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Born to speak?

An investigation into the innate aspects of language

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1. Introduction

The essay on hand is concerned with the problem whether language is an innate skill or not, and if so, what exactly is innate.

The first part of the essay deals with the first part of the question. As a starting point, human language is compared with other, non-human communication systems. It is examined whether any animal besides the human shows language under natural conditions and if any animal is capable of learning language in a way comparable to humans. Furthermore, the special features of human anatomy and physiology which are related to language are considered. At the end of the first part, the question whether language can be called a biologically programmed behaviour is tackled.

The second part of this essay tries to answer the question, what exactly is innate. For this purpose, the theories, both the older and the newer, of the influential linguist Noam Chomsky are outlined. Subsequent to this brief overview of Chomsky's ideas arguments in favour as well as against his later theory are listed.

Finally the author gives a short summary and an outlook on possible future subjects of psycholinguistic research.

2. Language, an innate ability?

2.1. Non-human communication and animal language learners

As a first step to answer the question, whether language is an innate ability, one has to find out if language is unique to humans or if it can also be found among other species. If language was restricted to humans, this would support the idea of an innate ability, although it could not proof it. There are quite a number of abilities which are restricted to humans, e.g. playing the piano, cooking or driving a car. However, these are not innate but learned. Conversely, if language could be found among other species, this could not be an argument against innateness, because a vast number of innate skills, e.g. walking or

jumping, are shared by a number of species. Nevertheless, the comparative study of different communication systems is a good starting point for the line of argumentation.

The variety of animal communication systems is enormous. Starting with the chemical messengers exchanged by bacteria over the sound patterns of the crickets up to the various songs of the birds. So, how can one compare all these different systems and judge, whether they are languages or not. Aitchison as well as other linguists suggest that before one can compare human language with other communication systems it has to be defined (Aitchison 1998). When it comes to defining language, the ‘design features’ by Charles Hockett have proven a helpful tool. These are “features found [...] in all human languages but lacking in one or another system of non-human animal communication” (Greenberg 1966: 2). Hockett, among others, was looking for universals in human language and in turn of this work he developed his ‘design features’. The number of the features has been continuously changed as they have been adapted to new linguistic data. New features have been added, not necessarily by Hockett himself, and others have been abolished. However, there are a number of design features which are widely accepted and used for the comparison of human and non-human communication systems. Those are: use of the vocal-auditory channel, arbitrariness, semanticity, cultural transmission, spontaneous usage, turn-taking, duality, displacement, structure –dependence, and creativity.¹ As this work can not discuss the various non-human communication systems in detail, the results of the huge amount of research shall only be summarised in a very short manner.

No non-human communication system contains all the ‘design features’, i.e. no animal uses a language under natural conditions. Some animals show some of the features. Bee dancing, for example, has displacement, bird songs have duality, but no non-human communication system contains both these features. Semanticity, structure dependence and creativity cannot be found in any non-human communication system (Aitchison 1998: 34). Under natural conditions the human species is the only one which uses language. But what happens if one puts animals into unnatural conditions and exposes them to a language training?

¹ For a detailed description of these features see Aitchison (1998: 27f.)

During the past decades, various attempts have been made to teach animals human language. Some animals who were exposed to language teaching have gained great fame in the linguistic community and even beyond. Gua and Viki, are the names of the most prominent chimpanzees who have been trained spoken language by various scholars. Although they were exposed to an intensive training the outcome was disappointing. None of them learned a language to any extent comparable to human children of comparable ages.

One of the major criticism of these experiments was that apes are not able to produce sounds like humans, due to their different vocal tract. Therefore, some scientists started to teach sign language to the chimps or trained them to use a system of symbols in order to communicate. The debate over the results of these experiments was heated and intersperse by emotion and ideological arguments. However, if one examines the results objectively, one fact is quite obvious. The apes did not achieve a level which was even close to the language abilities of young human children.

The results of comparative researches make clear that language is an ability restricted to humans. No other animal shows a language under natural conditions and no animal can learn a language as efficient as humans. This is a very strong hint to an innate ability.

2.2. The manifestation of language in the human body

If language was innate, one would expect to find some kind of adaptation of the human anatomy or physiology to this ability. As Aitchison puts it: “Changes in the form of the body or *structural* changes are the most direct indications of innate programming” (Aitchison 1998: 48). The human teeth, lips, tongue and larynx show features which are very useful in terms of speech. They enable humans to manipulate the air-flow when they breathe out and thereby produce various sounds, the basic elements of language. If one presumes an innate language program these features can be seen as the anatomic manifestation of this program.

