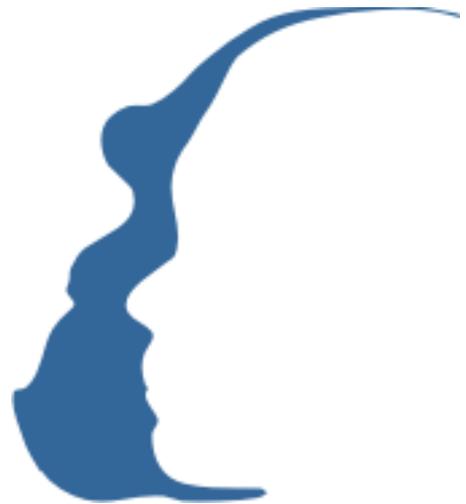


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LANGUAGE BEGINNINGS – A VIEW FROM THE EARLY ARCHAEOLOGICAL RECORD

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Gaining a realistic appreciation of human origins depends on several disciplines at least. Very often it is difficult to cross-date them, and so to interlink the separate records, although these may offer valuable clues about the beginnings of language. There is some broad parallel between increases in brain size in *Homo* from about 2 million years ago, and the development of technology, both in sophistication and numbers of artefact classes. My paper follows this long perspective, and especially the archaeological record, in asking 'what do these developments have to say about the origins of language?' This focus on the early record accords with the idea of the 'social brain' but makes a strong contrast with the work of scholars who look to recent and sudden language origins.

DO DOGS GET THE POINT?

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Human forms of communication seem to be unique. Research suggests that this is already the case a long time before humans start speaking because humans are also unique in their use of gestural communication. One gesture of particular interest is pointing, a triadic, referential communicative act, which, as of yet, has not been found in other species. However, in recent years a large body of research has demonstrated that domestic dogs are proficient at following human communicative signals, e.g. the human pointing gesture to find hidden food. In fact, dogs' abilities in this area surpass those of our closest living relatives, chimpanzees (Hare et al, 2002; Bräuer et al, 2006). This raises the possibility that dogs, like humans, interpret others' intentions in this communicative interaction and that dogs, like humans, view these signals as a means to share information. This would challenge the hypothesis that this is in fact a uniquely human trait and is therefore an important empirical question.

HOW CAN WE ACCOUNT FOR THE INCORPORATION OF FORELIMB ACTIONS INTO UTTERANCE PRODUCTION FROM AN EVOLUTIONARY POINT OF VIEW?

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The common phenomenon of the co-involvement of forelimb actions with speaking (“co-speech gestures”) is either ignored or regarded as unimportant by those language origin theorists who concentrate on a “speech first” view, while those who favour a “gesture first” approach tend to assume that co-speech gesturing just shows that gesture did not disappear and its modern presence can be regarded as somehow supporting their position. So far, however, no satisfactory theory to account for the co-involvement of forelimb actions with speaking compatible with evolutionary principles has been put forward. In this paper, drawing in part upon ideas from Leroi-Gourhan, Gentilucci, MacNeilage, among others, I suggest that the oral activity involved in speaking is a component of a system that has descended with modification from a material-object-management and environmental-modification system that first arose when mouth and forelimbs became co-ordinated in feeding.

Speaking, like gesturing, is ultimately derived from a system of practical action directed to the physical environment. Its adaptations to interpersonal manipulative and communicative functions are derived developments. On this view, speaking is not an adaptation of the expressive or emotive or signalling uses of the voice that humans share with their primate cousins (indeed with all other tetrapods), although these aspects have themselves been adapted and incorporated into it. More generally, it is argued that speech did not evolve as the first vehicle of language which, later, somehow recruited to it the use of the hands; nor was gesture the first vehicle of language which later somehow was transferred to speech. Rather, a prehensile feeding system (possibly arising from the adoption of an arboreal existence) gave rise to a hand-mouth coordinated manipulatory system which, when employed with communicative functions differentiated into what today are called “gesture” and “speech”. Oral actions, as they came to be used symbolically, incorporated already existing vocal expressive and signalling functions, while manual actions were transformed into the mimesis of gesture. In this way the “speech first”/“gesture first” controversy is resolved and the intimate relationship between forelimb actions and speaking is given an evolutionary explanation.

VOCAL COMMUNICATION IN CHIMPANZEES

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The comparative approach to language evolution builds on the premise that some of the cognitive capacities required for language evolved long before humans diverged from the rest of the primates. The comparison of communicative and cognitive capabilities in non-human primates and humans therefore furthers our understanding of which elements of language are phylogenetically old and which are unique to humans. Chimpanzees are our closest living relative and as such are the best model of our last shared common ancestor. I examine natural vocal communication in both wild and captive populations of chimpanzees in order to assess the commonalities and differences between chimpanzee and human communication.

I will discuss studies which address whether chimpanzees are capable of communicating complex information about ongoing events and the flexibility they have in call production. I will then outline some ongoing research projects into caller intentionality and control over vocal production. Finally I will reflect on the issues associated with studying single modes of communication (such as vocalisations) in isolation and suggest that the field would benefit from a more integrated multimodal approach to primate communication.

RELATIONSHIP BETWEEN VOICE CHARACTERISTICS AND MASCULINISATION IN WOMEN

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Previous research shows that voice characteristics are related to body size and physical attractiveness in humans insofar that we are able to make judgments about those traits basing on voice. Since testosterone has an impact on glottal folds structure, we hypothesized that morphological traits indicating level of masculinity (e.g. WHR, SHR, 2D:4D, body size), are related to voice characteristics. Therefore the aim of this study is to evaluate the relationship between the level of body and voice masculinisation in young women.

Height, WHR, SHR and 2D:4D ratio were measured in 35 women (mean age 19.7). The size of trunk was calculated as area of trapezoid $((\text{shoulder width} + \text{hip width})/2) * \text{sitting height}/2$. Voice samples were recorded using capacitor microphone with a preamplifier connected to PC. Acoustic analyses were made using DiagnoScope software. Participants were asked to say 'aaa aaa'. Fundamental frequency (F0), first four formants and formant dispersion were included in analysis.

We found positive correlation between 2D: 4D and two out of four formants (F1 and F3). Also we found negative correlation between height and voice pitch (F0) and negative correlation between trunk size and F2 but no correlation for formant dispersion. There was, however, no correlation between WHR, SHR, and acoustic characteristics of voice.

Similarly to previous studies we found that women who are taller have lower voice pitch than those who are shorter. Voice pitch of both men and women depends on the body size as upper body part plays the role of a

resonator and has an impact on the sound of voice. Also women with higher prenatal androgens level (lower 2D:4D ratio) tend to have lower formant frequencies. Therefore we conclude that the level of body masculinisation and voice characteristic in women are related.

PERCEIVING SUCCESS IN LANGUAGE EVOLUTION

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1. Introduction

The field of language evolution is arguably known for its vast amount of heatedly debated speculative theories. In scientific terms, a theory is nothing more than that until it has been shown to be supported by a sufficient amount of empirical data. On the other hand though, ideas should not be dismissed without further investigation, as even the seemingly absurdest hypothesis could either by design or by accident end up providing the missing piece to the puzzle of language evolution. Consequently, it appears that in order to make progress in solving this extremely complex puzzle, a healthy symbiotic relationship needs to be established between the theoretical and the empirical. In this paper, we want to make a step in this direction by analytically evaluating aspects, such as not having a success requirement, of the gossip-as-grooming theory of language evolution postulated by Dunbar (1997) without any preconceived judgements or convictions.

2. The Theoretical

In his book *Grooming, Gossip, and the Evolution of Language*, Dunbar theorizes that at some point in the evolution, hominid species were forced to relocate to territories that were much more open than the woods they previously inhabited, thus making them more susceptible to predation and as a consequence forcing them to live in larger groups. However, while living in larger groups was beneficial in terms of fighting off predators, it also required much more effort in terms of organizing and keeping the group together, thus increasing the amount of time that had to be devoted to grooming and leaving less time for such survival-important activities as food gathering and sleeping. If one assumes that there exists a certain threshold between time spent on such crucial activities and actual survival, then if a species were to drop below this threshold, their survival would be put at risk, forcing them to either change their living surroundings or adapt by making a time-consuming activity such as grooming more efficient. It is for this reason, claims Dunbar, that language has emerged, in particular through the invention of gossip.

