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HOMO SAPIENS: THE SPEAKING ANIMAL

In the past decades scientists of several disciplines have contributed to the theory of human descent. Although the picture is not yet complete, enough has been discovered to agree with the story sketched by Charles Darwin on the origin and evolution of man. What is missing so far in the wide discussion is a contribution of linguistics. Therefore, the question arises: to what extent has the genesis and development of language attributed to the transition from animal to human being or, more fundamentally, are those steps conceivable without the generation of language?

INTRODUCTION

Parallel to the exploration of the universe and the development of the big bang theory the theory of human origin and the several stages in his growth have been uncovered. Archaeologists and palaeontologists, but geneticists and neurologists as well, have contributed in reconstructing this development and complex lines from the past to the present have been drawn. The investigations now operate in an accelerated motion and every fossil dig up in the African soil, particularly in East-Africa, attributes to the completion of the historical process. Besides, findings in the field of genetics and of the structure and functioning of the human brain seem to almost complete the book of human life. With the excavation of pieces of skeleton and the unravelling of the DNA structure with its 30.000 genes we can reconstruct the growth of the body and of the hereditary qualities as well. We thus more or less delimit the distinc-

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tive qualities of the human species and we discover how the typically human properties are stored. At the same time, the ropes with other creatures in the animal world are tightened. More surprising still, the similarity of information processing in the brain and in the computer, digitally or analogically, becomes visible. Again one wonders what role language and linguistic communication have played in the conquest of a niche somewhere between ape and machine. These questions are not to be refuted since we know that man shares 98 to 99 % of his genes with the chimpanzee – not to mention the similarity in behaviour. Moreover the electro-chemical wiring of the brain allows a comparison with a serial Von Neumann machine. At least virtually, it must be possible to develop computer models operating with brain-like structures. The conclusions in these fields warn us to expect any scientific contribution of theories such as the so-called intelligent design. Notwithstanding its scientific claim it does not differ fundamentally from forms of creationism as they are defended in some southern states of the USA. We think that in contrast to these great stories – but stories! – the Darwinian approach has received enough scientific support to constitute a framework for our linguistic considerations.

THE EVOLUTION

Some six million years ago the great family of our ancestors saw a separation into two groups, each of which followed its own paths and ended up as chimps in the western parts of Africa and as hominids, man-like creatures, in the eastern parts. That the evolution of the two groups soon showed remarkable differences is due to their difference in surroundings, their habitat, in the first place. The eastern part of Africa, separated from the west by the so-called Great Rift Valley, had changed seriously in the preceding millions of years. Due to the shift of tectonic plates on the bottom of the Indian Ocean, the eastern parts of Africa became dry over the years. The dense forest disappeared and a plane like today's South-African 'bosveld' resulted: grass-land, pasture-like with scattered trees and bushes. In this area our early ancestors had to adapt, while their cousins, early chimpanzees, remained in their relatively safe jungle. The flat country the hominids were confronted with obliged them to change their way of moving. They had to overlook wide fields, where beasts of prey threatened them and where food was scarce and dispersed. As a result,

they began to walk upright and the anatomy adapted to the new way of going straight. The hominid became bipedal.

There is every reason to subscribe to the thesis that “the evolution of bipedal walking is probably the most significant of all the features shown by the hominids”¹. The upright posture ultimately resulted in three characteristic qualities of the new type of creature, viz. a large skull with expanded brain, a specific development of the vocal track and the free activity of the hands. The three new qualities implied a greater thinking capacity, subtle communicative contacts and manual creativity. Palaeo-anthropologists nowadays see different stages of development. The *Australopithecus afarensis* – *Australopithecus*: southern ape-man, *afarensis*: from the Afar desert – living some 3 ½ million years ago, is to be considered our prehistoric mother. Reconstructed from no more than a handful of fossils, she has conquered the world of science under the Beatle-name Lucy. She must have been enough human-like to be clearly distinguished from the creatures in the chimpanzee branch, although most recent discoveries suggest that there still were sexual contacts between the two families in Lucy’s time. About a million years ago the archaic sapiens found his way out of Africa, particularly into Europe and Asia. His direct descendent, *Homo Neanderthalensis*, disappeared from the European stage some 30.000 years ago, dispelled or mingled with the new human off-spring, today’s *Homo sapiens*, born about 150.000 years ago in eastern Africa.