Furthermore, brain science supports the innateness hypothesis. If language was genetically programmed, one would expect a specialised area in

the brain which is responsible for language. In 1836 Marc Dax observed that patients who suffered under paralysis of the right body side often had speech problems as well (Aitchison 1998: 51). This led him to the conclusion that language must be controlled by the left brain hemisphere, as this controls the right body side. In 1861 the French physician Paul Broca confirmed this hypothesis. He dissected the brains of various aphasic patients and found a damage to the left hemisphere in all cases. Further experiments showed that damages to a special area of the left hemisphere result in a reduced ability to speak, though comprehension remains relatively unimpaired. In the 1870's the German physician Carl Wernicke discovered another area of the left brain hemisphere which caused just the opposite effect. Damages to this area result in a reduced ability to comprehend speech, though the ability to speak remains relatively unaffected. Today these two areas are named 'Broca's area' and 'Wernicke's area' after their discoverers. Ongoing research confirmed the 'left-hemisphere-hypothesis' (Aitchison 1998:53). In the 1940's Wada developed the 'sodium amytal' test. He showed that the injection of a barbiturate into the left brain hemisphere resulted in language difficulties whereas the injection into the right hemisphere did not cause this effect. In 1967 Kimura introduced the dichotic listening test. During this test two different words are played to the test subject simultaneously. One is played into the right ear and the other is played into the left ear. In most cases the word played to the right ear is better understood than that played to the left ear. As the right ear is connected to the left hemisphere of the brain, this supports Dax's hypothesis. Later on, electrodiagnosis and experiments with 'split brain' patients made a further view into which part of the brain is involved in language processing possible. Nowadays, Computerized Axial Tomography, Magnetic Resonance Imaging or Positron Emission Tomography enable scientists to locate the areas of the brain which are active during various stages of language processing. As these modern techniques allowed a detailed view into the brain, it became clear that the mechanisms involved in language processing are much more complicated than suggested by Broca, Wernicke or other early scholars. The localisation of language in the brain is not as fixed as it was once supposed. In some 10 percents of humans, language is located in the right hemisphere. There are also some hints that language can be re-located if damages occur in special areas.

Although brain scientists are far from understanding how exactly language is processed in the human brain, there is no doubt about the lateralisation of the human brain. Certain areas are specialised for certain tasks. And among them are some which are involved in language processing. The existence of such language areas strongly demands the existence of a genetic determination for language.

Beside the anatomical evidence there is some physiological, too. Language, in a physiological sense, is manipulating the air flow while breathing-out. Therefore, the lungs have to be able to control the air flow very efficiently. As Aitchison summarises it:

[...] during speech the breathing rhythm is altered quite noticeably without apparent discomfort to the speaker. The number of breaths per minute is reduced. Breathing-in is considerably accelerated, breathing-out is slowed down.

(Aitchison 1998: 49)

This alteration of the vital breathing mechanism is quite remarkable as it does not cause any physical harm to the speaker.

Another strong evidence for an innate ability is the phonetic perception which differs considerably from the perception of other sounds. An average human adult is able to recognise 20 clicks per second as distinct sounds (Pinker 1994: 161). If more than 20 clicks are presented in that time, the subject is not able to recognise them as single sounds but only hears one continuing low buzz. When it comes to language, the same adult is able to recognise up to 45 phonemes per second (Pinker 1994: 161). That makes it obvious that the perception of sounds and the perception of phonemes are based on two different physiological systems which do not simply differ in quantity but in quality. The existence of a special language perception system demands a genetic endowment for this ability.

To sum up this section one can stress the various anatomical and physiological adaptations which enable humans to speak. Teeth, tongue, larynx and lungs efficiently work together in the production of sounds. Our brain as a highly complex organ shows structures which are primarily if not exclusively

used for language processing. All these adaptations do not necessarily lead to the acceptance of the innateness-hypothesis but they make clear that we are genetically programmed to develop a number of features which are very helpful in producing and understanding language. When it comes to the phonetic perception, one can hardly imagine that such an elaborate system is not connected to an innate language ability.