3. The Empirical

Admittedly, Dunbar's theory is based on a very rational evolutionary premise and fits well with the empirical findings by Aiello and Dunbar (1993), attesting a correlation between group size and neocortex ratio in the brains of primates. However, in order for the theory to gain wider acceptance in the research community, it requires for its most controversial aspects to be empirically confirmed, e.g. with the help of a computational model. Firstly, it is questionable if larger population would be better (or at all) suited for developing a complex communication system such as human language. Secondly, and more importantly, the gossip theory has been criticized by Bickerton (2002) among others for not being able to explain how meaningless sounds could have served so well as a grooming mechanism, and how meanings could have been attached to words in this task-free context.

Experiments conducted with the help of the Language Evolution Workbench by Bachwerk and Vogel (2010) suggest that larger groups are clearly at a disadvantage during lexicon formation. Furthermore, the results of our most recent experiments focussed on the role of task success in interactions, approximated through agents' understanding of each other, as partially reported on by Bachwerk and Vogel (in press), clearly indicate that being able to at least remotely detect the success of an interaction plays an essential role in lexicon formation at the early stages of language evolution. In fact, if the agents are completely ignorant about the success of their utterances (and do not possess any telepathic skills of meaning-form transmission), their lexicons will eventually become less efficient than random guessing. These findings lead us to believe that the gossip theory in its current form is at the very least incomplete, in particular what concerns the apparently neglected role of success in primeval interactions.

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WHAT DOES COMPUTER-MEDIATED COMMUNICATION REVEAL ABOUT LANGUAGE?

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The primary assumption of the presentation is that Computer-Mediated Communication (or CMC) attempts to resemble natural language by acquiring a repository of means, which allow it to mimic Face to Face (F2F) communication. This poses a notable constraint that should be brought to attention in research concerning language evolution. In the introduction to the field of the work a brief characteristic of what can be called the “old” and the “new” Internet will be presented. It consists of contrasts and similarities between the past and the present of the World Wide Web in the context of linguistic communication and sets up the scene for consequent parts of the presentation.

The following part will be concerned with showing and stressing how we communicate utilizing the Internet, how it is interwoven in our everyday communication processes and, therefore, how this type of linguistic communication may be an important factor in language evolution studies. This poses a set of questions, namely: does Web 2.0 mean Communication 2.0? What do these seemingly obscure terms mean? What are their implications? And finally: why should we be aware of the 2.0 mechanisms in the process of linguistic communication over the Internet? It will be attempted to, at least partially, answer these questions in the course of this short presentation. From this point of view, the means utilized by Web 2.0 in order to mimic Face to Face communication will be discussed; these include: web applications, which merge traditional means of CMC communication with novel ones and allow for the combining of the two in a rich multimedia environment, this facilitates the mimicking of natural F2F exchanges in many aspects. Linking and uploading mechanisms allowing users to communicate via messages devoid of textual

content, based on context, conversational structure imprinted into our minds in the process of natural language evolution (turn taking and repair) and a wide range of intertextuality phenomena. Emoticons – the most basic and primary means of “naturalization” of CMC, the evolution, false universality of these means of communication and their influence on the way we perceive communication in the Internet (as formal, informal etc.).

Finally the discussion will move to Internet genres – the established and popular ones, as well as the novel genres which emerged as a result of Web 2.0. Spoken and written genres of Internet communication are both transmitted in writing, yet we are capable of distinguishing what is meant as spoken and what is meant as written quite easily even without much experience in on-line communication. The observations presented here may shed a small ray of light on how does a very familiar process such as communication function in a new and strange environment which poses many constraints on it and forces it to adapt to new conditions.

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PROTO-COMBINATORICS

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Jackendoff (2002) identifies certain linguistic "fossils" -- features or forms at some remove from the logic and structure of language as it is now, but interpretable as traces of innovations that appeared along the path from primate calls to modern language. In this sense "defective" lexical items such as Ouch! or Dammit! may be fossils of an ancient one-word stage. Here we propose a different sort of linguistic fossil. A key question about language origins concerns how humans attained a compositional view of utterances, routinely expecting to find discrete elements falling into integrated groups, with each element qualifying the interpretation of the whole. Various authors (Bickerton, 2010; Jackendoff, 2002) have suggested that the first step toward modern syntax was concatenation. We argue, however, that concatenation has limitations in this role, especially relative to perception. The concatenation concept can ascribe succession to elements, but it can divide a string only if supplemented by some further criterion for finding cut points. We propose as an alternative a set-like aggregation function (cf., Burge, 1977). This is seen as a derivative or exaptation of the set-forming capacity critical to the Approximate Number System (see literature review in Carey, 2009), an evolutionarily ancient system present in a wide range of species. An aggregation function based on this source would be an innovation in a protolanguage otherwise capable only of one-word utterances by allowing listeners to recognize small assortments of items as related to each other in conceptual terms. Useable criteria of relatedness might include notions like being produced in response to some particular stimulus, being items connected with the same theme (as in properties of a certain predator), etc. We argue that by merely recognizing relatedness of these sorts and asserting connectedness among utterance units, an aggregation function could extract information otherwise unavailable to the listener. By being insensitive to order (in the sense that sets are unordered), it could capture information without depending upon speakers to be exploiting order in forming their utterances. If these suggestions have merit we expect evidence of the aggregating function in modern language. We propose that there is such evidence in coordinate structures. It is now

widely (not universally) assumed that syntactic theories should not incorporate construction-specific rules. Yet in the half century of generative work on coordination, there is a notable lack of consensus as to how this principle can be applied with these very common structures, though they seem to be the simplest and most straight-forward of structures. Coordinates seem to be far more transparent than are relations among referring expressions in binding theory. We propose that the source of these difficulties is that coordinates to a limited but significant degree are not products of a hierarchical syntax as pursued in frameworks such as the Minimalist Program, Lexical-Functional Grammar, HPSG, or various others. We propose that while each member of a set of coordinated constituents is organized by the syntax, the relation among the conjuncts is not, and is instead established by a modern derivative of the aggregating function described above. Likewise the link between a collection of conjuncts and the containing sentence is established by a further application of the aggregating function.

We review typological, neurological, and developmental evidence in support of this proposal. Further, we report on various results from ongoing behavioral studies that support the claim that coordinates do not enter into hierarchical relations among the conjuncts, in contrast to various proposals within the Minimalist framework. We show that by comparison closely matched and uncontroversially hierarchical control cases do show strong evidence that the language processing system sees them as though they are laid out in terms of a hierarchical data structure that is evident in both apparently grammatical effects, as well as in processing issues such as attraction effects. These studies suggest that some properties of the coordinates we examine are treated conceptually as aggregates in ways that are inconsistent with standard assumptions.

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PROTOLANGUAGE AS PROTODISOURSE

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The main idea of our proposal is that the problem of the origin of language is concerned with the analysis of the linguistic comprehension and production processes from a pragmatic perspective. More specifically, from this perspective, the problem of the origin of language concerns the flow of speech and has to be analyzed at the level of the cognitive systems used by human beings in discourse processing. This means that, from our point of view, the protolanguage must be characterized in terms of a protodiscourse.

Considering an initial condition in which a code isn't available yet (nor can grammar be present either), emerging verbal communication can be founded exclusively on simple clues that the speaker offers to the listener in order to make intelligible his communicative intentions. Now, as the clue contains, by definition, little information, the weight of the actual comprehension and production processes must be entrusted to something other than the codification and de-codification processes. How can such initial clues be comprehensible?

We believe that the source of the origin of language is our capacity to give coherence and consonance to the communicative clues and that such a capacity depends on a cognitive system able to lend direction and aim to the flow of speech that is, at this level, just a kind of protodiscourse. In effect, such a system (Triadic System of Grounding and Projection – TSGP) has two main features: it “grounds” organisms to the actual situation and “projects” them to other alternative scenarios. It can do that by exploiting three specific subsystems: ecological intelligence (based on Mental Space Travel), social intelligence (based on Mindreading), and temporal intelligence (based on Mental Time Travel). These three components have evolved to fulfill separate adaptive functions but there is evidence indicating their convergence in the

brain on shared grounding-projecting functions (Buckner & Carroll, 2007). Clues could not be the basis for actual language unless they had been understood by the means of a system that grounded them to the social, spatial and temporal context and projected them to the flow of speech. Therefore, along with language communicative function, we should take into account language grounding function too. It means that pragmatics, not grammar, constitutes the basic condition for the origin of language.

