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THE COOPERATIVE NATURE OF LANGUAGE FROM THE PHYLOGENETIC POINT OF VIEW

1. Introduction: language and protolanguage

The phylogenetic development of language is a complex topic, an appropriate treatment of which crucially depends on a proper handling of this central notion — l a n g u a g e — i.e. in a way that would be most theoretically fruitful. A convenient starting point is provided by the classification developed by S. Lamb (reviewed in Johansson 2005: 5-6), who, basing on earlier terminology, distinguishes:

1. language1, roughly equivalent to the Saussurian l a p a r o l e ;
2. language2, roughly equivalent to the Saussurian l a l a n g u e ;
3. language3; roughly equivalent to the Chomskyan I - l a n g u a g e ;
4. language4; innate, genetically determined, species-specific ability to acquire language.

Based on the above classification, two senses of language are viable targets for phylogenetic/evolutionary explanations — language2 and language4 — giving rise to two major complementary perspectives. Following J. Hurford (1999), we term these perspectives the e v o l u t i o n o f l a n g u a g e s and the e v o l u t i o n o f l a n g u a g e . The former, concerned with the development of language as externalized code spanning tens or hundreds of thousands of years (thus different from historical grammar), utilizes partly linguistic methodology aided

greatly by computational tools. The latter, the 'proper' evolution of language, takes interest in the biological emergence of the human language faculty, deals with a larger time scale measured in millions of years, and is highly interdisciplinary. It is also the perspective assumed in the rest of this paper.

As has been suggested by numerous scholars (e.g. Bickerton 2007; Hurford 2003), the complex and multifaceted nature of language dictates that its evolutionary emergence is not a uniform issue that may be reflected in a single unwieldy research question, but rather needs to be broken down into a collection of smaller-scale sub-tasks. Minimally, there are two such distinct questions: the emergence of language out of pre-language, and the emergence of pre-language. This, of course, entails a meaningful and well-grounded definition of a pre-language that is qualitatively different from both the communication of nonhuman animals and from language in modern human populations. This need was catered for by D. Bickerton, who established the notion of p r o t o l a n g u a g e , distinct from the notion of proto-language as understood in historical grammar (e.g. Bickerton 1998). Protolanguage is used in the evolution of language research to mean the early stage of language-like communication, characterised by the absence of grammatical structure, especially of thematic relations and combinatorial, hierarchical syntax, but the presence of the conventional sign as well as informative, c o o p e r a t i v e s i g n a l l i n g (see below). Our paper pertains to the stage of the emergence of protolanguage so construed.

2. Communication

Classic in linguistics is R. Jakobson's model of communication, which focuses on the elements involved in a communicative act:

> The ADDRESSER sends a MESSAGE to the ADDRESSEE. To be operative the message requires a CONTEXT referred to, sizeable by the addressee, and either verbal or capable of being verbalised; a CODE fully, or at least partially, common to the addresser and addressee (or in other words, to the encoder and decoder of the message); and finally, a CONTACT, a physical channel and psychological connection between the addresser and addressee, enabling both of them to enter and stay in communication. (Jakobson [1960] 1999: 47)

Jakobson's primary motivation in spelling out the model is to delimit the functions of language — elaborating on K. Bühler's model of language (1934), he anchors the functions of language in the structure of a communicative act. Thus, the referential function is orientated towards the context in which an act takes place; the emotive function, towards the addresser; the conative, towards the addressee; the phatic function is focused on the contact between the addresser and addressee; the metalinguistic one reflexively bears on the communicative code; and the poetic function, as already explained, is message-orientated (Jakobson ([1960] 1999: 48-51). The structure-function model has been widely accepted in

linguistics, exerting a particularly strong influence on functional approaches to language analysis such as J. R. Firth's functionalism or M. A. K. Halliday's systemic grammar (see Jaworski and Coupland 1999: 41-42).

