitly assumed by many approaches to protolanguage. Over the past 30 years or so, the discipline of linguistic pragmatics has developed an alternative to this model. In the *ostensive-inferential* model of communication (see Sperber & Wilson, 1995), production is taken to be a physical alteration of the environment (e.g. acoustically), which provides evidence for the meaning that the speaker intends to communicate. This is the act of ostension. Listeners then use this evidence to reconstruct that meaning – this is the act of inference. The very existence of pragmatics as a discipline is predicated upon the integrity of this model. Its findings are thus arguments in its favour (Origgi & Sperber, 2000).

These twin acts of ostension and inference are one way in which linguistic communication can be clearly delineated from other forms of communication in the natural world. To be sure, other species, most notably non-human primates, do possess some form of inferential capacities, but their communication systems are not fundamentally dependent upon them. In contrast, humans that do not possess these skills are “unable to participate in a conversation in any normal sense” (Baron-Cohen, 1988, p.83-84).

Any complete theory of protolanguage must therefore (i) account for the advent of ostensive-inferential communication; and (ii) consider how the existence of ostension and inference would have impacted on the emergence of both symbols and grammar. With respect to the first of these, a plausible first hypothesis, in need of empirical investigation, is that ostension and inference emerged from a pressure for increased social intelligence. With respect to the second question, a number of recent experiments that study the emergence of communication in pairs of interacting individuals (e.g. de Ruiter et al., 2007; Scott-Phillips et al., under review) shed some light. My talk will discuss these, and in doing so demonstrate why ostension and inference cause the process by which a communication system might emerge to be different, in quite fundamental ways, to that observed elsewhere, for example in the evolution of animal signals, or in ontogenetic ritualisation (Tomasello & Call, 1997). I will also comment on how a recognition of the importance of ostension and inference might defuse the debate between the analytic (e.g. Wray, 1998) and synthetic (e.g. Bickerton, 1990; Jackendoff, 1999) approaches to protolanguage.

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EVOLUTION OF LANGUAGE: WHAT DO CHIMPANZEES HAVE TO SAY?

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One powerful approach to understanding how human language evolved is to examine the cognitive and communicative abilities of non-human primates whose phylogenetic relationship to humans is known. Such a comparative approach allows us to investigate which facets of human language are unique to humans and which have their evolutionary routes deep in the primate lineage. Research into the vocal modality has already revealed that monkey species are capable of communicating about external events with calls (Seyfarth et al., 1980) and that calls can be combined into meaningful sequences (Arnold and Zuberbühler, 2006). Such findings have been interpreted to indicate that linguistic reference and basic syntactic rules built on abilities already present in the primate lineage. It is, however, possible that if such abilities are present in monkeys, but not other great apes, that the monkeys' abilities could represent a case of convergent rather than homologous evolution. In contrast to the wealth of knowledge we have about many areas of great ape cognition, very little research has focused on their vocal communication. Thus currently, we do not know if ape vocal communication shares or surpasses the complexities of monkey communication and this gap in our knowledge makes it difficult to interpret the significance of the monkey evidence. In order to tackle this issue research into the vocal behaviour of great apes is urgently needed.

Chimpanzees are our closest living relatives and allow us to estimate what our last common ancestor may have been capable of. I will present data from recent and ongoing studies on two broad chimpanzee call types: food-associated calls and agonistic screams. The research combines studies conducted with the wild chimpanzees of Budongo Forest, Uganda and captive populations.

Food associated calls were investigated principally in captivity, where it was found that callers vary the acoustic structure of their calls as a function of the value of the food and in some circumstances the type of the food (Slocombe and Zuberbühler, 2006). A playback study showed that listeners extracted information about the value of the food source from the calls, providing the first evidence for functional reference in great apes (Slocombe and Zuberbühler, 2005). Ongoing work into the referential specificity of the calls from the listener's perspective and the motivation behind the production of these calls will be outlined.

Screams are commonly produced by chimpanzees in response to a range of agonistic contexts. The acoustic structure of screams varies systematically with the social role the caller takes: victim or aggressor (Slocombe and Zuberbühler, 2005b). Recent playback experiments in captivity have shown that listeners understand the meaning of these calls. Victim screams were examined in more detail and were found to vary acoustically as a function of the severity of aggression the caller was experiencing (Slocombe and Zuberbühler, 2007). Playback experiments conducted in the wild demonstrated that listeners meaningfully distinguished screams given in response to mild and severe aggression (Slocombe and Zuberbühler, 2009). Lastly we found that victims altered the acoustic structure of their screams if they were facing severe aggression and there was an individual in the immediate audience who outranked the aggressor and could therefore provide effective aid (Slocombe and

Zuberbühler, 2007). The implications of this finding for our understanding of call production in primates will be discussed.