2.3 Language as a biologically programmed behaviour

In 1967 Eric Lenneberg published his influential book *The Biological Foundations of language*. His aim was “to reinstate the concept of the biological basis of language capacities” (Lenneberg 1967: viii). His book is an impressive collection of biological researches on language. Beyond other aspects, Lenneberg tried to find out, whether the emergence of language shows the “hallmarks for maturationally controlled emergence of behaviour” (Lenneberg 1967: 126). He introduces four of these hallmarks, Aitchison subdivided them and thereby expands them to six (Aitchison 1998: 67). For this essay Aitchinson’s characteristics shall be taken as the basis for the further argumentation. The hallmarks listed by Aitchison are:

1. The behaviour emerges before it is necessary.
2. Its appearance is not the result of a conscious decision.
3. Its emergence is not triggered by external events (though the surrounding environment must be sufficiently ‘rich’ for it to develop adequately).
4. Direct teaching and intensive practice have relatively little effect.
5. There is a regular sequence of ‘milestones’ as the behaviour develops, and these can usually be correlated with age and other aspects of development.
6. There may be a ‘critical period’ for the acquisition of the behaviour.

(Aitchison 1998: 67)

In case language shows all these features, it must be called an biologically programmed behaviour and, by definition, innate.

It is not very difficult to verify the first characteristic. Children usually start to speak between their eighteenth and twenty-eighth month. At this age they do not need language for any vital purposes. They do not have to ask for food, they do not have to defend themselves and they do not have to find a partner for mating. They are still sheltered by the community they live in. Mute children are by no means less loved and cared for than speaking ones, even if they do not learn a sign language during their early childhood (which, unfortunately, is very often the case). If language started when children are left on their own, children in different cultures should start speaking at different ages, which is not the case (Aitchison 1998: 67). And if humans did not start speaking as long as they do not have to look after themselves, some would probably remain mute until their thirties.

The second characteristic is also quite obvious. If it was a conscious decision whether to speak or not, statistic probability would demand a number of cases where children do not speak because they do not want to. However, no such incident has been reported, yet.

In order to examine the third hallmark, the environment of children has to be investigated. If language was triggered by an external event, such an event would have to happen in every single child biography. It is quite obvious that this is not the case. Some child biographies are full of drastic events such as loss of parents, accidents, abuse or simply moving several times. Other children, however, lack all these experiences. They remain in their familiar environment and are surrounded by the same people during their entire childhood. Nevertheless, they develop language. Conversely, if an external event triggered language development, it should be possible to make children speak earlier by giving them enough of these events. However, there is a minimum age for language development and no child has ever spoken below this age. As an external trigger does not make children start to speak, it must be an internal, a biological trigger. There is a predetermined time for every child to speak. "An inner biological clock is ticking away, set for the right time" (Aitchison 1998: 68).

However, the environment of the child is a very important factor in language development. According to the Greek historian Herodotus the Egyptian king Psammetichos had two children raised without any contact with spoken language during the seventh century BC. His aim was to find the first, God-given language. The two children ended up speaking no language at all. Similar experiments have been carried out by the Holy Roman Emperor, Frederick II of Hohenstaufen (1194-1250) and James IV of Scotland (1473-1513) (Crystal 1997: 290). These experiments are often referred to as Kaspar Hauser experiments, named after a boy who was found in Nuremberg in 1828 at the age of seventeen. Kaspar could not speak and people suggested that he must have been raised by wolves. *The Cambridge Encyclopedia of Language* lists 47 so called 'wolf-children' (Crystal 1997: 291). All these children either showed a retarded language or non at all. That makes clear that children are not able to develop human language if they are not surrounded by speaking or signing people during their childhood. Aitchison states: "although no external event *causes* the behaviour, the surrounding environment must be sufficiently 'rich' for it to develop adequately" (Aitchison 1998: 68). In terms of language, the environment of the 'wolf-children' was as poor as it could possibly be, because they did not have any linguistic input at all. The effect of an impoverished environment can also be observed with children suffering from hospitalism. As a result of little care and little linguistic input they often end up with retarded language abilities. Fortunately, most of them can catch up with their peers as soon as their linguistic environment is enriched. The external factors are not the reason why children start to speak, but they are immensely important for language to emerge.