Mutatis mutandis, the same conception of communication underlies C. Shannon and W. Weaver's foundational work of on information theory (1949). Their study into statistical probabilities of verbal responses highlights the components of a communication system: source, transmitter, signal, receiver, message, destination, and noise. The difference between Jakobson's view of communication, on the one hand, and Shannon and Weaver's, on the other, results from their respective research goals — if Jakobson, to present an exhaustive description of linguistic functions, needs a holistic account of a communicative act, Shannon and Weaver's cybernetic approach selectively focuses on the possibilities of formalisation of information transfer. In linguistics and related disciplines, the generalised model based on those two proposals is referred to as the c o d e m o d e l (alternatively, the t r a n s m i s s i o n m o d e l), in which communication is conceptualised as transfer of information that is encoded in signals produced by the sender, transmitted through a channel and decoded by the receiver; the underlying metaphor is that of conduit (Reddy 1979).

The chief alternative model of communication stems from H. P. Grice's pragmatics, and in particular from his work on conversational implicature. Grice views communication as a collaborative process — since, as he claims, much of talk is implicit, speakers must rely on inference to reconstruct intended meanings of each others' utterances (Grice [1975] 1999, see also Jaworski and Coupland 1999: 43). Being a rationalist, Grice believes that conversational inference is governed by a set of rules, and his model of communication based on the Cooperative Principle (CP) should be seen as an attempt explicate them:

> I would like to be able to think of the standard type of conversational practice not merely as something that we all or most do IN FACT follow but as something that it is REASONABLE for us to follow, that we SHOULD NOT abandon. ... So I would like to able to show that observance of the CP and maxims is reasonable (rational) along the following lines: that anyone who cares about goals that are central to conversation/communication (e.g. giving and receiving information, influencing and being influenced by others) must be expected to have an interest, given suitable circumstances, in participation in talk exchanges that will be profitable only on the assumption that they are conducted in general accordance with the CP and the maxims. (Grice [1975] 1999: 70)

Grice's i n t e r a c t i v e - i n f e r e n t i a l m o d e l of communication has been a lasting influence in pragmatics. For example, its direct continuation is D. Sperber and D. Wilson's relevance theory, which emphasises the role of the Relevance Maxim in the construction of discourse (1986). Furthermore, his ideas played an important part in the inception politeness research. In "Logic and Conversation", Grice (1975) offers a brief comment that along the Cooperative Principle, which is geared towards informational clarity, conversational exchanges are regulated by the Politeness Principle, whose function is to make interaction socially appropri-

ate. This led some linguists, most notably R. Lakoff and G. Leech, to try to elaborate on the notion of the Politeness Principle, which — in turn — created a context for the foundation of politeness study as an independent theoretical pursuit within pragmatics (see Eelen 2001, Watts 2003, and Żywiczyński 2010).

While both the code model and the interactive-inferential model are geared to dealing with communication in humans, extending our task to the description of communication in prelinguistic hominids places additional — and partly unexpected — requirements which make those two models insufficient. Both the above approaches presume the existence of an essentially cooperative frame of interaction which, while characteristic of language as it is today, is an assumption that cannot be legitimately made with respect to the nascent stages of language-like communication. To remove this fundamental limitation, a third model of communication must be introduced, embracing a wider scale of biological phenomena; it may be named the 'naturalistic model' or, after J. Krebs and R. Dawkins (1984), the 'cynical' model. On this model, communication is seen as interplay between the actor and the reactor, both of whom are trying to maximise their respective payoffs as described by game theory. Communication is "the process in which actors use specifically designed signals or displays to modify the behavior of reactors" (Krebs and Davies 1993), and it occurs "when the action of or cue given by one organism is perceived by and thus alters the probability pattern of behaviour in another organism in a fashion adaptive to either one or both of the participants" (Wilson 1975). More 'cynically', "[a] signal is a means by which one animal (the 'actor') exploits another animal's (the 'reactor's') muscle power" (Krebs and Dawkins 1984: 380-381).