Explicitly, this conclusion ensues from an analysis of the origin of language inspired by the analysis of effective comprehension and production processes. Examining these processes in individuals affected by some neurocognitive disorders reveals that TSGP has a central role in discourse processing (Ferretti & Cosentino, in press). In fact, the studies of linguistic abilities in some pathological patients show that when just one of three mechanisms which form TSGP is damaged, individual's ability to elaborate discourse is threatened. In particular, recent empirical data show that the domain of discourse processing is a relative weakness in autistic, Williams Syndrome and schizophrenic individuals. As these three conditions are linked, respectively, to a selective damage of Mindreading, Mental Space Travel or Mental Time Travel, these studies seem to suggest that the domain of discourse processing is related to the TSGP as a whole: when one of the three system components is impaired, the ability to be coherent and consonant to the situation, which is at the foundation of discourse processing, shows a deficit. Particularly interesting is that in each of these cases dissociation between discourse and grammar is evident: the first is threatened while the second is not compromised.

In the light of these considerations, we conclude that the common functions of TSGP are recruited by language in order to construct and maintain discourse coherence and consonance to the situation, and that the functioning of the TSGP is the basic condition by which the protoforms of communicative exchanges (just simple clues at the beginning) would transform into actual language.

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WHY SPATIAL NAVIGATION IS INVOLVED IN THE ORIGIN OF LANGUAGE

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This paper is based on conceptual and methodological assumptions. From a conceptual point of view, our hypothesis is that the origin of language should be investigated in reference to pragmatics. From a methodological point of view, our idea is that the origin of language can be analyzed studying some of the processes which govern its actual functioning. Specifically, our goal is to show that the origin of language is tied to the capacity of building coherent discourses. Indeed, coherence is a pragmatics property that underlies the way in which the discourse is organized with reference to a goal, a plan or a general topic. Given the methodological assumption, we propose that the cognitive systems involved in the evaluation of coherence in the actual processes of language use are the same processes involved in the origin of language.

In opposition to the classical perspective, according to which the evolution of language can be understood in terms of a progressive construction of complex entities from simpler constituents, we show that the origin of verbal competence should be conceived as a form of proto-discourse (cfr also Bowie, 2008) governed by coherence. The individuation of the cognitive devices involved in the evaluation of the coherence of proto-discourse represents an empirical verification of our thesis. In our idea both the development of proto-discourse (in the case of the origin of language) and the development of discourse (in the actual functioning of language) are regulated by the same processes that control the navigation of individuals in space (Ferretti & Adornetti, 2011). In verbal communication the ability to speak coherently relies on the speaker's ability to orient himself correctly (keep the route) within the flow of discourse. As in spatial navigation, the flow of communication appears tied to the problem of keeping the route for reaching a goal (the communicative

intention that the speaker intends to convey to the listener). As in spatial navigation, indeed, in verbal communication the achievement of a communicative goal relies on continuous realignments that the speaker must perform to find the route (after, for example, a digression). In our opinion, the processes of action planning and monitoring, that characterize strictly the 'executive functions' and that are involved in the navigational guidance system in the human brain, are at the basis both of 'keeping the route' to achieve a destination and of building discourse coherence in the flow of speech.

Data to support this hypothesis come from a recent study by Marini and colleagues (2010) on the narrative abilities of subjects with Williams Syndrome (WS), a pathology characterized by visuospatial representation deficits (Karmiloff-Smith, 2007), orientation deficits (Lakusta et al., 2010) and planning deficits (Rhodes et al. 2010). The experimental data suggest that the domain of discourse processing is a relative weakness in WS individuals. We propose that the problems of coherence and discourse processing of WS subjects may be attributed to the aspects of executive functions involved in spatial navigation. In particular, they may be attributed to a deficit of planning that does not allow subjects to orient themselves and to navigate the space correctly. We conclude that the executive functions that control spatial navigation are at the basis of the proto-discourse in the early stage of language evolution.

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AN EVOLUTIONARY PERSPECTIVE ON ONOMATOPOEIC EXPRESSIONS IN CONVERSATIONAL INTERACTION

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The study of the earliest stages of human communication used to be polarized between its vocal and gestural aspects. The current tendencies to view language development with a multimodal approach constitute an attempt at compromising between the two competing perspectives. The aim of this paper does not contradict the recent tendencies. With no intention to depreciate the results of gesture-oriented research, this paper shifts focus to the vocal aspects of language development. The presented part of the study constitutes only a cutaway of larger project that investigates functions of sounds as linguistic signs in spoken English. Leaving all other levels of linguistic signification behind, this paper deals exclusively with onomatopoeia and onomatopoeic expressions. Its aim is to demonstrate the frequency of use of sound-iconic messages in conversations and to analyse the nature of speech events in which they were applied.

The pilot study is based on empirical material from Vienna-Oxford International Corpus of English. The corpus, known also as VOICE, is the result of co-operation of researchers and professionally prepared transcribers working within project founded and supervised by Barbara Seidlhofer. The corpus contains 150 transcripts of dialogues and multilogues in which English is used as lingua franca. It includes interactions of people of different origin, speaking various mother tongues; nonetheless speakers of European roots seem to prevail in this group. The conversations include a wide range of domains (professional, educational, leisure) and functions such as exchanging information and enacting diverse social relationships.

The deep insight into the VOICE material results in a number of observations on communicative strategies employed by the speakers in interactions. Sending messages in their proto-symbolic form of onomatopoeia

constitutes one of them. The advocates of the so called bow-wow theory used to hold that human language evolved from such sound-iconic forms. There may be multiple motivations for the appearance of such expressions in the contemporary language that go far beyond the reference shared by the sender and the receiver. This paper cannot provide a satisfactory answer to this question; nevertheless, it can depict the scale of the phenomenon in everyday communication.

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GESTURE DECODING IN MOROCCAN IMMIGRANT IN ITALY – A PILOT STUDY

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Among the many theories proposed for explaining the evolution of language, one maintains that gestural communication has been the precursor of human speech (Armstrong, Stokoe, Wilcox 1995). Indeed, gestures and language are interrelated at different level of symbolic complexity: from paralanguage, where speech illustrators accompany the discourse up to full fledged sign languages (ASL and others) that need complex training to be learnt, (Argyle, 1972, Ekman & Friesen 1972, 2007, Cogill-Koez 2009). Symbolic gestures or emblems (De Jorio 1832, Efron 1941), such as the two fingers V for victory, completely substitute for a concept or a short sentence, and can be placed in between the above quoted discontinuity: they convey a complete meaning, like Searle's speech acts. The higher the level of complexity, the more subject gestures are to cultural influences, this might interfere with social understanding. The aim of present pilot is to test the decoding of Italian gestures by a group of long term immigrant from Morocco.

Nine male immigrants from Morocco and nine female immigrants from Morocco were recruited for this study. Eighteen Italian subjects (9M, 9F) were used as controls. A sample of gestures (n= 13), were chosen from published Italian "questionnaire" as some of the most frequently used in everyday gestural interactions (Munari 1994, Diadori 1990, Poggi & Magno Caldognetto 1997), they were video-taped, uploaded in a portable computer and submitted individually to all subjects in a quiet room; after, subjects answered to a short qualitative interview relating to the knowledge of the Italian meaning, and/or the Moroccan meaning of the gestures. Data analysis was performed by means of SPSS.