As we have noted, the *Homo sapiens* can be defined by three distinctive features based upon the upright attitude: his intellectual capacity, stored in a brain of 1,3 kg, his communicative faculty, resulting from the specialization of the vocal track, and the manual skill of free hands, opposed to each other and equipped for manufacturing tools. It must be emphasized that the three capacities are clearly interrelated and have developed in close harmony. In other words, there is no *Homo sapiens* with one of the three properties missing, since they interact and have strengthened each other in their growth. Most distinctive, however, is the way in which intellectual exercise and communicative contact have collaborated and resulted in the unique quality that characterizes man, viz. human language.

¹ J. Lynch, L. Barrett, *Walking with caveman*, London: Headline Book Publ. 2002, p. 36.

ON THINKING

Leaving aside for the moment the sublime quality of what we have called linguistic thinking, we can state that every animal, not only the human variant, can think and does think indeed. Thinking is “solving problems, remembering, planning what one is expected to do, planning what one is about to say, imagining things, considering opinions, and making judgments”². Apart from speaking as humans do, all activities are carried into effect by other living creatures, chimps as well as birds or whales. This does not imply that the highest levels of thinking such as drawing up a theory or playing chess can ever be reached in the animal world. However, natural as well as logical thinking is not restricted to the human species: “Natural thinking selects a pathway according to emphasis. Logical thinking blocks pathways according to the mis-match reaction”, in De Bono’s words³. We can leave the former activity aside, since it plays no part in our theory. The latter, however, is interesting, since the structure and the use of language are ultimately founded on this way of thinking: in essence it implies choice or, once more borrowing De Bono’s definition: “Logic is the management of *no*”. And management of *no* brings us back to the last part in the definition of thinking, viz. making judgments. Before going deeper into this subject, especially where it relates to language, we want to draw attention to other aspects of animal behaviour that considerably narrow the gap between our primate family and man. Ethologic research, more particularly by primatologists, has proved that chimpanzees not only know what we consider typically human emotions and social patterns, but also offer proofs of rational forethought. One example of the latter. When the bonobo Kuni – bonobo’s are a subclass of chimpanzees – in Twycross Zoo in Great Britain notices a starling tumbling down after a collision with the glass fence, it carefully picks up the dazed bird. She puts it on its feet and when it does not move she throws it up a bit. But the starling does no more than slightly flutter. Then Kuni climbs to the top of the highest tree, carrying the bird, neatly unfolds the wings, a wing in each hand, and throws it in the air like a paper aeroplane. The bird does not succeed in passing the fence and the bonobo climbs down and keeps watch until the starling has recovered and flies away⁴. Other phenomena such as

² R. L. Gregory, *The Oxford companion of the mind*, Oxford: Oxford U.P. 1997, p. 530.

³ E. de Bono, *The mechanism of mind*, Harmondsworth: Penguin 1976, p. 237.

⁴ F. de Waal, *De aap in ons*, Amsterdam– Antwerpen: Contact 2005, p. 10.

empathy, consciousness, helpfulness, etc. among members of the bonobo family suggest that the distinction between *Homo sapiens* and less sapiens creatures requires serious rethinking of our position in the world of the living.

Narrowing the gap as the above examples do, does not imply that we should deny the special position of mankind. We may share natural and logical thinking with other animals, but mathematical thinking, i.e. thinking in accordance with a recipe, appears to be the exclusive ability of the human species. And although the bonobo knows what love and care means, it is not capable of playing the role once played by Florence Nightingale. Why not? Are only creatures gifted with language in its full sense capable of executing high performances?

COMMUNICATION

No less important for life than thinking in whatever form is sign-giving. Signs keep groups together, create oppositions between beings of a different nature, are necessary for recognition of what must be recognized in order to survive. Even the life of trees, flowers, plants seems to be crucially dependent upon the signs nature emanates. For seeds to spring in the vernal season, a message has to reach them, a combination of sunshine, humidity, temperature. In the animal world there is an ongoing stream of sign-giving, either to keep contact within the group or to warn for immanent danger. Even leaves, grasses, fruit send their signals: edible or non-edible, dependent on colour or smell. As regards procreation and the preservation of the species, without signs of a species-specific quality it would be impossible for mating to be realized. And then the human world. In its complexity it is a hundred times more dependent on sign-giving. Apart from language and everything expressed in it, there are traffic-signs, formulas of greeting, the organization of society, in short: without sign-giving the whole human world would collapse.

