

same extent holds good for both the association fields situated more to the rear, in which the combined images and perceptions form themselves and constitute the immense material of practical knowledge, and for the frontal organ where this material is grouped into a world of abstract conceptions, the world of theoretical knowledge.

There is something contradictory in that the qualitative leap in thinking from animal to man should have nothing which corresponds in the organ of thinking, the brains undergoing a merely quantitative enlargement. This then would have to be understood in such a way that the enlargement is to be regarded as a condition, but not as a sufficient or decisive cause for the qualitative leap; it did not necessarily bring with it the new character of human thinking. Besides the biological growth of the brains there must have been other causes through which specifically human thought came into existence.

V. SPEECH

19. Speech is one of the most essential characteristics of man, distinguishing him most strikingly from the animals. This is so true that it is sometimes regarded as the only determining characteristic, in that by definition man starts with the coming of speech.

Speech consists of active production and passive understanding of sounds for mutual communication and understanding. Such sounds, however, also exist in animal communities, with their effects on their fellows. Most of the higher animals are capable of producing throat sounds as expressions of their emotions. These also exist with solitary living animals, and are normally related to their sexual emotions or they may be a means of terrifying a prey. With gregarious animals these sounds likewise are expressions of emotions, of fear in case of danger, of anger, or of contentment. Since the other members of a group react by nature to such sounds, they acquire the character of warning or assurance and become a means of understanding and co-operation which is valuable in their struggle for life.

If sometimes such sounds, in their highest state of development, are called animal language, this term certainly is

improperly used, as the comparison is very remote. Human speech differs from animal sounds in that it consists of words. Words are names for things, actions or properties. Words are sound-symbols, sounds serving as a symbol for something else, and signifying something else. Language is an organised system of conventional sounds, serving as symbols for realities. "Language is a purely human and non-instinctive method of communicating ideas, emotions and desires by means of a system of voluntarily produced symbols... the essence of language consists in the assigning of conventional, voluntarily articulated sounds... to the diverse elements of experience." (Sapir, p. 6 sqq). The similarity of animal sound and human speech as an instrument of communication and mutual intercourse makes it conceivable that the one has developed from the other through a natural process. However, the not only great, but essential difference, and the not merely quantitative but qualitative distinction makes it that human speech must be an entirely new creation. As such an explanation will have to be sought, as part of the entire problem of the origin of man.

The characteristic element in language as a complex of symbols is the arbitrariness. There is no clear connection between the object or phenomenon and its name — apart from occasional examples of onomatopoeia, such as cuckoo. The sound "horse" designates a certain type of animal, but it only has this meaning for those speaking the same language. For that reason language is not innate, but has to be learned by means of imitating. Only the disposition, the ability and the organ of speech are inborn. It is precisely this necessity for learning, for being initiated in the complex of symbols, that demonstrates the artificiality of language. The same thing, for example the same species of animal, will be designated by different peoples by entirely different words: horse, cheval, pferd, equus, hippos, loshadj, kooda.

This does not mean that they are arbitrary fancies. Language has developed and grown according to its own rules, which are an object of investigation in comparative linguistics. Language has been called a creation of the human mind. That does not mean, however, that its rules are products of intelligence and judgment. The curious origin of the German word "Pferd" from

the Latin "paraveredus", a carriage with men and horses requisitioned by the government, illustrates the chance-character of names (cf. Geiger, p. 281). Particularly the languages of the most primitive, least developed peoples, often show the most intricate grammatical rules, far beyond the theoretical understanding of those using them. "The evolution of language shows "a progressive tendency from inseparable irregular conglomerations to freely and regularly combinable short elements." "Primitive language... has a larger vocabulary than later "languages" (Jespersen, p. 429, 431). That development goes from greater complication to smoothness and simplicity is a proof of spontaneous evolution, and in this respect language and its subjection to laws is rather to be considered as a natural product. The science of linguistics traces the human mind in its mysterious hidden and subconscious depths, in which it acts not as conscious intelligence, but as an unconscious force of nature.