Now the fourth hallmark shall be examined. If language was innate, it should be quite resistible against direct teaching. Although most parents eagerly want their children to develop language as fast and as correct as possible, most of them do not teach them in a way a teacher would do. They rather try to make their children imitate them. For this purpose they usually apply two strategies. The first is overt correction, which happens consciously, and the second is expansion, which usually happens unconsciously (Aitchison 1998: 69). According to various scholars, overt correction has no effect on the child's performance. A famous example is that of Martin Braine, a

psychologist, who tried to eradicate a grammatical error in his little daughter's language.

Child: Want other one spoon, Daddy.
Father: You mean you want THE OTHER SPOON.
Child: Yes, I want other one spoon, please, Daddy.
Father: Can you say "the other spoon"?
Child: Other...one...spoon.
Father: Say..."other".
Child: Other.
Father: "Spoon".
Child: Spoon.
Father: "Other...Spoon".
Child: Other...spoon. Now give me other one spoon?
 (Braine, quoted in Pinker 1994: 281)

Another example is given in *The Cambridge Encyclopedia of Language*.

CHILD: Nobody don't like me.
MOTHER: No, say 'Nobody likes me'.
CHILD: Nobody don't like me.
(Eight repetitions of this dialogue.)
MOTHER: No, now listen carefully: say 'Nobody likes
 me'.
CHILD: Oh! Nobody don't likes me.
 (McNeill, quoted in Crystal 1997: 236)

These examples show that overt correction has no effect on the child's progress in language learning. Some studies have even shown just the opposite effect (Aitchison 1998: 70). The other way of correction often applied unconsciously is expansion. If a child utters a 'wrong' sentence, the parents tend to repeat it, expand it and thereby correct it. If, for example, the child says 'There ball' the mother or father is likely to answer 'Yes, there's a ball.' Obviously, parents want to help their children by correcting them. And as expansion is an

unconscious reaction to children's language, it could well be that it is a kind of instinctive reaction to mistakes in children's utterances, in order to help them to acquire the right versions. The parents' subconscious could make them react in this specific way, because it is important for their children. However, various researches have brought to light that children who are not exposed to the expansion strategy but get a different kind of input show better results when it comes to progress in language learning (Aitchison 1998: 71f.). All these researches make clear that correction of a child's language only makes sense when the child in its individual language development has reached the point where it deals with the problem in question. Direct teaching, conscious or unconscious has no effect on the language development if it does not accept the child's pace.

In order to accept Lenneberg's fourth hallmark entirely, one has to show that intensive practice, like direct teaching, has little effect on the emergence of language. This is not too much a problem to be solved. A very characteristic feature of language development is overgeneralization. By overgeneralization linguists understand the expansion of rules to words which are not covered by the rule. Well-known examples are the English inflections –s, marking the plural, and –ed, marking the past tense of a regular verb. Nearly all children go through a stage where they say *mans, *foots, *seed, *comed or other forms like these. The interesting thing is that they do not use such forms before they know the right ones, but that they already have used the right ones and then start making these mistakes. Therefore, language development cannot be seen as a continuous process which is only based on practice. If practice was the driving force of language development, errors like *mans should not occur after the child has learned and frequently used the correct form. Direct teaching and intensive practice have no big influence on the development of language. Language complies with the requirements of the fourth hallmark.

If the fifth characteristic was also shown by human language, one would expect some characteristic stages during child language acquisition which always occur at the same age and are met by other developments. It is quite obvious that there are different stages in the acquisition of language which every child has to pass. The first stage is crying, followed by cooing, babbling, intonation patterns, 1-word-utterances, 2-word-utterances, word

inflections, questions and negatives, rare or complex constructions and, finally, mature speech. Although these stages are not clear cut but overlapping, every child has to go through all of them, step by step. 1-word-utterances and intonation patterns may be used at the same time, but no child can just skip the intonation pattern part and jump from babbling to 1-word-utterances. The relation of the different stages to specific ages is not very clear cut, either. Nevertheless, a rough guideline can be given (Aitchison 1998: 76). The different stages of language acquisition can be loosely linked to the physical development of children.

The gradual change of cooing to babbling occurs around the time an infant begins to sit up. Children utter single words just before they start to walk. Grammar becomes complex as hand and finger co-ordination develops.

(Aitchison 1998: 84)

Studies on language acquisition have verified that language meets all demands of Lenneberg's fifth hallmark. There are certain milestones in the development of language among children, they always occur more or less at the same age and they can be linked to physical developments.