Like Searle's speech acts, some gestures convey a complete meaning, that sometimes is quite far from the iconic form of the gesture itself. Present pilot study indicates that in two different cultures gestures with the same icon, may have different meaning, in addition, it is apparently easier to get a new meaning for an already known gesture. A second suggestion is that proficiency in decoding might also be dependent on the social exposure to gestures, in fact female housewives were less proficient. As we reported in the introduction, gestures come in a flow that include many different level, it might be difficult

for an immigrant, to tease apart the emblematic gesture from the flow, analogously as it is difficult to tease apart words from the verbal stream. Because no training on gesture is done in language schools for immigrants, apparently this meaning extraction is performed on the base of well established native emblems, or on a frequent exposure, and, most interesting as regards as the gesture/language controversy in language evolution, meaning extraction is performed spontaneously

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A MULTI-LANGUAGE STATE IN THE NAMING GAME ON ADAPTIVE WEIGHTED NETWORKS

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Computer modeling becomes a more and more important tool to address the problem of language origin and evolution. Various models have been proposed dedicated to particular aspects of this complex problem (de Boer, 2006). Language games constitute an important class of models and they are used to describe, for example, the formation of compositionality, categories or syntactic structures (Loreto *et al*, 2010). One of the most basic language games is the so-called naming game (Steels, 1995; Lipowska, 2011). In this game one considers a population of agents that try to establish a common vocabulary for a certain number of objects present in their environment. More sophisticated versions with formation of homonyms and synonyms (Lipowski and Lipowska, 2009) or where biological evolution couples with linguistic interactions (Lipowski and Lipowska, 2008) were also examined. Typically, in the naming game the agents establish such a linguistic coherence rather fast, but the dynamics of this process might depend on some details of the model such as, for example, the topology of interactions between agents. A number of results was obtained for the naming game on regular or random graphs, however, linguistic interactions (between people) are of much more complicated nature and it would be interesting to examine the naming game on more complex networks. Some results were already reported for the naming game on small-world lattices and scale-free networks and they also show a fast approach to the linguistic coherence (Baronchelli, 2007).

Such a single-language coherence apparently differs from the multi-language structure in (at least current) human population. In the present paper we show that the naming game on an adaptive weighted network might describe such multi-language structures. In our approach we examine a population of N agents playing the naming game. More specifically, a pair of neighboring agents is selected and one of them (speaker) communicates a word to the other one (hearer). Communicative success appears when the hearer has

this word in its repository and in such a case both agents retain in their repositories only the communicated word. If the hearer does not have this word in its repository (communicative failure), then this word is added to the hearer's repository. Neighborhood relations between agents are of probabilistic nature and form an adaptive weighted network – the larger the communicative success rate, the larger the weight and thus the probability of communication. Simulations show that in some cases the model, similarly to other versions of the naming game, reaches a single-language coherence, where all agents share a common vocabulary, i.e., they have only one (and the same) word in their repositories. But there is also a regime where the model remains trapped in a multi-language state. In this case agents are separated into several groups and a common vocabulary is established only within a group. The distribution of language users in a multi-language state reasonably agrees with statistical data of G. Weber.

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DEVELOPMENTAL CHANGE IN GESTURE PRODUCTION AND COMPREHENSION IN GORILLAS: INDICATIONS OF RITUALIZATION

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There has been a debate over the origins of the gestures (Call & Tomasello, 2007, Hobaiter & Byrne, 2011). In particular the concept of “ontogenetic ritualization” (Tomasello, 1996) has been at the center of the discussion and most recently been questioned by researchers in the field of primate communication (Genty et al., 2009, Hobaiter & Byrne, 2011). The aim of this paper is to show that ritualization can indeed serve as an explanatory model for the origins of a particular gesture in lowland gorillas.

The so-called *hand-on* gesture (Pika et al., 2003), also termed *pat off* gesture by Tanner (1998), is frequently used by gorillas to end activities, such as bouts of play (also see Tanner, 1998) or peering by other individuals. Adult animals perform the gesture as a light and brief touch on the partner’s head and the recipient animals typically reacts with cessation of the previous action, such as retreat from play or stop begging and/ or peering. See figure 1.



Figure 1. *Hand-on* gesture to end play bout

Infants perform the *hand-on* gesture as a forceful pushing-away of the other's head, and most *hand-ons* that are directed towards infants are performed as pushes. The ritualized *hand-on* gesture of adults may have derived from a forceful pushing of the other individual's head to prevent further play-biting (or peering) and thus put a stop to the activity. Receiving animals may have come to anticipate the push and started reacting to it before being physically removed by the other. In gestures that are derived from an ancient shared ancestry and not subject to forms of ritualization (see Hobaiter & Byrne, 2011), very little or no developmental change would be expected. In the *hand-on* gesture, the age-dependent flexibility, which is shown in the great variation in how the gesture is performed and received, may indicate that ritualization plays a role in the formation of the adult-like form of the gesture.

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**A DEVELOPMENTAL INCREASE IN SUSCEPTIBILITY TO
CONTAGIOUS YAWNING IN CHIMPANZEES: AN
EXPRESSION OF EMPATHY?**

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One way to study the evolutionary origins of language is to explore the different cognitive and emotional capacities involved in imitation and bodily mimesis, and to trace their phylogenetic history within mammalian species and, perhaps particularly important, within the primate lineage. Contagious yawning has been theoretically and empirically associated with empathy in both human and non-human primates. For example, social bonding predicts contagious yawning among gelada baboons (*Theropithecus gelada*), and adult chimpanzees (*Pan troglodytes*) are more likely to show contagious yawning in response to watching videos of familiar than unfamiliar conspecifics yawning (Palagi *et al.*, 2009; Campbell & de Waal, 2011). Moreover, human beings show a developmental increase in susceptibility to the yawn contagion, with typically developing children displaying a substantial increase at the age of four (Helt *et al.*, 2010). Here we report an experimental investigation into whether infant and juvenile chimpanzees differentially exhibit yawning and an alternative control behavior, nose-wiping, when presented with a number of facial/bodily movements performed by, respectively, (i) an unknown and (ii) a known human experimenter, with whom they had a close social bond.

We predicted that (1) the chimpanzees would be more likely to yawn when interacting with a human experimenter who (i) yawned, rather than either (ii) nose-wiped, (iii) gaped (i.e., performed an open-mouth expression, morphologically similar to yawning, but devoid of the embodied movements typically associated with yawning, e.g., deep inhalation and exhalation,

momentary closing of the eyes, slight backwards tilting of the head), or indeed (iv) performed none of the three behaviours. We also predicted (2) yawning to increase in response to viewing another individual yawn, but not that a control behavior (nose-wiping) would increase in response to viewing another individual nose-wipe. We predicted (3) that if contagious yawning is underpinned by empathetic concern, the potential contagion should be more likely evoked by observing yawning in an individual, with whom the subjects had a close social relationship. Finally, (4) we predicted that, as humans (Helt *et al.* 2010), chimpanzees would show a developmental trend in susceptibility to the yawn contagion.

The participants were 12 infant and 22 juvenile orphaned chimpanzees (*Pan troglodytes schweinfurthii*), housed at Tacugama Chimpanzee Sanctuary in Sierra Leone. The participants observed, (i) an unknown human being and (ii) their primary human caregiver (their surrogate mother since their arrival at the sanctuary as young infants) displaying (1) yawning, (2) gaping, and (3) nose-wiping (with the hand and/or arm). Each participant engaged in a 35 min. session of play, grooming and other forms of calm, friendly interactions with the experimenter. Each session consisted of a 5 min. baseline phase followed by three 5 min. phases, during which the experimenter either repeatedly yawned, gaped or nose-wiped. The phases (except for the baseline) were presented in a counterbalanced order and each was followed by a 5 min. interlude phase, in which interaction continued, but the experimenter neither yawned, gaped or nose-wiped. The chimpanzees were tested with the known and unknown experimenter on different days in an order counterbalanced across the participants.

Provisional analyses suggest that chimpanzees (as human children: Helt, *et al.* 2010) may be subject to a developmental increase in susceptibility to the yawn contagion: Juvenile (but not infant) chimpanzees were more likely to yawn when interacting with a human experimenter who repeatedly yawned, than gaped or nose-wiped, or indeed performed none of these three behaviours. Moreover, as predicted, neither infant nor juvenile chimpanzees increased the frequency with which they performed a nose-wiping behavior when viewing another individual nose-wipe. While the developmental increase in susceptibility to the yawn contagion in human children (with which the current data is consistent), has been linked to the development of empathetic concern, there was, however, no evidence of a differential susceptibility to the yawn contagion when the chimpanzees observed yawning in a stranger versus an individual, with whom the subjects had a close relationship.

EVIDENTIALITY – A PRIMITIVE OR SOPHISTICATED FEATURE OF LANGUAGE

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This presentation deals with the notion of evidentiality—the coding of source of information. Although the notion has been thoroughly researched in languages of both North and South American Indians (Boas 1942, Hardman 1986, Malone 1988) and Balkan languages (Friedman 1986), only recently has evidentiality become a field of interest of scholars dealing with Germanic languages. It has been neglected mostly due to the previous conviction, that evidentiality is simply not expressed in those languages.