20. Information is the main characteristic of speech, though now and again an emotional exclamation may perform the same role. With animals the informative function is to be found in the kind of emotional sound, which effects a special attitude with the others, and stimulates a determinate behaviour as a reaction to the sound. With man the communication, be it a warning, question, answer, or announcement, takes the form of a phrase imparting information with regard to conditions which are of importance in the struggle for life. With the animal a warning cry or an alluring call at most can be considered as a kind of signal. "But are signals the same as words? No, for "words can serve to build up a sentence which expresses more "than a mere summation of words; from signals only a sequence "of signals can be made... No animal expresses itself in words, "and no animal composes sentences; this is the essential point." (Ammann, p. 9—10). Originally the single word could serve as a communication, and the communication consisted of a single word, a sound. In a later development sentences are formed with different words associated in different relations to one another, such as subject, object, and verb. Thereby the experience and the situation can be depicted in a more precise and detailed manner. Words become relay-pieces as it were which ever again

can be included as free links in another context. This opens up the possibility of separating the elements of a complex of actions and of imagining them individually.

Originally a communication, proceeding from a short exclamation, was intended to provoke an action by others, as an immediate reaction to the sound heard. In the further development there appears a separation between hearing and acting. The communication serves as a preparation for action later on. It becomes self-sufficient and an aim in itself. Instead of being a spur inciting action, it becomes a neutral description of the situation, whereby the experience of one becomes the knowledge of others. Then language begins to differentiate and to enrich itself, words increase in numbers and split up into many meanings, and from names of things and actions they become indications of properties and situations, of place, time, and conditions. As a new and living organism develops from a few similar cells into an ever increasing diversity of organs, so language grows into a workable instrument of ever greater power and flexibility.

Speech now is no longer a part of another action, but has become an independent action. The reaction to a communication is no longer an immediate activity action, but a "linguistic action" (as called in the theory of Significa); it is a response in the language itself. Speech now becomes an organ of deliberation, and a medium for the combining and adjusting of personal experiences. Verbal intercourse, consisting of speaking to each other, now becomes an exchange of thoughts, and a special field of human life. It becomes the most specialised and complicated of all expressions of personal life, at a greater distance and through intricate intermediate forms connected with the practical daily life of labour. At this stage the often used definition of speech: that it is an expressing of ideas by means of sound-symbols, is appropriate. It has now developed into a means for transferring the knowledge of an individual to that of a whole community.

21. Speech is a communal organ. Nearly all authors who deal with it have expressed, more or less clearly, this to be its essential basis. "Speech is the great medium through which

"human co-operation is brought about. It is the means by which "the diverse activities of men are co-ordinated and correlated "with each other for the attainment of common and reciprocal "ends. Men do not speak simply to relieve their feelings or to "air their views, but to awaken a response in their fellows and "to influence their attitudes and acts." (De Laguna, p. 19). Speech would have been non-existent if there had not been a community; it would have been useless for isolated beings living outside a community, and could as little have originated as an eye in perpetual darkness.

The community is not an accidental collection of individuals. It was not the individual but the community which, from the earliest times, as with our animal-like ancestors, was the life-element of mankind. This point has been frequently overlooked in modern individualistic ways of thinking. The fact that the group, clan, or tribe, was the all and end for primitive peoples, and the individual next to nothing, had to be rediscovered. However, the significance of the group remains even for our modern times. "The very amount of literature and tradition "about the dangers of the crowd... has seriously misled us. "The implication has been that only the individual free from "the control of the group is the normal and desirable person. "Nothing could be farther from the truth", states the American sociologist Herbert Miller (p. 1). Animals, and likewise men, live in communities on account of the great advantages gained thereby in the struggle for life. In the first place it offers reciprocal protection and assistance against enemies; it is known that beasts of prey endeavour to isolate individual members of a herd. Protection is obtained by means of united strength or by warning, sometimes combined with an instinctive division of labour. The entire group profits from the experience of the individual members. A further and very important factor is the protection of the young. Each member of the group thus has a greater chance of becoming fullgrown and of procreating. All the qualities essential for the life of the community are thereby perpetuated.