Finally, the sixth hallmark has to be tested on language. If language met the demand, one would expect that language is learned during a certain period and that the ability to learn language after this period is much reduced. As it has already been pointed out, children usually start to speak between their eighteenth and twenty-eighth month. Roughly at the age of puberty the language reaches the mature level. What happens if humans learn to speak after puberty? Socially isolated persons can give a hint. Aitchison lists three of them, all of different ages (Aitchison 1998: 86f.). Isabelle was six and a half years old when she started to learn language. She succeeded in achieving all language skills and caught up with her peers within two years. Genie was thirteen and a half years old when she was first exposed to language. She had major difficulties while learning language, especially with syntactic structures, and never reached a level equal to her peers. Chelsea was in her early thirties when she began to speak. She developed a good vocabulary but a poor syntax. Genie

and Chelsea might support the critical age hypothesis. However, their difficulties might also be caused by other than linguistic reasons.

2.4. Summary

At the end of this first part the results shall be shortly summarised.

Language is a skill which is limited to humans. No other animal communication system shows all the design features introduced by Charles Hockett, by which the human language is characterised. No animal can reach a language ability which is comparable to that of humans. Even intensive training leads to poor results. The mental ability to speak finds its manifestation in the human body. It shows anatomical and physiological features which are very useful when it comes to the production and reception of language. Language shows all the hallmarks of biologically programmed behaviour introduced by Eric Lenneberg.

Due to these results, there can be no doubt about the innateness of language. There must be structures in the human brain which enable us to speak and which are genetically predetermined. What these structures could be like and what they might contain shall be discussed in the next part of this essay.

3. What is innate?

3.1. The establishment of the language acquisition device

1959 was a year of high significance for modern linguistics. In that year, Noam Chomsky walked onto the stage, and up to the present day he hasn't made his exit, yet. Although Chomsky had already published his *Syntactic Structures* in 1957, it was "A Review of B.F. Skinner's Verbal Behavior" (1959) that brought him broad recognition in the linguistic community and beyond. This review was the starting point of what is sometimes referred to as the 'mentalist revolution'.

In the 1940's and 50's the predominant branch of science was behaviourism. Behaviourism also made its way into linguistics, with Leonard Bloomfield as the main figure. B.F. Skinner was a behaviourist, too, and he had gained popularity through his invention of the so called skinner-box. In his book *Verbal Behavior* Skinner tried to explain language as a very mechanical system, following laws of correlations between stimuli and responses.

What happens when a man speaks or responds to speech is clearly a question about human behaviour and hence a question to be answered with the concepts and techniques of psychology as an experimental science of behaviour.

(Skinner 1957: 5)

Chomsky, being a rationalist, completely rejected the idea that language could be learned and controlled entirely by stimuli. In his review he literally dissected Skinner's work and step by step proved wrong every single of Skinner's arguments. Simultaneously, Chomsky introduced his own ideas about the acquisition of language. In his view there must be some innate mechanism involved.

The fact that all normal children acquire essentially comparable grammars of great complexity with remarkable rapidity suggests that human beings are somehow specially designed to do this, with data-handling or "hypothesis-formulating" ability of unknown character and complexity."

(Chomsky 1959: 40)

Chomsky's review marks the end of the behaviouristic influence on linguistics and the beginning of a mentalist tradition. Nowadays, the existence of an innate mechanism which is involved in language acquisition is accepted throughout the linguistic community, although the ideas about the actual shape and function of this mechanism differs considerably.

Chomsky did not give a detailed outline of his ideas about the quality of the innate mechanism in his review. However, in some of his later works, he