Acknowledgements

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MUSIC: ANGEL SPEECH OR PRE-LANGUAGE OF HUMANS?

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The idea of a musical protolanguage is resurrected in recent work by Steve Mithen and Tecumseh Fitch. I argue that postulating such a system offers nothing interesting in the search for a putative pre-language, since it is not consonant with what we know about primate communication, and moreover has no characteristics that plausibly lead to any of the features found in language today.

For Thomas Carlyle, music was the speech of angels; two recent works (Mithen 2009, Fitch in press) propose a musical precursor for language, *prosodic* or *musical protolanguage* (MPL). I investigate proposed characteristics of an MPL and argue that such a postulation offers no explanatory advantages.

For Mithen 'it appears incontestable that human language evolved from a communication system [with] strong similarities to that used by primates, especially the chimpanzee today' (2009:62). Even assuming Mithen means *speech*, not *language*, MPL is a cul-de-sac in investigation of a pre-linguistic stage. First, MPL is not a likely outgrowth of vocal communication in the last common ancestor of humans and chimps: no great ape vocalizations display Mithen's 'musicality'. Mithen cites a 'significant degree of musicality' in the 'rhythmic chattering of geladas' and the duetting songs of gibbons (2009:62). But these primates are too distantly related to humans for their vocalizations to be relevant.

Second, and given the lack of a clear 'musical' strain in the LCA of extant primates, parsimony militates against the idea that MPL arose *de novo* only in hominins, branched into both speech (then language) and vocal music, and then disappeared. Mithen claims a core rôle of MPL is 'the expression of emotion and social bonding' (2009:75). Once compositionality emerges, something must replace this rôle: in Mithen's view, music. But though music is universal, *forms* of music are culture-specific (learned), and thus poor candidates for managing societal factors (as is language!). In fact, 'emotion and social bonding' are handled by innate and thus universally-recognized primate features—and the huge overlap between human gestures and those of chimpanzees and bonobos suggests a system also present in our LCA. Since non-verbal, social communication in humans and its homologues in other primates are so similar, both in form and function, postulating the emergence of a new evolutionary strand (music) to handle just these features is entirely unnecessary.

Crucially, Mithen neglects the question whether MPL itself would be innate, like the vocalizations of non-human primates, or learned, like vocabulary. But a central issue is, how did learned vocal communication arise, if there is nothing like it in primate communication? Fitch stresses that learned 'song' systems have evolved separately in distinct lineages, e.g. in songbirds, some whales and seals, and suggests that similar selection pressures might produce such a system in humans. But vocal imitation / learning constitute such a radical discontinuity with great ape vocalization (contra Mithen) that their emergence in hominins is not explained simply with reference to analogous systems in other vertebrates, especially given the total lack of compositionality in such systems, in contrast with language.

Fitch claims 'song possesses the characteristics of openness and generativity, as well as cultural transmission, that are needed for language'. True, song is learned, but the cultural transmission of

song in humans is never *inevitable*—in contrast with the transmission of language, and also with ‘song systems’ in other vertebrates. Moreover, human song transmission has no critical period, and is not complete in all its important aspects at a very young age (around three years in humans), again, in total contrast to both language and birdsong etc.

For Fitch, MPL comprises ‘meaningless sung phrases of complex phonological structure’. He explicitly states ‘the generative aspect of phonology might have emerged before it was put to any meaningful use’. But crucially, why would it? MPL without meanings wouldn’t *need* ‘the generative aspect of phonology’; selective pressure for contrastive phonology only arises from expanding vocabulary (MacNeilage 1998). Fitch’s sequence of events is thus entirely the wrong way round.

Finally, Fitch claims there is something ‘syntax-like’ about MPL: ‘Regarding syntax, [MPL] provides meaningless but hierarchically-structured signals, which include phrases’. But a phrase isn’t merely a sequence of items; rather, crucially it has a *head*, without which there is, in linguistic terms, no phrase. Heads are modified by optional items, and require complements, which in turn typically have specific semantic properties (selectional restrictions) and are of a specific syntactic category. The idea that ‘phrases’ could evolve before meaningful words simply makes no sense, because without words there are no phrases.

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PHILOSOPHY IN THE EVOLUTION OF LANGUAGE. THE CASE OF THE HCF – PJ DEBATE

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An increasing conviction in the circles of evolution of language researchers, expressed both in speech (the Evolang 2008 conference) and in print (Fitch 2002) is that in the present decade, evolution of language has “come of age”. Among the strongest points of consensus regarding the development and maturity of this research area is the movement towards quantitative methods and formalism, and away from qualitative methods and speculation. This change, as a characteristic that sets evolution of language apart from more traditional theorising on the origins of language, may even be considered constitutive of its identity. However, it bears significant implications for philosophers, whose methodological instrumentarium by definition revolves around speculation and qualitative study, but who also aspire to be a part of the evolution of language movement. Consequently, it provokes the question of the possibility of valuable contributions that philosophical research has to offer to evolution of language.