Evidentiality can be subdivided into two main categories: direct and indirect. The former shows that the speaker has witnessed the action directly and its two main subcategories include *visual* and *auditory* evidence, which state that the speaker has seen or heard the action respectively. The latter includes such evidentials as *inferentials*, which means that the speaker has inferred the action from available evidence, and *quotatives* (also referred to in the literature as *hearsay* evidentiality), which state that the speaker has been told about the event by another person.

My paper aims at describing evidentiality and its realizations in languages along with their geographical localization. Since the phenomenon is claimed to be absent from major European languages as well as most African languages, I would like to research whether this grammatical category is essential for accurate communication. If pointing to a source of information had been a crucial element of communication, it should be possible to find some traces of evidentiality in less “complex” languages. What is more, the presence of evidentiality in a language could influence the cognitive ability to point to and distinguish the source of information. The above hypothesis was researched by Papafragou (2007) on the basis of evidentiality acquisition by both Korean and English children. Additionally, the paper will present some hypotheses describing the origins of evidential markers and will try to deduce if evidentiality could have been one of the features of protolanguage.

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CULTURAL COADAPTATION IN A HOLISTIC PROTOLANGUAGE PRODUCES PREADAPTATIONS FOR THE EMERGENCE OF SYNTAX

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Bickerton (1990) proposed the term *protolanguage* to refer to a stage in the evolution of language prior to the emergence of full syntax during which meaning was conveyed through the use of isolated words, or their unordered, unstructured combinations. Syntax is argued to have evolved on top of this system, providing regular ways to combine preexisting words into semantically complete utterances (Bickerton 1990, Jackendoff 1999). In contrast, Wray (1998) conceptualizes protolanguage as a system in which communication is achieved through the use of a lexicon of indivisible utterances, each individually expressing a semantically complete meaning. Supporters of this view argue that syntax emerged through a process of segmenting these utterances based on chance similarities in their meanings and forms (Wray 1998, Arbib 2002).

In this paper I consider one of the many challenges facing proponents of such a *holistic protolanguage* (Tallerman 2007); how could our ancestors have found sufficient meaning-form patterning in a “small inventory” of utterances to inform syntactic segmentation? It is argued that cultural coadaptation based on a general, non-linguistic, biological learning bias resulted in a semi-structured holistic protolanguage, significantly simplifying the segmentation task.

Learning-by-analogy is a powerful learning heuristic, which can simplify the acquisition of new skills and behaviors. Instead of learning new information from scratch, a preexisting *memory schema* (Bartlett 1932) is used as a template for the learning process. When a sufficiently similar schema already exists, this can result in a *positive transfer* (Perkins & Salomon 1992) of preexisting knowledge to the new learning task, boosting both its speed and accuracy.

In lexical learning, the learning template that would be used is the learner's knowledge of a lexical item with similar phonological/semantic properties to a newly encountered target lexical item. A copy of this template would be made, and then refined to account for any differences between it and the target lexical item. While learning-by-analogy is useful for lexical acquisition, it is a far more general learning heuristic, and should be seen as part of the learner's general cognitive toolkit, and not as a specifically linguistic adaptation.

However learning-by-analogy doesn't universally enhance lexical learning. Rather it introduces a bias towards learning lexemes similar to those already known. For the proto-lexicon, this results in a selective pressure to maintain and enhance any chance similarities that it may happen to contain. As pairs, and eventually sets, of proto-lexical items *coadapt*, the lexicon will begin to exhibit a higher degree of structure than would be expected by chance alone. Phonologically this structure will manifest itself with lexemes sharing common phonetic substrings, and semantically with otherwise similar lexemes also having an increased probability of sharing common meaning elements.

It is argued that in the resulting semi-structured proto-lexicon, segmentation is significantly simplified, and therefore the culturally coadapted lexicon should be regarded as a preadaptation to the emergence of syntax. This preadaptation results from a learning bias that is not specifically linguistic, and emerges following a process of cultural, rather than biological, evolution.

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MUSICAL PROTOLANGUAGE PUT TO THE TEST

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This paper will present results from a recent experimental test of a musical precursor to language. Inspired by birdsong research, and drawing from advances in experimental psychology, this experimental paradigm aims to demonstrate that theories of musical protolanguage *can* be empirically tested. By framing the genesis of a proposed musical precursor as an honest signal of cognitive fitness, this opens up a new area of experimental possibilities.

Theories of musical protolanguage have interested musicians and linguists since Darwin first suggested that an early ancestor may have “used his voice largely...in producing true musical cadences, that is in singing” (Darwin 1871: 133). Theories of musical protolanguage have, in recent years, seen somewhat of a revival, with recent proposals by Brown (2000), Mithen (2005), and Fitch (2010). However, there has been a lamentable lack of *empirical* research to support these theories. Fitch (2006, 2010) has written of the need for empirical investigation into musical predecessors of language. So, it is in this spirit that the following sections will propose a testable hypothesis of a musical precursor to language.

In this section, it will be proposed that protolanguage developed from a musical signalling system, used to signal cognitive fitness by early hominins. It is proposed that the ability to learn and faithfully reproduce complex sets of musical sequences behaved as an honest signal of cognitive fitness, alongside physical fitness, in early hominins. Only individuals who developed well despite stressors such as genetic mutations, malnutrition, illness, and parasites in development developed the cognitive and physical abilities required to learn and reproduce complex musical sequences. This proposal is inspired by birdsong research, in particular the Developmental Stress hypothesis (Nowicki et al 1998). This hypothesis led Kirby (In Press) to propose the “Investment in Learning” hypothesis – this rhythmic precursor must have required an

investment in learning, in order to stay stable and honest. However, others' productive abilities must have been easy to detect, and so an asymmetry between producer and perceiver should have been present in this precursor.

The hypothesised theory identifies three areas which can be empirically tested –

1. Developmental stability (as measured by symmetry)
2. Cognitive fitness
3. Ability to learn complex musical/rhythmic sequences

100 experimental subjects are currently being tested for their fluctuating asymmetry (an inverse indicator of developmental stability), alongside their general intelligence (as measured by the Alice Heim 2 test of verbal, numerical and perceptual ability), and their ability to learn and faithfully reproduce complex sequences of rhythms. It is predicted that fluctuating asymmetry will negatively correlate with intelligence and ability to learn rhythmic sequences, indicating that the proposed musical precursor could have behaved as an honest signal of fitness. Furthermore, it is hoped that this research will show that musical protolanguage theories can and should be tested empirically. Analysis is ongoing and results will be presented at the conference.

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INTERACTION OF ADAPTIVE BEHAVIOUR IN DYADS

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The issues concerning interpersonal coordination have recently undergone many studies. Special interest has been taken in imitative behaviour, one of the manifestations of interpersonal coordination (Bernieri & Rosenthal, 1991). This phenomenon has been considered in many research contexts, namely developmental (Jones, 2007), communication (Bavelas, Black, Lemery, & Mullett, 1986), social (van Baaren, Holland, Kawakami, & van Knippenberg, 2004), evolutionary (Lakin, Jefferis, Cheng, & Chartrand, 2003) and neurobiological (Oztop, Kawato, & Arbib, 2006). Behaviour whose function is directly related to communication, that is postures, speech patterns, facial expressions or gestures and processes that provide the ground for imitative behavior such as emotions, mood, affiliation, empathy and rapport have most often been subject to examination. In the context of imitation, though, less attention has been paid to nonverbal behaviour whose communication function is less obvious, namely to adaptors.

Adaptive behaviour (adaptors), sometimes referred to as mannerisms, are habitual activities associated with specific emotions, attitudes or characteristics of social interaction (Ekman & Friesen, 1969). This behaviour, usually unconscious and unintentional, has been classified into several categories, that is behaviour directed towards oneself (self-adaptors), towards others (alter-adaptors) and towards objects (object-adaptors). A few studies (Chartrand & Bargh, 1999) have proved that the above-mentioned nonverbal behaviour may be subject to imitation. However, a more precise characteristics of forms and conditions in which interactions of behaviour occur is still missing.