described how it works in his point of view. Language acquisition is controlled by the 'Language Acquisition Device' (LAD). This LAD enables the child to process the language it hears and in some way to build up and internalise the grammar which underlies this language. The need of an internalised set of rules is quite obvious, says Chomsky, as "We constantly read and hear new sequences of words, recognize them as sentences, and understand them" (Chomsky 1959: 39). In addition, every human constantly utters sentences, which he or she has never heard or read before. Therefore, the acquisition, reception and production of language cannot be based upon simple memorising. An internalised set of rules is necessary to recognise and produce sentences one has never come across before. Chomsky says that children learn these rules by forming hypothesis about the underlying rules of the language they hear (Chomsky 1965). After they have formed such a hypothesis, they test it. If all sentences the child hears follow the hypothetical rule, it is accepted and internalised. If not, it is discarded and a new, more complex hypothesis is formed, which is then tested and so on. However, Chomsky points out that this hypothesis-making device is not efficient enough to acquire the complete grammar of a language. To solve this problem Chomsky establishes the idea of language universals. The child must have some universal knowledge what language looks like. This language is no particular language, as every child can learn every language if brought up in the corresponding environment, but human language as such. Chomsky distinguishes between substantive and formal universals. Substantive universals say something about the elements of language, formal universals something about the way in which these elements are connected, that is grammar. Children can distinguish right from the beginning which sounds are elements of language and which are not and they know which sound combinations are possible and which are not appropriate. These are substantive universals. Another substantive universal is the existence of nouns, verbs and sentences in all languages. When it comes to formal universals, the matter gets more complicated. According to Chomsky, children have internalised rules on various levels of language. They have semantic, syntactic and phonological rules. Children also know that language is a structure dependent system. They know, that certain words can be replaced by others and that sentences are organised in phrases which can be moved around.

They also know that every sentence is working on two different levels, a surface level and a deep level. The surface structure is the actual appearance of a sentence. The deep structure is never visible but underlies every sentence. This concept can explain why active and passive sentences, which look different, have the same meaning. They have a different surface structure, but, nevertheless, an identical deep structure. The relationship between the surface and the deep structure is characterised by distinct rules which Chomsky calls grammatical transformations.

The grammar of English will generate, for each sentence, a deep structure, and will contain rules showing how this deep structure is related to a surface structure. The rules expressing the relation of deep and surface structure are called 'grammatical transformations'.

(Chomsky 1972: 166)

Chomsky claims that children are not only equipped with the knowledge of all these complicated rules, but that they have also got an innate evaluation procedure. This goes into action if more than one hypothesis could explain the rules of the language input. Somehow, children can judge which of the two rules is the more efficient and discard the other.

To sum up, one can say that in his earlier writings Chomsky proposes the existence of an innate Language Acquisition Device. This LAD consists of three parts. Firstly, it is filled with substantive and formal universals, innate knowledge about the nature of language. Secondly, the LAD contains a hypothesis making device which enables the child to build up hypotheses on the input language which increase in complexity. Thirdly, the LAD contains an evaluation procedure, by which the child is enabled to judge competing hypotheses and use the more efficient one.

The concept of a LAD gave rise to a number of critical responses to Chomsky's work. Some of the ideas presented by Chomsky are quite vague and especially the evaluation procedure remains a secret, nearly mystical phenomenon. Obviously, Chomsky was not very satisfied with his early ideas as well, and in his later works he changed his theory quite radically.

3.2. Universal Grammar and the ‘principles and parameters approach’

The main problem Chomsky’s theory had to face and could not satisfyingly solve was the ‘logical problem of language acquisition’ (Aitchison 1998: 103). In Chomsky’s view the language data which children have at their disposal is inadequate to serve as the only source for language learning. On the one hand side, most of the language children hear is ungrammatical, on the other hand side, it is unlikely that children hear every grammatical construction which is possible in their language. Nevertheless, they develop a perfect grammar. Where does the information come from, then? Chomsky argues that it is already there when the child is born. Every child is equipped with a Universal Grammar (UG).

UG is a characterization of these innate, biologically determined principles, which constitute one component of the human mind-the language faculty.

(Chomsky 1986: 24)

With the concept of UG the innate knowledge of language becomes even more important than it had been in the theory of the LAD. According to this older theory, a child had to construct the grammatical rules of the language spoken around it by examining this language. If a child is equipped with UG this is no longer necessary. The rules are already there. How do these innate rules look like? Chomsky suggests that language consists of a number of modules. Each of these modules contains a limited number of principles. These principles are universal grammatical rules which are valid for every single language in the world. If one principle is viewed isolated, it is fairly easy structured. It covers only a very small range of grammar. However, as soon as these principles interact, all the complicated rules of grammar can evolve. As the languages of the world differ considerably, these principles cannot be the only part of the UG. Otherwise, all languages had to be the same or at least very similar. According to Chomsky, the differences are caused by parameters. Parameters are also elements of the UG, but unlike the principles they are not fixed from the beginning. They can be seen as switches between the principles, which can

either be switched to one or the other side (Aitchison 1998: 105f.). As the principles are quite rigid and characterised by narrow constraints, the setting of a single parameter can have a major effect on the whole system. Once the parameters are set, the ‘core language’ is established. From that point on, changes only occur on the ‘periphery’ (Chomsky 1986: 147). According to the ‘principles and parameters approach’, language learning can be seen as a setting of switches. A universal grammar is already present in the language faculty and the child just has to fix the parameters in order to apply this universal knowledge to its mother tongue. Innate knowledge as well as experience is integrated into this approach, the first being the more important. How many principles exist and what they are like has still to be found out.