2.1. Communication and evolutionary stability

In discussing conditions on communication being an evolutionarily stable strategy, a short review of the logic of evolution's basic mechanism, natural selection, will be useful. As a first step, mutation is responsible for introducing variety in a population's gene pool, which translates into variety in the phenotypes present in that population (with behavioural strategies/tendencies included under the notion of 'phenotype' and thus given at least some genetic anchoring). As a next step, selection weeds out those phenotypes that are below average at passing on the genes that built them. As a logical conclusion, evolutionary theory stipulates that only those behavioural strategies will survive and reach evolutionary stability that are the most profitable ones in terms of their genetic success, i.e. that are characterised by the best benefit/cost trade-off calculated in terms of the genetic success of the phenotype implementing a given strategy. Individuals that follow a substandard strategy have reproductive success below the population average, which means that natural selection acts to gradually eliminate their genes from the gene pool of the population; this in turn means the gradual elimination of the strategy itself from the population's behavioural repertoire. In contrast, a successful strat-

egy is by definition such a strategy that grants those who adopt it a greater genetic success, leading to its gradual expansion in the population. A strategy that — once adopted by the majority of individuals in the population — is impossible to be replaced by a different strategy, goes by the name of evolutionarily stable strategy (ESS) (see also Wacewicz and Żywiczyński 2008).

2.2. Cooperative communication is not an ESS.

Altruism (acting to the benefit of another organism at a cost to oneself) and cooperation (reciprocating help; that is reciprocating, at a later time, altruistic behaviour directed towards oneself) are phenomena that are extremely rare in nature. This uncommonness is well attested by empirical data from ethology and equally well grounded in evolutionary theory (e.g. West et al., in press), which explains it by reference to the notion of ESS: simply put, altruistic and cooperative behaviours tend not to be evolutionarily stable. A crucial step in our reasoning is to realise that honest communication is a form of cooperation and thus displays the same vulnerability to being outcompeted by alternative strategies.

All volitional communication starts with the production of a signal, which carries some cost — at a minimum, it is more expensive than its alternative, doing nothing. Even if the cost is very small, given sufficient time natural selection will act to eliminate this behavioural strategy — unless the cost of producing the signal is outweighed by the benefits consequent on its production. In principle, such benefits could take the form of reciprocation from the other party, as is so often the case in human language: if the signaller imparts valuable information to the receiver, he or she may expect the receiver to return this favour at a later time. Still, *ceteris paribus*, a strategy to reciprocate for honest signalling will always be outcompeted by a cheater (free-riding) strategy "reap the benefits of honest communication, but do not pay the costs (however small) of reciprocating".

However, the strategy of producing honest signals faces a more serious and more fundamental risk from a different direction. A strategy "use dishonest rather than honest messages to manipulate the receiver to behave to the signaller's advantage" clearly offers greater fitness benefits, and consequently it will spread in the population at the cost of the honest strategy. At a point when dishonest signallers form a substantial proportion of a population, they exert a selection pressure on the receivers. The receivers who fall for dishonest signals enjoy a below-average reproductive success, leading to the progressive elimination of their genes and with them — the behavioural strategy of observing signals.

2.3. Linguistic communication as cooperation

In stark contrast to the implications of the reasoning presented above, language (as we know it today) presents itself as a communication system that is inherently and pervasively cooperative. Reviewing the full spectrum of cooperative phe-

nomena in language would constitute an immense task that could not be attempted in this short section. However, at this point we would like to highlight at least some aspects of language that lay bare its unquestionably cooperative design.

Even a perfunctory look at semantic and pragmatic aspects of language organisation indicates that linguistic communication is geared towards facilitating the correct interpretation of valuable signals. In very basic terms, the primary function of language is to reliably and voluntarily transmit symbolic information by phonological means, that is, by discrete vocal units (see e.g. Jackendoff 2002, Donald 1991, Deacon 1997, MacNeilage 2008). As argued by Studdert-Kennedy and Lane (summarised in MacNeilage 2007: 96-98), the development of phonology resulted from the pressure towards increasing the expressive power of vocal communication — the essential condition in the emergence of language was to enrich symbolic contents that could be communicated without compromising perceptual distinctiveness of vocal signals. This pressure set in operation the process of self-diversification governed by the particulate principle, which eventually resulted in the appearance of dual patterning (Studdert-Kennedy 1998, Hockett 1960). This characteristically linguistic phenomenon depends on a finite and lower-order set of discrete sound units (i.e. phonemes) to form higher-order elements — monomorphemic or multimorphemic lexemes (MacNeilage 2008: 97). Here, the logic of the development is to promote the value of transmitted signals by increasing their semantic richness, and at the same time, to make these signals easily interpretable by strengthening their perceptual distinctiveness.