The most important of these are the social instincts. These social instincts are intensified by selection because the groups where they are weak are more easily destroyed and the groups

where they are strong persist, closely united. These special social qualities, such as solidarity, loyalty, courage, the readiness to make sacrifices, known to men as moral sentiments, become dominating features. They become such, not on account of reason or judgement, but instinctively, through an irresistible impulse; hence, since their origin remains unconscious, they are felt to be mysterious and supernatural. They are the cement of the community, moulding it into a firm and unbreakable unity. "Each individual unconsciously postulates his own "existence in the continuity of his group, because in the "struggle for survival there was no other possibility of ex- "istence" (Miller, l.c. p. 5). The deep instinct of self-preservation must make place for, or rather take on the nature of, communal feeling. The interests of the community stand as the supreme commandment over and above personal interests, because the life of each individual is ensured only when the community itself survives.

The community is a life-community, jointly engaged in the struggle for survival. Community action consists of communal or associative work, the common fight against enemies included. The community is a working and fighting community, moulded into a unity by strong social forces. All action is co-operation; so an organ is needed for mutual understanding, for communication and deliberation. Speech is such an organ, and is the mightiest means for binding the community together, the most important and indispensable instrument in the common struggle for existence. "In its primitive uses, language functions as a "link in concerted human activity, as a piece of human "behaviour... narrative speech is primarily a mode of "social action rather than a mere reflection of thought", thus Malinowski expresses the function of speech with primitive peoples (cf. Ogden and Richards, p. 474—475). Speech is not, as Otto Jespersen conceived it to be with primitive man, a luxurious blossoming and an organ of mere emotion, bursting into song¹⁾. Speech is the indispensable element of the most

1) "Thoughts were not the first things to press forward and crave for "expression; emotions and instincts were more primitive and far more "powerful. But what emotions were most powerful in producing germs of "speech? To be sure not hunger and that which is connected with hunger:

important contents of life, namely the work in common, inspiring all thought and sentiment, including also the emotional blossomings of imagination and mysticism in ritual and solemnity, in feast and song. Economic and cultural life are not separated and opposed to each other: they are one. Work and struggle are not distasteful accessories; they are hard reality, as surely they are for each living being that asserts itself, well-balanced and in harmony with its surroundings. That which is necessary and essential to life gives it its contents and significance and becomes the source of sentiment and poetry. As all this action is done in common, organised by, and permeated with, strong social sentiments, language, the binding element, possesses a powerful sentimental value and becomes the bearer of the most profound emotions.

Speech multiplies the strength of the community, as it enables the experience of each member to become the property of the whole. The assembling of all experiences, and the exchanging and adjusting of thoughts in mutual deliberation, result in knowledge becoming a purer, more precise and objective basis for effective actions.

Its significance for the community, however, is even greater than what is gained by mutual information. Speech is also the organ for verbal tradition, the treasure-house of lasting and increasing knowledge. By means of speech the older generation passes on its knowledge to the younger. As stated above, the community is immortal; and its possession of knowledge, which has to accompany and complete as a means for their good use the possession of tools, of technical implements, consists of language and is expressed in words and sentences. The technical apparatus could not continue to develop if knowledge and science did not develop simultaneously. Solely because this fund

"mere individual self-assertion and the struggle for material existence. "This prosaic side of life was only capable of calling forth short monosyllabic interjections, howls of pain and grunts of satisfaction and dissatisfaction . . . the source of speech is not gloomy seriousness but merry play "and youthful hilarity." (Jespersen, l.c. p. 433). Does not this opinion characterize the modern scholar as being so foreign to the social process of labour that he considers it only an inferior prosaic matter? But it betrays at the same time what a heavy burden, even in modern centuries, labour puts upon man's shoulders.

of knowledge is fixed, retained, and preserved by language, it can continue to increase indefinitely. Thus speech becomes the vehicle of ever higher human progress.

22. Whenever speech and language here are spoken of it stands to reason that both sides, speaking as the active, hearing as the passive side, are included as a matter of course. Hearing and sight are always mentioned together as the highest, most developed and most important senses of man. Yet there exists a noteworthy contrast between these two; whilst sight is primarily an individual organ, hearing is above all a community organ. Sight allows for such a detailed orientation in space and such a wealth of knowledge of the natural surroundings as could never be supplied by hearing. This takes place by means of the direct observation in two dimensions, which becomes a precise localisation in three dimensions through the stereoscopic use of both eyes. With man hearing, on the contrary, is a downright community-sense; it binds him to his fellow-men by means of spiritual intercourse, Sight is the organ and vehicle for objective and passionless knowledge of facts. Hearing is the organ and vehicle of abstract thought and of all inner feelings which pervade the relation of man with his fellow-men. Herein lies the basis for the emotional power of the human voice, and of sound and music in general, in contrast to the cooler beauty of the visual arts.