The aim of the present pilot study is to determine the form, direction and timing of spontaneous adaptive behaviour that occurs during interactions between strangers. For this purpose, a series of conversations between pairs of students who were strangers to each other was recorded with the use of a video

recorder. The experimenter's assistants (psychology students) asked their interviewees (students of other faculties) about their plans for the future. Neither of the participants knew the actual purpose of the examination, which was conducive to more spontaneous behaviour on their part. The behaviour of both parties was analysed with the use of ELAN software. It was observed that during these conversations imitation and synchronization of interactive adaptive behaviour took place. Sample recordings of will be presented. The phenomenon of the interaction of adaptive behaviour will be discussed in relation to theories explaining the functions of imitation and synchronization as well as in the context of the evolution of communication forms.

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THE GENESIS AND EVOLUTION OF CONCEPTS WITHIN THE EVOLUTION OF COGNITION

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This paper provides an overdue account, within the domain of theories of concepts in philosophy of mind, of the phylogenetic evolution of concepts, based on Merlin Donald's work (1993, 2001) on the evolution of cognition.

I begin by taking concepts to be units of structured thought, where "structured thought" is roughly any thought that meets Gareth Evans' (1982) Generality Constraint on the systematicity and productivity of structured thought. This means that concepts can be deployed systematically by an agent across many different contexts without substantially changing their meaning; and a finite set of them can be used to produce a potentially unbounded number of complex concepts and, in linguistically capable agents at least, propositions.

Concepts require an agent: i.e., they cannot exist independently of an agent actively possessing and employing them; and they likewise require something (such as an abstract or physical object, an action or event, or a property) to be about: i.e., they are always, *per* Franz Brentano (1995), attached to some aspect of the experienced world.

Concepts are, in Kant's terms, *spontaneous* as opposed to *receptive*: that is, they are part of the agent's active intellectual engagement with its environment; they are under the agent's *endogenous control* (Prinz, 2004). On the one hand they are identifiable as concepts to the extent they are relatively stable across time and contexts, and on the other, they are useful only to the extent they are amenable to change as circumstances change beyond their original scope. This latter point is the most potentially controversial – it is anathema e.g. to followers of Jerry Fodor's (1998) *informational atomism* theory of concepts – but is consistent with e.g. Peter Gärdenfors' (2004) and Jesse Prinz's (2004) own accounts.

It is as unwise as it is common to talk about the nature of concepts in philosophy of mind without considering both the advent and the evolution of concepts: i.e., the genesis of conceptually structured thought from its nonconceptual origins, and its development from that point forward. When these matters are considered at all, it is usually in the context of the individual conceptual agent and not the species: ontogenetic, not phylogenetic. Yet unless one is prepared to grant conceptual abilities to even the simplest organisms, at some point conceptual genesis must have taken place; and unless one believes that all conceptual abilities are equivalent, some account must be made of the way conceptual abilities, if not concepts themselves, change.

Such discussion is, I believe, overdue for a number of reasons. Like other advocates of so-called "animal concepts" (e.g., (Allen, 1999; Newen and Bartels, 2007)), I believe there are good grounds for counting many non-human animals as conceptual agents, or as existing within what John McDowell

(1996) calls (following Wilfrid Sellars) the “space of reasons”. That is to say, conceptual thought in its simplest form appeared earlier in evolution than humans did – possibly much earlier. At the same time, there are aspects of human cognition in general and conceptual abilities in particular that seem quite distinct from other species. Without a proper discussion of how conceptual abilities first arose and how they may have evolved, it is too easy to limit conceptual abilities arbitrarily to the human animal and to miss an important part of what non-human and human have in common.

Closely related to this is the relationship between concepts and language. Many philosophers seem inclined either to stipulate that concepts require language – a position I find not very interesting – or to take it as a matter of empirical fact that there are, to date, no credible instances of concepts without language. I believe that e.g. Sellars (1963), McDowell (1996) and Fodor (1998) take the latter view without doing so much to argue for it. Sellars may well have moderated his views over time (de Vries, 1996), but the “early” Sellars position that non-linguistic agents lack not just concepts but thoughts and minds – if it is to be distinguished from the later Sellars – is far from dead: it is the position Zoltan Torey has taken in his recent book (2009).

Many other philosophers appear to take a similar position of linking concepts tightly to language without explicitly saying so. Although there is good reason, indeed, to believe that language fundamentally transforms our experience and deployment of concepts, it is far from clear that it makes them (as I have defined them above) possible in the first place.

Finally and closely related is the question of whether conceptual abilities are an all-or-nothing affair. To advocates of “animal concepts” and others who, like myself, believe that concepts pull apart from language, it seems clear that they are not. I argue in this paper for a continuum from the uncontroversially non-conceptual to the equally uncontroversially conceptual. No one wants to attribute concepts to amoebas. Some people might want to attribute certain concepts to some insects. Many people want to attribute them to mammals and several species of birds. No one questions their attribution to humans. This is not to say that one should not or cannot draw a line between conceptual and non-conceptual abilities, nor that there are not more and less appropriate places to draw it, but only to suggest that where that line precisely lies is a pragmatic choice, subject to revision depending on the particular questions being asked and the context of application.

Merlin Donald's (1993, 2001) work on the evolution of cognition provides an excellent foundation on which to begin such a discussion while providing support for the positions I myself want to take. Donald is keen to stress the continuity between non-human and human cognition, the better to highlight those aspects of human cognition that are distinctive. His four stages of “cognitive-cultural development” – episodic, mimetic, mythic and theoretic – show how a conceptual foundation common to many species is progressively transformed and becomes, in humans, itself a means toward cognitive evolution.

HERMENEUTIC PRESSURE: A NECESSARY ASPECT OF LANGUAGE EVOLUTION

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I want to argue that the evolution of language cannot be theorized only in terms of selective pressures and that, at some point, one should also invoke hermeneutic pressures – crucially so when explaining the passage from protolanguage to language.

The term “hermeneutic pressure” is used in phenomenology to show how certain intersubjective relations may function as a ladder to a higher level of consciousness (Russon, 2004: 81). A situation of this kind, I believe, obtains in human ontogeny, when adults offer clues to children which exceed their mental grasp. Thus, effective pedagogy must take into account “zones of proximal development” – cognitive thresholds which children are able to cross at a given level of maturity – as postulated by Vygotsky (1978: 86). To some extent, attempts to teach apes language may be treated as a comparable case, since enculturation may lead to their use of symbols, cf. Deacon's account of experiments with chimpanzees (1997: 71ff.). Research in this field proves that different species have some symbolic potential which can be developed in a specially devised interaction with human beings, while at the same time animals have inherent limitations which they are apparently unable to overcome.

The evolutionary context, however, is crucially different: who is to exert hermeneutic pressure when everyone remains at the same level of cognitive development? (the bootstrapping problem). The ingenious solution offered by Deacon (1997, 2010) involves the construction of a “semiotic niche”: due to a shift in foraging ecology and the invention of stone tools (2.4 million years ago), precipitating a restructuring of social relationships, the development of protolanguage is postulated as a necessary stabilizing factor. Several

converging perspectives confirm this position: Donald's reconstruction of the "mimetic stage" (1991, 1999), Zlatev's refinement of this proposal with the notion of "mimetic schemas" (2007a, 2007b), McNeill's work on gestures (2005). From the hermeneutic perspective, the crucial point in this scenario concerns the displacement of reference: the foraging males had to coordinate their actions among themselves and with their females (remaining in safety) over long distances and periods of time. Thus, "felt absence" was the driving force of mimetic expression. The passage from protolanguage to language (a relatively recent event, if underlying the subsequent cultural explosion) seems to involve a more radical discontinuity. It is not my aim here to offer a scenario of this transformation. I would like to suggest, however, that a felt threat of death could be a likely factor. Awareness of death is generally considered to be a defining feature of humanity. It is also a crucial element in Hegel's "logical" account of the passage in question, as described in his "master / slave dialectic" (Russon, 2004: 72ff.).