In my talk, I argue that the evaluation of the status and function of philosophically-oriented research is among the many important parallels that evolution of language, as a research area, shows with Cognitive Science. In CS, the role of philosopher has been a matter of debate for a considerable time, with opinions remaining divided. I draw mostly on the distinctions made in the recent discussion in *Topics in Cognitive Science* (Brook 2009, Dennett 2009, Thagard 2009) to establish the candidate roles and investigate how they transfer to the field of evolution of language. I argue that in general, ‘negative’ (*constraints-driven*) rather than ‘positive’ philosophical work in evolution of language is founded on a more solid standing. Specifically, I identify *conceptual clarification* as the most important function to be performed by philosophers.

As a case in point, I refer to the debate, between Hauser, Chomsky and Fitch, and Pinker and Jackendoff (Hauser, Chomsky, Fitch 2002; Pinker & Jackendoff 2005; Fitch, Hauser, Chomsky 2005; Jackendoff & Pinker 2005). I hope to show conclusively that this debate, pivotal to the field of evolution of language, is founded on a profound terminological confusion – two mutually contradictory definitions of the opposition FLN – FLB.

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RETHINKING LANGUAGE FACULTY. HAS LANGUAGE EVOLVED FOR OTHER THAN LANGUAGE RELATED REASONS?

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It is tempting to think that if language evolved by gradual Darwinian natural selection, we must be able to find some precursor of it in our closest relatives, the chimpanzees. In several famous and controversial demonstrations, chimpanzees have been taught some hand-signs based on American Sign Language, to manipulate colored switches or tokens, and to understand some spoken commands (Gardner & Gardner, 1969; Premack & Premack, 1983; Savage-Rumbaugh, 1991). Whether one wants to call their abilities language is not really a scientific question, but a matter of definition: how far we are willing to stretch the meaning of the word language.

The scientific question is whether the chimps' abilities are homologous to human language – that is, whether the two systems show the same basic organization owing to descent from a single system in their common ancestor. For example, biologists do not debate whether the wing-like structures of gliding rodents may be called genuine wings or something else. It is clear that these structures are not homologous to the wings of bats, because they have a fundamentally different anatomical plan, reflecting a different evolutionary history. Bats' wings are modifications of the hands of the common mammalian ancestor; flying squirrels' wings are modifications of their rib cages. The two structures are merely analogous: similar in function.

Homo sapiens is the only species with symbolic language. According to evolutionary theory, there should be a selective advantage fostering the development of language among humans. There are many explanations of such an evolutionary force. Some of the major ideas have stated that (1) language brings with itself the ability to convey information about prey or other food, or about dangers of all sorts; (2) language is a result of sexual selection; (3) language replaces the social grooming found in monkeys and apes as an instrument for building coalitions and other social bonds; (4) language is a mother tongue that evolved among kin for honest communication. However, despite all the merits of these proposals, they face a problem of explaining why language has not evolved among other apes or animals. I do not claim that there is a unique explanation for why language has evolved among humans. On the contrary, different aspects of language may fulfill different evolutionary needs. However, in this paper – borrowing some ideas of Peter Gärdenfors – I will propose another advantage of symbolic language: language makes it possible to plan future action.

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FROM (PROTO)MIMESIS TO (PROTO)LANGUAGE

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1. The need for “protolanguage” and “cognitive prerequisites”

As stated by Bickerton (1990: 128), the concept of “protolanguage” is necessary in evolutionary theorizing in order to avoid the implausibility of “some gargantuan leap from speechlessness to full language”. But given the large differences between the communication, both vocal and gestural, of present day apes (our best approximation for that of the Miocene apes, from which our species evolved) and that of pre-verbal children, even the “leap to protolanguage” is huge enough. Donald (1991, 1999) has persuasively argued for the need for “cognitive prerequisites” for protolanguages, and that an advanced capacity for *mimesis*, evolved for skill rehearsal, but recruited for imitation, mime, gesture and re-enactive imagination would have filled this role.

However, Donald’s theory leaves a number of unresolved issues. Present day apes have at least some mimetic skills, and if so why not the “common ancestor”? If originally non-communicative, how did mimesis get recruited for intentional communication? What were its precursors, and how did the transition to a conventional (though “grammarless”) protolanguage come about?