The special status of linguistic communication is also visible at the pragmatic level, which is here understood broadly as aspects of context and discourse organisation used by receivers to interpret verbal messages (Saeed 1997: 9). For example, there seem to be a discursive norm which stipulates that text-receivers should benefit from acts of communication by being supplied with new information but only such new information that they will able to interpret. R. De Beaugrande and W. Dressler use the notion of r e g u l a t i v e i n t e g r a t i o n to explicate how this norm operates:

> [A] text constitutes a cybernetic system which continually regulates the functions of its constituent occurrences. Whenever a textual occurrence falls outside the participants' systems of knowledge about language, content, and purpose, the stability of the textual system is disturbed and must be restored by regulative integration of that occurrence, e.g. via additions or modifications to one's store of knowledge. (de Beaugrande and Dressler 1981: 36)

Accordingly, they distinguish three levels of text informativity: the f i r s t - o r d e r of default knowledge; the s e c o n d - o r d e r, where informativity is beyond the default level but can still be integrated into participants' discourse models; and the t h i r d - o r d e r of novel and/or unexpected information which radically falls outside participants' discourse models and cannot therefore be integrated into them (de Beaugrande and Dressler 1981: 142-144). The second level

represents the desired state of discourse, in which informativity is partly dependent of the two types context — the intraliguistic context, related to what has been said (backward directionality) or will be said (forward directionality) and the extralinguistic linguistic context (outward directionality), related to elements of the communicative occurrence (such as previous texts, situation, coherence relations, etc.). The appearance of either first-order or their-order entities instigates the process of regulative integration, whose function is to bring discourse to the second level of informativity. This is done by upgrading the informativity of first-order entities and downgrading the informativity of third-order entities:

> The presence of at least some second-order occurrences would be the normal standard for textual communication, since texts purely on the first order would be difficult to construct and extremely uninteresting. Upon occasion, first-order occurrences could be UPGRADED and third-order ones DOWNGRADED to keep the medium order... (de Beaugrande and Dressler 1981: 143-144)

Another interesting aspect of linguistic communication pertains to the organisation of postural and proxemic environment in which it takes place. As microstudies suggest, conversation — the most prototypical form of language use (see e.g. Dunbar 1996) — requires that interactants should be positioned face-to-face in close proximity. A typical conversational exchange involves the *vis-à-vis* presentation (Scheflen 1972: 239ff) and personal distance, the term originally used by Hediger to indicate space separating members of non-contact species (1955) and adopted by Hall with reference to the distance in which people hold most of informal meetings (1969:119-120). The exact delimitation of personal distance differs from culture to culture, but it possesses a set of universal characteristics; for example, it is long enough to prevent visual distortion, which occurs in intimate distance; foveal vision covers face, torso, and arms; head size is perceived as normal and details of facial expression are clearly visible; speech is characterised by conversational style, moderate level of voice, and neutral tempo of delivery (Hall 1969: 119ff). Taking it all together, such a micro-ecological make-up provides an interpersonal encounter with what Goffman calls f o c u s — a sense of togetherness which enables people to openly cooperate by taking turns at talking (1963: 24). Therefore, it seems reasonable to conclude that the micro-ecological make-up of conversational settings serves to guarantee reliable transfer of semantic information from the sender to the receiver.

3. Conclusions: pre-existing cooperation as a prerequisite for language and the reception-driven nature of prelinguistic communication

Sections 2.1 — 2.3 leave us with a paradox: the obviously cooperative nature of language makes it a strategy that should not be evolutionarily stable, at least under the default circumstances. There exist three major special factors responsible for those rare cases in which cooperation does emerge in nature: inherently

high signal cost, kin selection, and reputational mechanisms. Neither of the above applies to language, since linguistic signals cost almost nothing to produce, they are directed mostly to non-kin, and they themselves form a basis for reputational mechanisms (which means that invoking reputational mechanisms to explain the emergence of cooperation in language would be circular reasoning). Communicative cooperation in humans, on the other hand, is compatible with generally high level of naturally occurring cooperation in our species. This in turn appears to be a unique trait whose evolutionary origins have so far failed to be addressed in a satisfying way (e.g. Henrich and Henrich 2007).