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**PSYCHOLOGICAL REALITY OF CONSTRUCTION
GRAMMAR: EVIDENCE FROM PSYCHO- AND
NEUROLINGUISTICS. IMPLICATIONS FOR THE STUDY OF
THE EVOLUTION OF LANGUAGE.**

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Mainstream Generative Grammar (MGG) has been the dominant theory of language representation constituting the basis for most of the psycho- and neurolinguistic models. Some of the key assumptions behind MGG include: independence of language components (syntax, semantics and phonology), syntax primacy in processing, rules and lexicon dichotomy, etc. Recently, alternative linguistic paradigms begin to replace the default generative approach to grammar, these are the unification-based theories. Being one of their representatives, construction grammar (Goldberg, 1995, 2006; Croft, 2001; Langacker, 2003, 2008) has been applied in both psycholinguistic (Jurafsky, 1996) and neurolinguistic models (Dominey, 2003). At the theoretical level, construction grammar (CxG) constitutes a legitimate language description accounting for issues which MGG failed to embrace (e.g. idioms) or rendered not effectively (verb argument structure). In this sense, CxG has become a major alternative for the generative approach.

By definition, unification-based theories imply a parallel architecture of language processing in which none of the components should be processed faster with respect to others. Significantly, a substantial amount of experimental data coming from both psycho- and neurolinguistic research poses a major problem for such paradigms. The experimental evidence from ERP studies (Friederici, 2002, 2003; Ullman, 2001) support the serial (sequential) architecture with syntactic information preceding (ELAN) semantic (N400) and other type of information (P600) in language processing which is in accordance with the generative theory. A preliminary study has been conducted (Pokornowski, 2011) to illustrate a number of problems resulting from a direct

implementation of construction grammar in a sentence processing model. The experiment tested English speakers' preferences in a sentence completion task in which the experimental items, at least potentially, instantiated the prepositional but construction (Pokornowski, 2009). Depending on their completion, the subjects resolved an otherwise ambiguous sentence which contained either a but-preposition or a but-conjunction. Construction grammar predicts a strong preference for the prepositional interpretation based on the idiosyncrasy principle, i.e. unpredictability (Goldberg 1995, 2006). However, the results exhibited a reversed pattern with but-conjunction being the preferred interpretation of English speakers accompanied by a major locality effect. Thus, lacking solid empirical evidence from psycho- and neurolinguistics, so far construction grammar fails to pose a significant threat to MGG which seems to represent a more accurate account of language representation when applied in processing models.

The implications of these findings are significant for the evolution of language at two levels at least. Firstly, a theory of language representation directly shapes any description of a protolanguage in that the system which linguistics strives to account for is the end-product of an evolutionary process. Thus, a proto-grammar which is ancestor to construction grammar is dramatically different from a proto-grammar which can be traced back from generative grammar. Secondly, depending on the particular linguistic theory it is based on, a given neurolinguistic model will ascribe different processing functions to the underlying neural networks which constitute the main focus of the evolutionary study of language.

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AGAINST IDENTIFICATION OF LANGUAGE CHANGE AND LANGUAGE EVOLUTION

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Recent research into the field of evolutionary linguistics has brought strong arguments in support of the idea that learnability, cultural stability and transmissibility of languages are basic constraints to understanding the issues of the evolution and origins of the complex human linguistic structures. Especially in the early stages of the evolution of language, when the survival of the language code is a decisive question, linguistic structures that are easier to acquire, to stabilize and to transmit have an obvious advantage over others. Moving on this assumption, most scholars propose a stronger thesis arguing that linguistic structure and language itself must be considered primarily as a cultural adaptation. From this point of view, learnability and transmissibility constraints represent the fundamental evolutionary pressure that allows explaining the evolution and the acquisition of language structure in terms of cultural transmission processes: how language changes in historical time can also explain how language is acquired and most of all how language emerged. Indeed, as has been pointed out by Christiansen and Chater (2008) and many others, patterns of historical language change can be seen as processes of language evolution in microcosm (Brighton et al., 2005; Chater & Christiansen, 2010; Smith, 2011). In this paper I critically discuss this perspective. Specifically, I argue that the identification of mechanisms for genesis, acquisition and change is questionable and therefore that it is not enough to consider the historical change of linguistic structures to explain language evolution and language acquisition.

The suggestion of uniform mechanisms for genesis, acquisition and change is founded on a uniformitarianism assumption of linguistic change, namely on the idea that actual and historical linguistic changes are quite similar or of the same kind as those in an early stage of evolution of linguistic

structure. The validity of uniformitarianism in linguistics can be questioned for several reasons (cfr. also Newmeyer 2002; 2003). In my opinion the issue here is that it is even more problematic when it is used on acquisition and evolutionary levels. This is a particularly relevant point; in fact, if the uniformitarianism position is wrong – as acknowledged, for instance, by Heine and Kuteva (2007) – the reference to only historical processes of cultural transmission to explain the genesis and acquisition of language structure was no longer persuasive. Evidence from language acquisition supports my argument; for example a study of Diessel (in press) showed that a strict parallelism between historical processes and ontogenetic processes does not seem to work because not all aspects of language evolve along similar pathways through the same kinds of linguistic change. For this reason I conclude that similarities between patterns of historical language change and process of language evolution cannot be taken for granted without further justification.

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READING CONCEPTUAL LANDSCAPES IN ABORIGINAL AUSTRALIA

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In the context of this presentation the idea of ‘reading conceptual landscapes in Aboriginal Australia’ bears a somewhat playful characteristics of a double metaphor. It hinges on the conception of *Song-lines*, or *Song-cycles*, which can be defined as fairly stable spectra of discursive formations that crisscross traditional Aboriginal territories in ways that allow to express physical landscape features linguistically as one travels a given landscape. In abstract terms, *Song-lines* express ancestral totemic beings that are mythically embodied in landscape features. Thus, the integrity of the land, its tribe, its ancestors and the law is fully expressed and preserved across territories and generations. Song-lines change flexibly and gradually as one travels the landscape. This requires the simultaneous process of ‘a multi-dimensional reading’ of its features. Oral traditions and cultural practices in Aboriginal Australia display an amazing wealth of spiritually profound and intellectually sophisticated conceptual constructs that remain inaccessible to an outsider. Traditional Aboriginal cultures are examples of powerful inseparability of humans and their environments, the spiritual and the material, the sacred and the profane, all embedded in the totality of time and space. Aboriginal cosmologies presuppose such Western conceptions as the relativity of time-space, as well as the idea of the Platonic cave. The original conception of ‘reading the landscape’ provides an inspiring metaphor for the lines that constitute the text of my presentation.

The aim of this paper is basically expository and encyclopedic, with an additional note on further research directions to be materialized within the cognitive linguistic framework. The main body of this presentation includes an overview of traditional cultural and linguistic universes in Aboriginal Australia, to be further developed into a discussion of a number of cross-cultural and cross-linguistic aspects resulting from the process of colonization. A cursory characterization of ‘mainstream’ Australian English will then lead us to a closer characterization of discursive formations on both sides, resulting from this tragic culture clash in colonial times, as well as the processes of appropriation and reconciliation in contemporary Australia.

A note on an Aboriginal Creole in the Northern Territory (Kriol) and a general characterization of Aboriginal English will follow, and address the question of a/the potential to express the universe of Aboriginal traditional concepts and how these specific linguistic devices aspire to meet the demands of contemporary Australian discourses. Emphasis will be placed on those aspects of Aboriginal English which require a greater cross-cultural sensitivity on the part of non-Aboriginal users of English visiting Aboriginal communities. These 'sensitivity factors' will also be addressed with regard to legal affairs and educational policies.

The paper will be concluded with a list of theoretical constructs and analytical tools resulting from the Cognitive Linguistics framework, that seem to bear a descriptive and explanatory potential with regard to Aboriginal Conceptual Universe(s), but due to their human and ecological nature, can also be applied to explore other cultures. The list illustrates a demand to bring a closer look to evolutionary and developmental aspects of natural languages in terms of categorization processes and cognitive conceptualisation through the embodiment of meaning creation, as well as the processes of abstraction (through kinship and totemic systems, taboo, myth, etc.), and also along the spectrum provided by the organization of the semiotic sign (i.e. index-icon-symbol). The proposed stance is basically constructivist, which means that conceptual universes within the space of the individual minds (semantic off-line storage), as well as those created within the inter-subjective social space (pragmatic on-line processing, drawing upon existing discursive formations and bearing novel ones), result from the unique interaction between humans and their environments in both spatial and temporal dimensions. If human languages are assumed to be treated as adaptive systems resulting from such interactions, the issue of the embodiment of meaning construction appears to be of fundamental significance.