VI. SPEECH AND THINKING

23. It is at once clear that speech would be impossible without human thinking; whilst language is not an arbitrary product of the intellect, it is, nevertheless, a product of the human mind. When man gives names to things the autonomous, creative power of the mind comes into action. Words are names for conceptions. The perceptions must have been digested into abstract notions when they are designated by words. The free handling of conceptions is necessary when joining words into sentences, which is the upward and downward insertion of different links into the chain of thought, and constitutes the specific character of human thinking. In short, language is a

spiritual phenomenon. Therefore it is understandable that, frequently, the conclusion was drawn that the human mind had to develop first, and that from it speech came forth.

In opposition to this simple opinion Lazar Geiger with great emphasis put forth its antithesis. "It is not reason that has caused speech, but the other way round", thus he expresses it in the "Contents" of his work. (S. XXI). Thinking in conceptions is not possible without speech — speech always understood in the double meaning of speaking and hearing; — conceptions in the end are nothing but words or combinations of words. Everybody knows, and can verify for himself, that conscious thought consists of deliberating with oneself in a voiceless discussion; we think in words and sentences, without the larynx or tongue coming into action. "How often does it not happen, in the most varied realms, that a greater clarity of thought is suddenly brought about by a happily spoken word! Yes, it needs only a momentary observation of ourselves to convince ourselves that not only the more distinct but also the more intensive our thinking the more we do so with words only. . . . so that present thinking is nothing but silent speaking, talking with or within ourselves. . . . So speech certainly has permeated thinking to such an extent and all its parts have connected themselves so intimately with it, that thinking loosened from this connection, thinking before and without speech, has to be essentially different from our present thinking. Whereas we hesitate to ascribe to reason a determining influence in the construction of language, yet a mutual relation between them cannot be denied, since reason without speech cannot be complete and for the creation of reason speech is not irrelevant." (Geiger, l.c. p. 12—13). Or to quote a modern author: "There is no thinking in conceptions without speech, and also in silent thinking we are apt to make indicative speech-movements, giving firm supports to the vague fleeting stream of consciousness." (Müller-Freienfels, p. 184).

From the changing mass of perceptions, partly new sensations and partly memories recalled by them, constantly recurring connections will form themselves as images, press forward, and endeavour to fix themselves. They remain vague, however, and dissolve, as long as they are not fixed by a name, *i.e.* a word.

Once the nebulous mass in our mind has been fixed in a sensorial perceptible phenomenon, as an audible and pronounceable sound, it becomes a conception, something that can be grasped¹⁾ and handled. Now the group of phenomena is fenced off from the rest of the world by the name which collects and summarizes them ("the word is a fence"). And any further phenomenon of the same sort is placed in this group by denoting it by the same name; for with this name as a label it is recognised, and all further properties and consequences are known at once ("the word is a label"). Thereafter, to recall the perception it is no longer necessary that similar phenomena take place. The mention of the name is sufficient, and the word is now so closely connected with the conception that the whole series of perceptions can thereby at will be brought to the front in our thoughts, as a marshalled, obedient crowd ("the word is a vehicle", thus Dewey expresses these successive functions of the word).

Language is praised as the "unsurpassable, efficient instrument" of thought. But it is more. The intellect would be incomplete without language, nay, it would not exist at all. Ideas and perceptions have only a shadowy, intangible and spiritual existence. The real world consists of concrete things, which are the phenomena themselves; the abstract conception is merely the expression of what a group of phenomena has in common, and therefore is outside this world of phenomena, with no separate reality. The word, the name, gives it that separate reality, as a physical existence, (although this is only transient) and changes it into a something, which can be described, and with which one can work. The word gives substance to a conception; and only through the word the vague feeling is turned into a precise thought. This is also true for the physical things of the world themselves. The thing also is an abstraction, a summary of all the separate images and impressions of sight, feeling etc., which have been acquired from different angles at different times. The identity which the word, the name, ensures to these changing phenomenal forms makes them a figure in space, a permanent and constantly recognisable object,

¹⁾ In German: *Begriff = was ergriffen wird.*

of which the different perspective aspects can be derived and can be known in advance. The animal too recognizes, through experience and instinct, the identity and similarity of enemy or prey — though here also strongly led by the positionless impression of smell. However, to arrive at a clear picture of shape in the surrounding space, from this recognition, the formation of abstract conceptions attached to the word is necessary.