Having outlined the basic ideas of Chomsky’s theory, the following two sections shall present both supporting and counter-arguments.

3.3. Evidence in Chomsky’s favour

In this section arguments shall be presented which support the hypothesis of an Universal Grammar and the ‘principles and parameters approach’.

It has already been mentioned earlier that humans are able to distinguish between language and other sounds. Studies have shown that children are capable to make this distinction at the age of one to four months already (Eimas et al. 1971). In Chomsky’s words, children are able to recognise substantive universals very early, which fits into his theory that they are born with these universals.

Language universals would be the strongest arguments in favour of a Universal Grammar. If there were structures which were shared by all languages of the world, these structures could be seen as the manifestation of the principles embedded in the language faculty. The quest for language universals has long been going on. The *Grammaire générale et raisonnée* which was published in 1660 in its subtitle refers to ‘that which is common to all languages, and their principal differences’. In 1963 Joseph Greenberg examined 30 languages from five continents and on the basis of these data proposed 45 universals which he himself “viewed as no more than suggestive”

(Greenberg 1966: 104). Nowadays, three types of universals are distinguished (Hawkins 1988: 4). Firstly, absolute universals. These are universals which are found in every language. The existence of vowels is an example for this kind of universals. Secondly, there are implicational universals. These are universals which limit the possibilities of variation within a language. Implicational universals usually sound something like: if a language shows feature a it also shows feature b. Thirdly, distributional universals can be found. These are universals of the type: languages of type X are more frequent than languages of type Y, for example: “languages without self-embedded relative clauses are more frequent than those with” (Hawkins 1988: 5). Obviously, there are a number of language universals, although they may be hard to detect. These universals seem to support the idea of a Universal Grammar.

One element of Chomsky’s theories has always been attacked by his opponents. Chomsky states that the language faculty is not connected to the general intelligence of humans. Whereas empiricists claim that language could well be a result of general intelligence, Chomsky rejects this idea. And in fact, there is some evidence that language is not related to intelligence. Patients who suffer from aphasia have great difficulties, although their overall intelligence is not influenced by the disease. Patients who suffer from Specific Language Impairment (SLI) often show an average intelligence but fail when it comes to simple language tests. Members of a family studied by Myrna Gopnik were not able to pass the ‘wug-test’ (Pinker 1994: 48f.). This is a fairly easy test which is usually used to find out whether a child can use the plural suffix –s in the correct way. A picture of a bird is shown and the subject is told: this is a wug. Then a picture with two of the birds is shown and the subject is told: Now there are two of them. There are two... . The subject is expected to fill the gap with ‘wugs’ if he or she has already acquired the rule. The testees suffering from SLI were not able to solve the task. So, severe language problems can occur although a person does not show a reduced intelligence at all. Conversely, an elaborated language ability can go hand in hand with a highly retarded general intelligence. Richard Cromer studied a girl called Denyse who suffered under spina bifida, an illness which often results in hydrocephalus (Cromer 1991). Although Denyse was not able to handle everyday affairs, her language was completely normal. Patients suffering from the Williams syndrome show an

average IQ of around 50 but do not show any retardation in terms of language. All these examples strongly hint to the fact that language is independent of general intelligence.

Moreover, SLI and the Williams syndrome are caused by genetic defects. Although this does not tell anything about the existence of *the* language gene, it nevertheless shows that there are gene defects which have a negative influence on language but do not influence other mental abilities and vice versa. Therefore, the hypothesis that overall intelligence and language are controlled by different genes is not too far fetched.

By now, the arguments in favour of a language faculty and a Universal Grammar have been outlined. Obviously, there are also counter-arguments, which will be discussed in the following section.