Notwithstanding the multitude of signs, as manifold as the stars of the universe, there are no more than two categories or, at best, a combination of the two. There are isolating signs – let us call them ‘names’ for the moment – and qualifying signs: for the moment we will consider them as property-signs. Isolating signs are proper names – *Mary* – and expressions referring to entities: *my brother*, *democracy*. But in the animal world there is a multitude of isolating signs as well: the call of the mother-hen to her chickens and vice-versa, the fish as an engagement present of the tern to a possible part-

ner, the flag of mother deer to guide her young, etc. Isolating also are the colours of birds, the subsonic noises of the elephant and so on. In the world of *Homo sapiens* the outward appearance may be considered one of the most important isolating signs: it is the means by which we recognize a person, but also a teapot, coffeepot, a sugar-bowl: all exterior qualities, not to be identified by what they are part of. The geographical map is a complex amalgamation of isolating signs: a line for a river, a dot for a town, an interrupted line for a border.

Beside the isolating signs, there are the classifying signs: a warning cry, the dance of the bee on the beehive and, in the human world, the sex-symbols, the colours of a medieval painting – white for innocence, red for love – the hair-dress of modern youth, etc. Perhaps the latter category is not always identifiable in its discreteness, since it may contain an (unexpressed) isolating sign as a nut in its shell. The bridal bouquet, for instance, is a qualifying sign no doubt, but it is interpreted as qualifying its bearer. The warning cry of the blackbird warns of ‘something’; although the latter is not audibly expressed it is supposed to be the object of the cry.

The two/three functions are essential for the structure of language. For the moment we will restrict our illustration to a single sentence such as *((dogs)bark)*, where the isolating term is defined by the qualifying term. An imperative impression such as *Go!* on the other hand can be regarded as a qualifying term of which it is assumed that it relates to some person, the non-realized isolating term.

LINGUISTIC THINKING

It will have become clear that thinking and communication are indissoluble aspects of human language: connected as the two sides of a medal. Both aspects have been refined in the long history of human descent and in doing so have fundamentally contributed in the evolution from animal-like to human being. In other words, to become *Homo sapiens*, our ancestor enlarged the simple sign-giving machinery to the complex linguistic instrument we dispose of today. The relation of animal and human thinking as well as the relation of animal and human communication should not blind us for the impressive differences⁵. No animal will ever communicate, i.e. think and express:

⁵ F. G. Droste, *Teken, taal en werkelijkheid*, 's-Gravenhage: Sdu Uitg. 1996, p. 33.

When to the sessions of sweet silent thought
 I summon up remembrance of things past,
 I sigh the lack of many a thing I thought,
 And with old woes new wail my dear time's waist.
 (W. Shakespeare)

In order to understand what happened in the poet's brain when he composed the first strophe of the sonnet, we follow the theory developed by Levelt. In his device, psycholinguistic in nature, he distinguishes several distinct information processing systems in the brain. Beside a kinaesthetic and a visual system, he acknowledges a so-called propositional system in which conceptual structures, the propositions, are generated. Propositions are semantic structures, preverbal but meant to be mapped upon their phonological counterparts, the sentences. The different information processing systems can interact: when we hear something we can go and look for it, which implies going from the auditory to the visual area. However, "if the intention is to speak, then the code must eventually be propositional in nature". There are different 'modes of thought' but if some concept or conceptual structure is to be expressed "the message must be in propositional form". Such a message, preverbal in nature, must pass a language-specific grammar, the so-called formulator, to be expressed. For Polish this must be a Polish formulator, for English an English one, etc.⁶ Information processing thus can operate on different levels. On a conceptual level ideas may be evoked and interconnected into a non-verbal message. This is called conceptualization; its images "are strictly pre-linguistic and only later mapped onto linguistic expression"⁷. The different stages of information processing resulting in expressions of a kind can be schematized as follows:

Pre-linguistic conceptualisation: idea of an empty stomach
 → Proposition: [{"I"} hungry]
 → Sentence: *I am hungry*

The output of the propositional system is a structure of linguistic concepts. Thinking in such concepts, more particularly in conceptual structures

⁶ W. J. M. Levelt, *Speaking: from intention to intonation*, Cambridge (Mass.): MIT Press 1989, p. 73.