CONCLUSION 1: the emergence of language requires a high degree of pre-existing non-communicative cooperation between hominids (i.e. a generalised predisposition to cooperation as a species-wide cognitive trait manifested in as well as outside communicative contexts); while the emergence of protolanguage requires that cooperation, if not already present, at least co-develops with it in a process of coevolution based on positive mutual feedback.

Nevertheless, it is important to realise that in early hominid phylogeny, at the nascent stages of languagelike communication, the default constraints from evolutionary stability (as described in sections 2.1 and 2.2) must have applied with full force. This means that prior to the emergence of protolanguage, hominid communication would have been vulnerable to the standard risk of invasion from dishonest signallers, ultimately leading to collapse of communication. Given this risk, intentional signalling is an unlikely possibility for the origin of signals, which must instead have been based on the process of r i t u a l i s a t i o n (see Krebs and Dawkins 1984). In ritualisation, it is the receiver who interprets (the beginning of) an originally instrumental action as containing additional, reliable information about the actor. In other words, for something to become a signal, it must be interpreted as one rather than produced as one.

This becomes more obvious when one appreciates the inherent asymmetry between the roles of the sender and the receiver, in the light of the constraint of evolutionary stability discussed above. Normally, signallers are selected against revealing honest information to individuals not closely related to them. In receivers, however, natural selection acts to favour the ability to maximise the amount of information gleaned from the signals of others. The pattern described above is what is indeed found in nonhuman primates, whose communication is described as r e c e p t i o n - d r i v e n : the receivers "acquire information from signalers who do not, in the human sense, intend to provide it" (Seyfarth and Cheney 2003: 168). This clearly points to the chronological primacy of reception over production. Systematic signal production becomes possible only when, firstly, the ability for reception is already in place and secondly, stabilising factors for honesty (such as in-group cooperation) are present.

CONCLUSION 2: the constraints of evolutionary stability in communication systems dictate that — prior to the emergence of the generalised cooperative capacity discussed above — intentional signalling is inherently unstable, and the development of communication remains entirely reception-driven.

Finally, based on the above consideration, it would be interesting to address the question of the primacy of pragmatics or semantics from the phylogenetic point of view. Of course, a major difficulty lies in conceptualising those two linguistic notions in a way that fits the context of a nonlinguistic communicative system. One useful canonical way of making the semantics/pragmatics distinction is based on meaning i n h e r e n t in a given expression as opposed to meaning arising from the i n t e r a c t i o n of the expression and the broadly defined context (e.g. Trask 1999: 161-162). Following the reception-driven character of communication, it can be assumed that for a behavioural unit to be ritualised into a signal with an i n h e r e n t meaning, it must first be systematically interpreted by the receivers trying to extract maximum information from it in a process heavily dependent on contextual cues. We suggest that this could be construed in terms of the application of a proto-pragmatic capacity, which — by this reasoning — would have appeared prior to any (proto)semantic aspect of the emerging language faculty.

References:

BEAUGRANDE, R./DRESSLER, W. (1981), Introduction to Text Linguistics. Harlow.

BICKERTON, D. (1998), Catastrophic Evolution: The Case for a Single Step from Protolanguage to Full Human Language. In: Hurford, J./Studdert-Kennedy, M. G./Knight, C. (eds.), Approaches to the Evolution of Language. Cambridge, 341-358.

BICKERTON, D. (2007), Language Evolution: A Brief Guide for Linguists. In: Lingua 117 (3), 510-526.

BÜHLER, K. (1934), Sprachtheorie. Die Darstellungsfunktion der Sprache. Jena.

DEACON, T. W. (1997), The Symbolic Species. The Co-evolution of Language and the Human Brain. London.

DONALD, M. (1991), Origins of the Modern Mind. Cambridge, Massachusetts.

DUNBAR, R. (1996), Grooming, Gossip and the Evolution of Language. London.

EELEN, G. (2001), A Critique of Politeness Theories. Manchester.

GOFFMAN, E. (1963), Behavior in Public Places: Notes on the Social Organization of Gatherings. New York.

GRICE, H. P. ([1975] 1999), Logic and Conversation. In: Jaworski, A./Coupland, N. (eds.), The Discourse Reader. London, 66-77.

HALL, E. (1969), The Hidden Dimension. New York.

HEDIGER, H. (1955), Studies of the Psychology and Behavior of Captive Animals in Zoos and Circuses. London.