24. It was seen above that the special character of human thinking lies in the interrupting of the series of perceptions, and in the parts becoming independent, self-sufficient and becoming objects of observation themselves. It should now be added that this is only possible when they can be designated and thereby are fixed. By giving them names they are made, as it were, into things which can be laid hold of, manipulated, and combined. That we can follow the series up and down, and can distinguish the different links, lift them out, exchange them, and compare them with other series, is made possible by constantly calling them by names, and by linking together and joining the names, which then as symbols represent the summarized realities of the world.

Now the realities of the world can be indicated in still another manner than by giving them names, such as by pointing to them, or by a picture. Here the name evokes the picture. But this is impossible in the case of the more abstract ideas; there is the word only. Such conceptions as virtue in ethics, truth in epistemology, adaptation in biology, and entropy in physics, correspond with phenomena so barely outlined and relations so broadly spread that one can scarcely if at all visualize them as images, but can only indicate them by words. The word, the symbol, is their sole tangible and representative form. Speaking of them then frequently seems, and often is, a play on words; but the words do mean something, and because they are understood, this is not a senseless or resultless play. "Almost all higher intellectual activity is a matter of words, to the nearly total exclusion of everything else. . . . The word is always concrete and sensible, however abstract its meaning may be, and thus by the help of words we are able to dwell on abstractions in a way which would otherwise be impossible."

(B. Russell, p. 211). Moreover this dwelling on and working with abstractions, not only holds good for information and discussion, but also for private consideration, for personal thought, for the deepening of one's own thoughts, and for the building-up of a theoretical insight. In its most absolute *i.e.* in its philosophical abstractions, thinking has become working entirely with words, with symbols only.

Thus human thinking and speech, words and conceptions are inseparably bound together. Even if we should call one the cause for the other, the one cannot be imagined without the other. Though we cannot call them identical, because they are different sides of a process, yet they are different aspects of one and the same process, which is the building-up of consecutive series of perceptions and ideas, pictures and symbols, of the world in which we live, and the means for realizing our life in it as a richly varied process. Together they originated, and together they have developed with and through one another to their present height. In the problem of the origin of man they appear as a unity.

25. Speech however is, as we have seen, a product of the community; it could only come into existence in the community, and it could only remain in existence as an organ of the community. "If we had not talked with others and they with us, we should never talk to and with ourselves." (Dewey, 14, p. 170). This shows how the whole of our capacity for abstraction and thinking is rooted in the community, in spite of the individual form of its appearance. "Speech and reason develop only in the womb of the community. Just as the word only possesses sense and meaning for the particular community (because its mere sound states nothing at all, and it only acquires its contents through all common experiences related to it) so by the community it must be made to develop in, *i.e.* be taught to, the young individual. It enters the sphere of the life of reason through the acceptance of speech. . . . The organ of communication becomes the organ of understanding. The entirety possesses the understanding, and experiences the urge to pass it on also to the growing up generation. . . . Speech is the voice of the community, its thoughts are necessarily thoughts of the com-

"munity, its earliest contents the activity of the community, its earliest objects the works of the community. The higher mental development of the individual must be traced back to the development of the community, and not the other way round. "Because for the common purpose the community learned to communicate by means of sounds, therefore the individual acquired words with which at later stages he could think out his personal activity and thus could indicate it by names. They all came forth from the source of the common spirit." (Noiré, p. 147—148).