⁷ M. Bierwisch, M. Schreuder, *From concepts to lexical items*, "Cognition" 42(1992), p. 45.

of this kind, results in a communicative entity, i.e. a sentence when the grammatical rules map the said structure onto a phonological structure.

It must be clear that linguistic processes are of a more complex nature than those of logical thinking on its own. As the above device and certainly Shakespeare's strophe prove, judgments of a simple yes-no character cannot account for linguistic thinking-*cum*-communication. The latter requires a rule system on the content as well as on the phonological level, a form of mathematical thinking. Is it nonetheless possible to hold that the latter is derived from simpler forms of information processing along Darwinian lines?

THE INNATENESS HYPOTHESIS

Is it conceivable that language is learned the way algebra is learned or how to play a game of tennis? Until half a century ago it was assumed that a baby is born with a brain like a empty page, *tabula rasa*, which page is filled in during its early years by instruction, more particularly stimulation and reinforcement. Learning of language would also happen in this manner, together with thinking processes, all skills acquired within the community. Since the sixties the view on thinking and language has drastically changed. In a series of books and articles Chomsky has argued that language is an innate system, the language faculty, transferred from generation onto generation. The linguist thus has to discover "necessary and sufficient conditions (...) that are rooted in the 'language capacity', and thus constitute the innate organization that determines what counts as linguistic experience and what knowledge of language arises on the basis of this experience"⁸. The theory has recently received experimental support by the discovery of a gene, FOXP2, "a gene involved in speech and language"⁹.

The innateness of language and thinking as hereditary systems support our theory that the rules of language are based on more primitive procedures, similar in man and animal, more particularly the logical thinking discussed above. The growth into a full-fledged system has taken at least half a million years rather than some fifty thousand years as is sometimes assumed. Organically, this becomes apparent in the development of the brain together with the growth and refinement of the vocal apparatus. We do not hesitate to use the

⁸ N. Chomsky, *Language and mind*, New York: Harcourt, Brace & World 1968, p. 24.

⁹ W. Enard a.o., *Molecular evolution of FOXP2*, "Nature" 14.08.2002, p. 870.

term ‘together’ since we hold that the higher forms of thinking develop in parallel with more refined expressive power of the larynx and the vocal track. Moreover, we also hold that the growth of the brain and the speech organs interact with the functions they exert. As we have seen the necessity of the intellectual and communicative specialization was brought about by the differences in conditions of life.

The specialization is clearly visible in the structure and function of the speech organs. In animals such as monkeys and primates, the food channel and the respiratory channel function separately, viz. through the mouth and the nose respectively. In the *Homo sapiens* the larynx – originally no more than a mechanism for closing the trachea while eating – has been pushed upward during the evolution. As a result, the mouth with tongue and cheeks and also the pharynx above the vocal chords can participate in the realization of speech-sounds. This implied a tremendous increase in discrete sounds and, consequently, an almost infinite variation in signs, more particularly speech-elements¹⁰.

The development of the vocal track into a typical organ of speech is characteristic for modern man, even the archaic *sapiens*. There is reason to assume that Neanderthal man could speak, but it will have been in a more primitive way than *Homo sapiens* does: reconstruction of his skull and the musculature of the speech-channel has proved so. It strengthens the assumption that the language-capacity does not only distinguish him from other mammals, but that it made him what he is today. At the same time it undermines the theory, still clung to in some quarters, that the basis of spoken language must be a kind of gestural language. This then is supported by the fact that not only men but chimpanzees and other animals as well make use of gestures to communicate¹¹. However, how gesture must have made the mental leap to sound and more particularly to communication on a breath of air remains unexplained.

¹⁰ F. G. Droste, *Over de oorsprong van de taal*, Leuven: Leuven U.P. 2005, p. 44 ff.

¹¹ D. Armstrong, *Gesture and the nature of language*, Cambridge: C.U. Press 1995, p. 46; W. C. Stokoe, *The origins of language*, in: P. Copley (ed.), *Semiotics and linguistics*, London: Routledge 2001, p. 43 ff.