HENRICH J./HENRICH, N. (2007), Why Humans Cooperate. Oxford.

HURFORD, J. (1999), The Evolution of Language and Languages. In: Dunbar, R./Knight C./Power C. (eds.), The Evolution of Culture. Edinburgh, 173-193.

HURFORD, J. (2003), The Language Mosaic and its Evolution. In: Christiansen, M./Kirby, S. (eds.), Language Evolution. New York, 38-57.

JACKENDOFF, R. (2002), Foundations of Language: Brain, Meaning, Grammar, Evolution. Oxford.

JAKOBSON, R. ([1960] 1999), Linguistics and Poetics. In: Jaworski, A./Coupland, N. (eds.), The Discourse Reader. London, 48-54.
JAWORSKI, A./COUPLAND, N. (eds.) (1999), The Discourse Reader. London.
JOHANSSON, S. (2005), Origins of Language: Constraints on Hypotheses. Amsterdam.
KREBS, J. R./DAVIES, N. B. (1993), Introduction to Behavioural Ecology. Oxford.
KREBS, J. R./DAWKINS, R. (1984), Animal Signals: Mind-Reading and Manipulation. In: Krebs, J. R./Dawkins R. (eds.), Behavioural Ecology: An Evolutionary Approach (2nd edition). Oxford, 380-402.
MACNEILAGE, P. F. (2008), The Origin of Speech. Oxford.
REDDY, M. (1979), The Conduit Metaphor: A Case of Frame Conflict in our Language about Language. In: Ortony, A. (ed.), Metaphor and Thought. Cambridge, 164-201.
SAEED, J. (1997), Semantics. Oxford.
SCHEFLEN, A. (1972), The Significance of Posture in Communication Systems. In: Laver J./Hutcheson S. (eds.), Communication in Face to Face Interaction. Harmondsworth, 225-246.
SEYFARTH, R./CHENEY, D. (2003), Signalers and Receivers in Animal Communication. In: Annual Review of Psychology 54, 145-173.
SHANNON, C./WEAVER, W. (1949), The Mathematical Theory of Communication. Urbana.
SPERBER, D./WILSON, D. (1986), Relevance. Communication and Cognition. London.
STUDDERT-KENNEDY M. G./LANE, H. (1980), Clues from the Difference between Signed and Spoken Languages. In: Bellugi, U./ Studdert-Kennedy, M. G. (eds.), Signed and Spoken Language: Biological Constraints on Linguistic Form. Berlin, 29-40.
STUDDERT-KENNEDY, M. G. (1998), The Particulate Origin of Language Generativity: From Syllable to Gesture. In: Hurford, J./Knight, C./Studdert-Kennedy M. G. (eds.), Approaches to the Evolution of Language. Cambridge. 202-221.
TRASK, R. L. (1999), Key Concepts in Language and Linguistics. London.
WACEWICZ, S./ŻYWICZYŃSKI, P. (2008), Broadcast Transmission, Signal Secrecy and Gestural Primacy Hypothesis. In: Smith, A./Smith, K./Ferrer-i-Cancho, R. (eds.), Proceedings of the 7th International Conference on the Evolution of Language. London – Singapore, 354-361.
WATTS, R. (2003), Politeness. Cambridge.
WEST, S. A. /EL MOUDEN, C./GARDNER, A. (In press), 16 Common Misconceptions about the Evolution of Cooperation in Humans.
WILSON, E. O. (1975), Sociobiology. Cambridge, Massachusetts.
ŻYWICZYŃSKI, P. (2010), The Axiology of Spoken Interaction. An Essay on the Organisation of Conversational Behaviour. Toruń.

THE COOPERATIVE NATURE OF LANGUAGE FROM THE PHYLOGENETIC POINT OF VIEW

This paper discusses the cooperative nature of language in the context of its emergence in hominid phylogeny. After a brief review of the main models of communication and an exposition of evolutionary logic concerning the stability of communication systems, selected aspects of pragmatics and semantics are discussed that testify to the cooperative design of language. We conclude that firstly, robust pre-existing non-communicative cooperation must have been a prerequisite for the development of language in hominids, and secondly, that the original hominid communicative system preceding language must have resembled the communication systems of extant nonhuman primates in being reception-driven.