3.4. Counter-arguments against Universal Grammar

Chomsky's main opponents are the empiricists. They reject the idea of a Universal Grammar and argue that language acquisition is mainly based on experience. Putnam and Paint are the best known advocates of this school of thought. Chomsky has always claimed that children learn language "in an astonishingly short time" and "with remarkable rapidity" (Chomsky 1959: 51). This could only be possible, if there is a special mechanism or an innate knowledge about language. Putnam countered this argument by a simple calculation. She worked out how many hours a child is involved in language learning and came to the conclusion that the amount of time spent by a child by far exceeds the time spent by an adult who learns a language (Putnam 1967). Steinberg worked out how long a student would have to study if he or she spent as much time on language learning as an average four year old is exposed to language (Steinberg 1993: 141). The student would have to study for 17.8 years in order to reach the number of hours the four year old is naturally exposed to language. If any student spent 17.8 years on learning one language, it is likely that he or she could master the grammar of that language quite well. Therefore, in Putnam's view, the 'rapidity-argument' is not valid.

A number of studies have brought to light that the language the child hears is not as degenerated as Chomsky claims. Actually, the language directly addressed to children is often very consciously planned and therefore correct in most of the cases. Due to this, a child is confronted with a huge number of correctly uttered sentences.

Pinker describes how a deaf boy with the pseudonym Simon, who was originally studied by Singleton and Newport, learns American Sign Language (ASL) (Pinker 1994:38f.). Simian's parents who were also deaf had not acquired ASL before the age of fifteen and sixteen. Their mastery of the language was far from perfect. Actually, in some areas their performance was quite poor. They used a lot of gestures which are ungrammatical in ASL and did not use a number of grammatical constructions which are possible in the language. Although Simian's grammatical input was therefore reduced both in quality and quantity he developed a far better ASL than his parents. Pinker applies this story as an argument in favour of UG, but if you look at it closely, it becomes clear that it is more of a counter-argument. If Simon had had UG he should have developed some rules which were not present in his parents' signing. However, Simon did not do that. He could make better use of the rules his parents were poor at. But he did not develop rules which went beyond the set of rules his parents used.

Finally it is highly controversial whether language is really independent of intelligence or whether it is just a result of more general mental abilities. Putnam put forward a very strong argument in favour of the latter (Steinberg 1993: 150). On a conference she argued that mathematics must have evolved from intelligence since it only exists for a few thousand years and therefore evolution cannot account for it. If the human mind is capable to construct such a complex and abstract system as mathematics, why should it not be able to construct a system like language, too? Chomsky's solution to this problem was not very convincing. He simply argued that mathematics like language has evolved from the language faculty.

These are just some of the arguments which have been and still are employed against Chomsky's UG and 'principles and parameters approach'. Now that the end of the second part is reached it is time to draw a conclusion.

4. Conclusion

After the presentation of the above, what can one reach from all this? The first part of this work dealt with the questions whether language can be regarded an innate skill or not. The answer to this question must definitely be: Yes. Human beings are the only species which shows language under natural conditions. No other communication system contains all the design features which are characteristic for language. Moreover, despite intensive training programmes no animal has ever reached a level of language ability comparable to humans. The human body shows a lot of anatomical and physiological adaptations to language which are unlikely to be the result of pure coincidence. Finally, language shows all characteristics of a biologically programmed behaviour. However, the fact that language is an innate skill does not mean that experience is completely unimportant. A rich environment is crucial for the development of language. If the stimuli from the outside world are missing, the internal language programme cannot run effectively.

The second part of this essay tried to answer the question, what is exactly innate. This is a very tough question and no final answer can be given. Chomsky as an advocate of the rationalist theory claims that there must be innate knowledge about the structure and nature of language. He quite radically modified his original theory and came up with Universal Grammar and the 'principles and parameters approach'. There seems to be some proof of the existence of a Universal Grammar, but the all convincing evidence has still to be presented. Empiricists argue against the existence of a Universal Grammar. In their view, there are other mechanisms which can explain language. They see language as a result of general intelligence and reject the idea of a separate language faculty.

Future linguistic research should throw overboard the old nature-nurture controversy. Innate as well as experienced factors play an important role in language acquisition. An adequate linguistic theory must integrate both aspects. The question for future psycholinguists should not so much be whether language is innate or not, as this is quite obvious, but more how the fascinating and highly complex system of language is actually processed.

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