 THE ORIGIN OF LANGUAGE

How to relate more primitive, let us say animal forms of thinking and communication to modern language and language use? A fundamental role in the process is played by what we have called incorporation. Incorporation is a mental process in which a concept is accommodated within a category. When the lion sees something moving within his reach he has to decide whether it is a possible prey, i.e. can be subsumed in that category. And when he sees two moving objects, he again has to make a choice: which of the two falls in the category of most easy preys. Incorporation thus is a form of judgment and is directly based upon logical thinking. It plays an important part in the behaviour of every possible species. Participation in traffic, e.g., implies a continuous series of choices, a categorization of every other participant or even a categorization of all his movements.

There is no animal life in which incorporation does not play a fundamental part. Choice of food, meeting a possible opponent or competitor, weighing the danger of some unexpected object, etc. It might be argued that incorporation does not differ from logical thinking, the choice between yes and no. However, while logical thinking is a type of information processing restricted to making distinctions, incorporation is related to action: mentally but also physically. Incorporation may lead to more complex plans, may also lead to inciting processes of a kinaesthetic nature: attack, flight, hiding and the like. What is most characteristic, however, is the following. Whereas logical thinking is closed in itself, incorporation has its counterpart in communication. Signs are signs of ideas. In communication it is formally expressed how these ideas are combined into a message. Thus the warning cry of the magpie to its family contains the message "Danger!" This is a qualifying sign and although it does not express what is being qualified, something incorporated on the level of thought is presumed nonetheless. In other words, the cry of *Danger!* of necessity corresponds to a conceptual structure ["[x] danger"] rather than to a discrete concept ["danger"] *tout court*. However, what is complex on the level of thinking, remains singular on the level of expression. Here, then, lies the fundamental difference between animal communication and that of man: its singularity. The vocal instrument clearly misses the refined possibility to express the underlying complexity.

Although logical thinking and the derived incorporation are at the basis of linguistic thinking, only the latter has made the leap to mathematical thinking. This decisive step could only be made because it took place in close collabora-

tion with the development of the expressive power. Let us compare the way our neighbour and his cat communicate something to be described – in the way of man! – as *That dog is dangerous*. On the level of human information processing a so-called conceptualization is formed, a preverbal message. In order to communicate this it has to be mapped onto a proposition, a complex linguistic structure in which concepts are ordered in such a way that they can be translated, ultimately, into a phonological structure. What should be kept in mind is that the concepts constituting a proposition are linguistic in nature, distinct from visual or other sensory concepts. They are thought in relation to their formal translation, the word. The proposition with its propositional structure ((subject) predicate) – linguistically representing the incorporated structure – forms a skeleton into which only language-like concepts can be entered. In this sense we subscribe to the thesis “A message is a semantic representation that is cast in the propositional language of thought but that, at the same time, meets conditions that make it expressible in natural language”¹². It is because of the communicative purport that semantic concepts are not realized independently: normally no utterance like *Dog* will be communicated. As regards our example, the proposition [“dog] dangerous”] in which an entity-concept and a property-concept are combined is mapped onto a formal structure in which a noun and an adjective (a kind of verb) are integrated.

Intermediating between the two levels, inside and outside, are syntax and lexicon. The rules of the lexicon account for the mapping of a propositional structure onto the formal structure of the sentence, while the lexicon with its two-sided lexical items – (“dog”/*dog*) – accounts for the correct mapping of concept onto word. Given the role of syntax and lexicon in the mapping of proposition onto sentence, it is clear that linguistic thinking and communication entertain a narrow contact and that realizations on both levels imply feed-back and feed-forward of the constituents and their interrelations.

Comparing the linguistic processing with the animal communication, we once more want to refer to the fundamental differences. Not only is the conceptual message in animal thinking of a simple character compared to that of man – the intricate level of positioning is missing – but the communicative channel, whether vocal, olfactory or tactile, is too underdeveloped to transfer more than a singular signal. Moreover, the information structured in the proposition is doubly complex in that not only a relation is fixed, but the concepts participating in that relation preserve their own value. In the propo-

¹² Levelt, op. cit., p. 73.

sition [[“dog] dangerous”] both constituents have their own semantic value beside their participation in the functional value of the structure as a whole, the subject-predicate structure.