2. Bodily mimesis and the Mimesis Hierarchy

In my research on the evolution of language, and its development in children, I have proposed an elaboration of the concept of *bodily mimesis*, as follows:

A particular bodily act of cognition or communication is an act of *bodily mimesis* if and only if: (a) It involves a *cross-modal mapping* between exteroception (normally dominated by vision) and proprioception (normally dominated by kinaesthetics); (b) it is under conscious control and *corresponds to* – either iconically or indexically – to some action, object or event, but at the same time is *differentiated* from it by the subject; (c) the subject *intends* the act to stand for some action, object or event for an addressee (and for the addressee to recognize this intention). But not if (d) the act is fully conventional (and normative) and (e) divides (semi)compositionally into meaningful sub-acts that systematically relate to other similar acts (as in grammar).

Each of features (a)-(e) is conceptually and empirically distinguishable, so that the later ones presuppose earlier ones, and thus form *the mimesis hierarchy* (Zlatev 2008).

3. Evidence from primatology and developmental research

Comparative studies of non-human primates and children show that on the first two levels of the hierarchy, *proto-mimesis* and *dyadic mimesis*, the gaps between apes and infants are relatively quantitative. The proposal is that these, however, result in the qualitative differences observed on the higher levels: *triadic mimesis*, *protolanguage* and *full language*.

In order to understand the nature of the transitions between the stages, developmental studies are the best source of evidence that we can have (with similarities, though not “recapitulation”, between evolution and development motivated by the highly epigenetic nature of human development). A study of children’s “acts of bodily communication” between 18 and 27 months, in two different cultures (Sweden and Thailand) shows similar developmental patterns and evidence for a qualitative transition around 20 months. This can be interpreted as that from (pre-conventional) triadic mimesis to protolanguage, the latter based on a meta-linguistic understanding of linguistic normativity, and supported by a species-specific adaptation for vocal control and lexical memory.

For the transition from protolanguage to language, no extra biological adaptation needs to be assumed – but rather, more or less gradual processes of

cultural invention and grammaticalization in prehistory, and cultural learning in ontogenetic development.

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AN ETHOLOGICAL-EVOLUTIONARY PERSPECTIVE ON POLITENESS PHENOMENA

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The mainstream of politeness research (e.g. Lakoff 1973, Leech 1983, Brown and Levinson 1987, Watts 2003) indicates that a large class of politeness phenomena can be subsumed under a mechanism discourse distancing. Using Miller and Johnson-Laird's deictic conception of discourse (1976), this mechanism can be explained as the instantiation of the distal pole of discourse deixis. Discourse distancing is comprised of three basic processes: (i) *discourse dislocation*, which consists in shifting discourse from the proximal pole of discourse deixis to the distal pole of discourse deixis, principally by means of optative and impersonalisation strategies (e.g. point of view distancing, the use of distal markers and passive voice, invoking general rules); (ii) *cognitive distancing*, which consists in affirming cognitive asymmetry between interlocutors, through the use of grammatically complete phrases, nominalisation, and high register; (iii) *personal distancing*, which takes place on two axes – the horizontal axis of interpersonal distance and the vertical axis of status distance – the use of full names as well as honorifics referring to sex and marital status (e.g. “Sir”, “Madam”, or “Miss”) serves to instantiate the distal pole of the horizontal axis, while elitist in-group markers (mainly familial terms of address, such as “Father”, “Mother” and the like) and status honorifics (e.g. professional titles) instantiate the distal pole of the vertical axis. Following Hall (1969), all distancing strategies are jointly referred to as *sociofugal politeness*.

Research in the structure of conversation shows accumulated presence of sociofugal politeness at moments of interactional crisis (e.g. refusing requests, offers, invitations, confirming self-deprecatory statements, or disagreeing with prior assessments). On this basis, the operation of sociofugal politeness is linked to territorial mechanisms, in particular to the strategic distance manipulation performed with the view to appeasing aggression (Hediger 1955, Lorenz ([1966] 2002, Hall 1969). It is hypothesised that linguistic politeness, and specifically sociofugal politeness phenomena, constitute a form of strategic distance manipulation. As such, the interactional function of politeness should be understood as aggression appeasement or conflict avoidance. Accordingly, at critical moments of interaction, conversants perform strategic distance manipulations, not in the physical space, but in the space of discourse, by employing discourse dislocation strategies (i) (e.g. on-stage-to-off-stage shifts or the use of conventional indirectness), cognitive distancing strategies (ii) (e.g. the use of high register and grammatically complete utterances), and personal distancing strategies (iii) (effected, primarily, by out-group marking). The hypothesis is supported by studies on the proxemics of conversation, which opens speculations about the origin of linguistic politeness as an expression of territoriality and its role in the evolution of language.

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