A TWO-SPEED LANGUAGE EVOLUTION: EXPLORING THE LINGUISTIC CARRYING CAPACITY

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Natural language can be seen as a complex adaptive system (Christiansen & Kirby 2003). The dynamics of its selection are controlled by autopoietic processes of transmission between generations of speakers in a population (Maturana & Varela 1980, Steels 2000). Recently, many attempts have been made to address the dynamics of the evolutionary trajectory of human language by using tools from other disciplines such as population dynamics or coding theory (Maynard-Smith & Szathmary 1995, Nowak et al. 1999).

In mathematical biology, it has been suggested that trait selection leads to a trade-off between two stereotypical strategies r and K , focused either on the quantity or the quality of progeny (MacArthur & Wilson 1967, Takada & Nakajima 1992, Aleksic 1993). In an environment under unstable conditions, a given population will tend to use the group's resources on breeding as fast as possible, whereas a situation at or near carrying capacity will favor a reproductive strategy producing fewer offspring efficient at utilizing limited resources optimally. The benefit of this approach lies in the fact that it offers a simple heuristic to predict future states of the system in absence of complete information about its constituents (Fog 1996).

The r/K theory places every species on a continuum ranging from fully opportunistic to purely competitive behaviour. Croft (2000) and Szathmary (2000) identify units of information (e.g., phonemes, morphemes or constructions) transmitted between humans by means of linguistic utterances. In this paper, these linguistic replicators are argued to adopt an r/K behavior, adapting their strategy of transmission, for example in the case of noisy environments or a lack of common background.

In this paper it is also argued, making use of an analogy between biological and linguistic evolution, that a carrying capacity can be defined for language, beyond which a K -strategy becomes more appropriate for linguistic replicators than an r - one. In order to tackle this phenomenon, we investigate

measurements of the energy spent by speakers to replicate linguistic features. In particular, the analysis focuses on lexicon size (Nowak et al. 1999), information entropy (Shannon 1948) and transmission channel (Shannon & Weaver 1949) to uncover the carrying capacity.

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UNDERSTANDING COMMUNICATIVE SIGNS BY CHILDREN AND CHIMPANZEES

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An often referred to study by Tomasello *et al.* (1997) purported to show that 30-month old children utilized not only pointing gestures toward one of three boxes that contained a hidden reward, but also arbitrary “markers” placed on top of the relevant box, as well as a “replica”, held up in the air, as a means of directing their attention and reaching action towards the box in question, and obtaining the reward. In contrast, chimpanzees could be trained to respond to one of the types of cues (pointing, markers, replicas), but did not generalize to the others. These results have been considered to demonstrate that children, but not apes, understand communicative and cooperative intentions. Zlatev (2008) interpreted these results as supporting the theory that children combine their understanding of signs and communicative intent through *bodily mimesis*: the representational use of the body (cf. Donald 1991, 2001).

However, these results were obtained from 30-month old children, when language is already considerably developed, while both “shared intentionality” (Tomasello) and “bodily mimesis” (Donald, Zlatev) are capacities that should, according to theory, *precede* language. Furthermore, other studies have shown that children as young as 14 months understand pointing in a similar task and that the understanding of pictures is not stable until 30 months, and of replicas even later. Finally, it has been argued that it is unfair to compare “middle-class children” and encaged and often orphaned chimpanzees and draw conclusions about species differences (Leavens *et al.* 2008).

To investigate these issues we conducted an adapted version of the original experiment, with the following modifications: (1) one of two “communicators” in the experiment with chimpanzees was a “surrogate mother” – a keeper in the zoo who had taken care of the chimpanzees since an early age; (2) we included a fourth type of sign – pictures; (3) three age-groups of children performed the task: 18, 24 and 30 month-olds; (4) measures for the children’s language skills using the standard MacArthur Inventory Questionnaires for Swedish (Eriksson and Björklund, 2005) were collected.

Based on previous research we predicted that: (a) the children’s sign comprehension would improve with age; (b) the children’s performance on the task would not correlate with the children’s measures for language skills, indicating that language is not the only factor contributing to sign comprehension; (c) there would be better performance (for both children and chimpanzees) for indexical than iconic signs (pointing and marker vs. picture and replica) and within these categories: better performance for

conventional/familiar types than unconventional/unfamiliar ones (pointing vs. marker, picture vs. replica); (d) better performance for the chimpanzees when the communicator was familiar; (e) considerably better performance even for the 18-month old children than for the chimpanzees.

Four chimpanzees were tested at Lund University Primate Research Station Furuviik and three groups of children, 24 children per group, at the Humanities Laboratory, Lund University. The results showed support for all of the predictions, with the reservation that the complete analysis of the MacArthur Inventory Questionnaires has not been completed (though will be, prior to the conference). Concerning (a), there was a significant difference between the performance of the 18-month-old children and the two older groups with respect to pointing and markers: less than half of the 18-month olds passed the task, while on average 4 out of 5 of the older children did so. With respect to pictures and replicas, only about half of the 30-month old children were successful, while none of the two younger groups (18 and 24 months old) were at all. Thus, there was a clear developmental progression, confirming to the predictions of (c): comprehension of indexical signs before iconic. Concerning the results for the chimpanzees, in 30 of the 32 cases (4 subjects * 2 experimenters * 4 signs = 32) they failed to reach significance, and thus supported prediction (e). Still, the only two successful cases offered support for (d): both occurred with the familiar communicator. Furthermore, there was a tendency for indexical signs to be more often correctly interpreted than iconic signs.

In conclusion, comprehension of communicative intentions is dependent on sign type, and seems to be sensitive to degree of familiarity with the communicator, at least in the case of chimpanzees. Experimental findings such as these need to be taken into consideration into future theoretical models of the early origins of language.

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BETWEEN COOPERATION AND AGGRESSION: A CASE FOR THE EVOLUTIONARY APPROACH TO THE STUDY OF POLITENESS

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As noted by Eelen (2001: i), politeness is now a well-established scholarly concept, fundamental to “politeness theory,” which has become a widely-used tool in intercultural communication. Contemporary research into linguistic politeness is diverse, with a principal division into the accounts inspired by pragmatics (e.g. R. Lakoff 1973, 1975; Leech 1983) and those deriving from sociolinguistics (e.g. Brown and Levinson 1987, Arndt and Janney 1985, Fraser and Nolen 1981, Watts 2003). It is particularly interesting to note that despite the differences, authors agree in considering politeness to be a form of cooperation:

- Lakoff understands politeness as a linguistic means developed by societies to reduce social friction in personal interaction (1975: 64);
- for Leech, it consists in strategic conflict-avoidance with a view to establishing and maintaining interpersonal comity (1983);
- Brown and Levinson treat politeness as a set of linguistic means for softening face threatening acts (1987);
- Arndt and Janney see it as “interpersonal supportiveness” (1985: 282);
- Hill *at al.* define politeness as a constraint on human interaction, the goal of which is “to consider other’s feelings, establish levels of mutual comfort, and promote rapport” (1986: 349);
- not far from this is Watts’s idea of politic behaviour defined as “cooperative social interaction and displaying mutual consideration for others” (Watts 2003: 14);
- even Fraser and Nolen, who view politeness in seemingly egocentric terms of “repay” and “reward,” concede that it is a joint venture directed at social harmony and equilibrium (1981).

It seems that researchers of politeness accept the existence of a set of linguistic means which serve to facilitate friendly interaction and diffuse interpersonal conflicts.

Our paper is an exploration of this idea from the perspective of the

evolution of language. Accordingly, we propose that linguistic politeness is the result of two distinct evolutionary processes. First of all, formalisation, deference, and optativeness, understood as means of increasing interpersonal distance between speakers, can be seen as deriving from the territorial mechanism for diffusing aggression. In our view, the logistics of face-to-face vocal communication – with a typical conversational exchange involving the *vis-à-vis* presentation in close physical proximity – could have created pressures to transfer the performance of aggression-appeasing distancing operations from the spatial domain into the linguistic medium, which eventually led to the development of politeness. On the other hand, the type of politeness defined by Brown and Levinson as “off-record politeness” (1987), which is based on conversational implicatures, is best accountable in terms of the development of the communicative intention *sensu* Grice (1975). Here, the explanation can be carried out along Tomasellian lines, with the emergence of politeness linked to the evolution of joint attention, mutual helpfulness, and normative behaviour (Tomasello 2008).

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