Semantic concepts as they figure in propositions have no independent existence detached from the words that represent them. As the vocal apparatus was refined during human evolution, the variety of speech-sounds made it possible to create an indefinite set of phonetic forms. With that variation subtle distinctions on the conceptual level became possible that would not have come into being without the anchorage in a controllable form. Still, notwithstanding the refined and subtle expressive power of language and language use, the relation with more universal forms of thinking and communication is undeniable. But man grew and in his growth developed an intellectual power that was only equalled by the increase in expressive power. Its result, language, surpassed any accomplishment in the animal world.

THE CREATIVITY OF LANGUAGE

We have united propositional thinking and human communication into one faculty, viz. that of linguistic thinking. Linguistic thinking is governed by three principles. The first two are structural in nature and have important consequences for the way language represents the world; the third one is a derived function operating on the outcome of the former two.

A proposition and its concrete realization, a message, combine a subject term and a predicate term in order to form the most fundamental structure of linguistic thinking; indeed, “there are good epistemological grounds for regarding (the) class of subject-predicate propositions as the basic or fundamental class”¹³. Since a property is attributed to an entity in a proposition, as is visible in every sentence – *My dog is black* – the sentence can be judged as to its truth value. It pretends to give a correct picture of the world and a comparison between what is said and what is represented is either true or false.

It is clear that the sentence considered in this light differs fundamentally from the signals in animal communication. Signals are true nor false since they do not intend to give a (truthful) picture of reality. Only language is capable of confronting a thesis with the world and in doing so makes the world

¹³ P. F. Strawson, *Subject and predicate in logic and grammar*, London: Methuen 1974, p. 35.

dependent on what is said. Indeed, “the world is not objectively reflected in the language: the categorizing function of the language imposes a structure on the world rather than just mirroring objective reality”¹⁴. What is at stake here is what we have called: the principle Truth. The characteristic function of the sentence is bringing truth to expression: laying a lattice or grid over the world that correctly fits the phenomena in their internal relation. With the principle truth we have dissolved the one-one relation with the original function of communication, viz. warning or calling. In a sense, a new reality is created, abstract, independent and closed in itself. Rather than comparing the sentence to a photographic image it should be compared to a painting. The latter is a reflex of what the painter conceives inwardly in the manner Picasso painted the horror of the war in his *Guernica*.

Beside the principle Truth there is the principle Logic. In a text, a concatenation of sentences, the verbal pictures are ordered as in a movie. What follows is not interchangeable with what precedes, since the preceding image prepares the ground for what follows: it is a causal relation. Thus in Shakespeare’s strophe it is not possible to interchange two lines without losing grip:

I summon up remembrance of things past,
When to the sessions of sweet silent thought

The principle logic – expressed in the text, but representing the coherence of the message – implies that the next sentence continues what has been posed in the former. As a consequence it can only be understood on the basis of what the preceding text has evoked. In fact, the principle logic concerns the contents of what is said, the message that is enclosed in the successive sentences: “interpretation of the new sentence must rely on two kinds of structures, the syntactic structure of the sentence itself and the structure representing the context of the earlier sentences”¹⁵. The combination of the two principles enables us to join truth with truth, which then results in a broad panorama of reality. We thus come to grips with the world and it is according to the principle logic that we can discuss and even manipulate that world.

We have called the two principles structural since the rules of grammar decide on their functioning. This also goes for the principle logic, because the following sentence functions as a kind of predicate to the former. A third

¹⁴ D. Geeraerts, *Diachronic prototype semantics*, Oxford: Clarendon 1997, p. 8.

¹⁵ H. Kamp, U. Reyle, *From discourse to logic*, Dordrecht: Kluwer 1993, p. 59.

principle operating on the structural ones we have called the principle Meta: it extends the fields covered by truth and logic. We distinguish two variants, viz. Metaphor and Metaphysics. The metaphor operates on sentence level, changing the contents of its constituents or the whole in such a way that new or unknown fields are opened. In *the sessions of sweet silent thought*, the adjective *sweet* originally referring to something concerning the palate, now refers to a mood, an intellectual experience. In a comparable way *session* relating to a corporeal (non)activity, here evokes something abstract, a presence in the mind, invisible to the eye.

The metaphor gives human language an extension beyond the sensory field: what is hidden and cannot be reached gets body, can be accorded properties, and what originally only could be presumed, gets a place in the set of concepts alongside representations of what is concrete. Thus *time's waist* attributes a property to time no clockmaker ever found in the bell-chamber.

The second meta-principle is Metaphysics. Whereas metaphory primarily operates on sentence level, metaphysics changes larger areas of representation: other worlds replace the *hic-et-nunc* reality, offer alternatives that can only exist in human imagination. This imagination is purely linguistic in nature and can only exist in virtue of the intervention linguistic mechanisms execute. All fairy tales, theories, plans for the future, but also hopes, desires, fears expressed in language create other worlds, possible worlds as they are called in model-theoretic semantics¹⁶. Expressions such as *I hope, believe, think* etc., so-called verbs of propositional attitudes offer a frame-work for non-real worlds; “the distinctive feature of use of propositional attitudes is the fact that in using them we are considering more than one possibility concerning the world”¹⁷. Counterfactuals also create alternatives for reality: *If I were ...* The latter expression confirms the idea that human communication concerns imaginary worlds rather than the world around us. It could even be argued that utterances concerning every-day reality are possible worlds as well as the derived ones, since they not only represent that reality on an abstract level, but also organize and manipulate it and capture it in the straight-jacket of our imagination¹⁸.

¹⁶ Cf. P. A. M. Seuren, *Western linguistics*, Oxford: Blackwell 1997, p. 388 ff.

¹⁷ J. Hintikka, *Semantics for propositional attitudes*, in: J. M. E. Moravcsik (ed.), *Logic and philosophy for linguists*, The Hague–Paris: Mouton 1974, p. 146.

¹⁸ F. G. Droste, *Reference and denotation*, Preprint 248. To appear in “Leuvense Bijdragen” 2006.

The application of the two meta-principles implies the unlimited creation of new worlds, real as well as imagined. This happens in novels, in simple accounts of daily life. Its highest form is reached in religion, creating a society of a strictly non-earthly character, inhabited by non-earthly creatures. Thus language makes visible what humans never set eyes on.

THE BINARY STRUCTURE OF NATURE

We have argued that language notwithstanding its enormous creative powers is based on the simple process of incorporation, a derived form of logical thinking that is characteristic for man and animal alike. Essential for the processing in both systems, so it seems, is the binary principle. Linguistic investigations have proved that binarity plays an important role on every level of language structure, semantic, syntactic and even phonological. The subject-predicate relation of the proposition is reflected syntactically in Bloomfield's so-called immediate constituent analysis. Two constituents such as *poor John* and *ran away* interact in mutual dependence and so do *poor* and *John*, *ran* and *away*. The analysis also operates on a morphological level: *run* + Past, *a* + *way*¹⁹. On the phonological level we also meet with binary oppositions, where the so-called distinctive features involve a choice between two terms of an opposition such as vocalic/non-vocalic, tense/lax, nasal/oral, voiced/voiceless etc.

The operation with two opposed elements that we notice in language structure is not restricted to the latter. As we have already remarked, there is reason to assume a certain parallelism in the working of the brain and of the computer. The electric wiring in both can achieve complicated results with simple digital computation, be it that the possibilities of the brain far exceed that of the machine. The processing of information in the brain implies the passing of messages from neuron(s) to neuron(s). "The message itself is sent in the form of a Morse code consisting only of dots"²⁰.

This then may lead to the following, rather tentative, thesis: the laws of nature, whether in physics, chemistry, neurology and other domains operate with a binary system. Where opposed elements are combined as in the immediate constituent analysis complex structures result. If combining is applied repeat-

¹⁹ L. Bloomfield, *Language*, 2nd, Impr., London: Allan & Unwin 1950 (1933), p. 167 ff.

²⁰ Gregory, op. cit., p. 516.

edly complex elements result: this goes for chemical structures as well as for complex thoughts or linguistic structures on their distinct levels of processing.

Our tentative thesis seems in harmony with Edward Wilson's so-called consilience on the one hand and the interdisciplinary cooperation others have argued for on the other hand. Consilience or the unity of knowledge implies the transgressing of boundaries between different disciplines such as biology and physics. The thesis of the necessary unity of knowledge may also bridge the gap between the natural sciences and the sciences of the humanities. To my mind the theory gets serious support from the study of language in which neurological and physiological and even physical aspects are interwoven²¹.

As regards interdisciplinary cooperation, it is argued that research in biology, psychology, neuroscience and the like share certain procedures with language in their working: kinaesthetic, conceptual but computational as well. As regards the processing of language – and this in accordance with what we have argued extensively elsewhere²² – it is the possibility to recursively apply the rules that lead to complex and refined structures. Again, this is working on different levels of processing, in word formation (*electric – electrical – electrify – electrification*) as well as in sentence structure: (*he said (that he hoped (that she would acknowledge (that ...)))*)²³.

We have tried to find a firm ground for the origin and development of human language on a Darwinian basis. This does not imply that we adhere to the materialist view that we *are* a body with a history rather than *having* a body and a history: man as no more than an intelligent machine. Notwithstanding our origin shared with the chimpanzee or even with the gorilla we are a distinct species. Perhaps it is not language itself with its profound thinking capacity and the refined communication that makes the difference. Rather it is the products of language that have given us our exceptional position in the world of living creatures, viz. self-reflection, our ethics, our art and science, and those who believe may freely add religion.

Summarizing our approach in one general outline, we get the following picture. Man, just like any other living being, disposes of a characteristic instrument that enables him to survive, cohabit, procreate. Essential to human existence is language, the combined action of creative thinking and refined

²¹ E. O. Wilson, *Consilience: the unity of knowledge*, New York: Vintage 1998, p. 4 ff.

²² Droste, *Over de oorsprong van de taal*, p. 79 ff.

²³ M. D. Hauser, N. Chomsky, W. T. Fitch, *The faculty of language*, "Science" 298(2006), p. 1569 ff.

communication. Although the operation of the instrument shares some qualities with animal information processing, it has developed into a uniquely powerful mechanism by virtue of the three principles Truth, Logic and Metafunction. The collaboration of these principles has resulted in so-called linguistic thinking, a refined manner of developing complex ideas. Thus it has become possible to arrive at reflection on what is observed, more particularly self-reflection. As a consequence the attention was directed at the position of the individual in human society. This incorporation then has led to the originating of ethical rules, necessary to guarantee the survival of the species²⁴.

HOMO SAPIENS: MÓWIĄCE ZWIERZĘ

Streszczenie

Teorie pochodzenia człowieka nie są do dzisiaj tak rozbudowane i uzasadnione jak wiele teorii kosmologicznych. Specjaliści różnych dyscyplin poszukują odpowiedzi na pytania zarówno o ewolucję człowieka jako organizmu biologicznego, jak i – szczególnie – istoty myślącej i mówiącej. W artykule omówiono pokrótce fakty paleontologiczne i związane z nimi teorie, a także opisano eksperymenty mające na celu dotarcie do sformułowania przekonującej teorii pochodzenia i rozwoju myślenia i mowy. Ważnymi punktami odniesienia w tych rozważaniach są: ewolucja biologiczna ssaków naczelnych, procesy myślowe u człowieka (i nie tylko), komunikacja, myślenie językowe. Wśród przywołanych ujęć powstawania mowy ludzkiej jest i dziecko jako *tabula rasa*, i teoria istnienia języka jako wrodzonego u ludzi (N. Chomsky). Przywołane w artykule konkretne przykłady użycia języka poddaje się analizie psycholingwistycznej: jak od obserwacji faktu i powstania wyobrażenia dochodzimy do sformułowań językowych, co samo w sobie już jest fenomenem, a jak jeszcze potrafimy twórczo wykorzystać tę powstałą materię języka. W ten sposób rodzi się konkluzja, iż to właśnie możliwość i umiejętność używania języka postawiły człowieka na czele stworzeń i pozwoliły mu na refleksję nad sobą, uprawianie nauki i sztuki, na wiarę i refleksję religijną.

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Słowa kluczowe: ewolucja, psycholingwistyka, pochodzenie języka, komunikacja.

Key words: evolution, psycholinguistic, origin of language, communication.

²⁴ I am grateful to Louise Joseph for correcting my somewhat rusty English.