Consciousness in man as an isolated being would not have been able to develop beyond the stage of vague perceptions, as we assume to be the case with animals. Speech, and therefore abstract notions, could come into being only through man living in a group, as a member of a community. Living together in a society is the nucleus and foundation for all thinking, for all mental development and for all human culture. This shows the shortcomings of philosophical opinions and systems which start from the individual and from individual consciousness. A philosophy, which considers thinking to be a merely individual process, can only incompletely approximate its essence. Reality is turned upside down when the philosopher proceeds from his own individual consciousness as a basic fact and then, along the way of critical doubt, endeavours to prove logically the existence of his fellow-men. He is not aware that the simplest facts of thought, from which he starts out, already possess a collective character; that in the first abstractions he is dealing with, a society, a human community has already made its deposit; that each word, each conception and each thought, which he experiences in himself and which he accepts as that which is "given", has been inspired by community life. Each personal consciousness is the individual form through which the mental life of the community, which is its collective process and collective possession, gains expression.

26. Speech is a new acquisition distinguishing man from the animals. Bodily organs must correspond to it and, in fact, do so in a twofold manner, firstly actively, for producing speech, and secondly passively, for hearing it. The human ear does not

display any particular development, and the hearing of animals is often much more acute, being for them a weapon in the struggle for life. The build of the organs which produce the voice in anthropoids, the larynx, lungs, tongue and lips, are not very different from those of man, and are capable of producing analogous sounds (cf. Yerkes and Learned, Chimpanzee Intelligence and its vocal expressions). Undoubtedly, however, the muscular system and the innervations of these organs in man developed further in accordance with the higher demands of accuracy and precision of movements.

Far more essential and important, however, are the corresponding changes in the brains. Speaking and hearing are chiefly mental activities. There is nothing peculiar in the fact that certain motor centres in the cerebral cortex conduct the movements of the vocal chords, tongue and lips in a precise mutual correlation to produce the delicate shades in the sound of the voice. Neither is it peculiar that the sound-stimulus is led to the temple lobe of the cerebral cortex and there becomes a conscious fact as an impression of hearing. What is peculiar is that from the whole complex of perceptions and conceptions, or from the free initiative of thought and will, the order is given to the motor centre for just these particular actions of speech to take place. What is peculiar is that the impressions of hearing, of this new world of sound, call up totally different kinds of memory-images and series of thoughts, for which they serve as symbols.

In 1862 Broca discovered that there was a special "speech-centre" in a certain place in the lowest part of the third frontal lobe in the left-hand hemisphere of the brains. If this centre was disturbed, or destroyed, the capacity for speech disappeared. This part of the cortex does not distinctly differ from the corresponding right-hand lobe, which plays no part at all in the function of speech; it is only quantitatively somewhat more developed, and neither is its construction fundamentally different from that of the anthropoid apes. It functions through its connections with the motor centres for throat and mouth, which are situated nearby. Afterwards it has been found that a larger part of the cortex extending farther behind and before, is involved in this function.

Proceeding from the significance of speech for thinking, some investigators have sought for the seat of logical thinking and abstract reasoning in these and the surrounding parts of the frontal brains. It appeared, however, that the loss of speech did not effect the capacity for thinking: "... the functioning of the "intellect does not depend on normal conditions of the cortical "motor organ of language... but on its cortical sensory organs, "auditory and visual..."; "the motor area of language does "not exercise any real regulative power on either the formation "or on the movement of thought." It is "the auditory sphere of "language, which is one of the main wheels in the logical "movement of thought." (Bianchi, l.c. p. 119—120). The parts of the cortex in which the connection of wordsounds with corresponding thought-series takes place and forms itself, are the association-fields, situated round the temple lobe. When these fields are affected and destroyed by disease, the symptoms of word-deafness and word-blindness appear. The sound is then heard, or the word read, but its meaning is not understood, and the whole process of logical thought, the normal linking of conceptions, is disturbed. From this must be concluded that the heard word is far more closely connected with human thinking than the spoken word. Yet we have to consider that both these functions do not exist independently of each other, but, localized in neighbouring fields of the cortex, influence each other powerfully. This is apparent, for instance, in that such mental defects are nearly always connected with the very hemisphere that contains the speech-centre becoming affected. The one-sidedness of the active speech-centre clearly involves an asymmetry in the organ of hearing and comprehending. The anatomical substratum for the connections of speech and thought must be sought for in the countless connections in the fields of association and assimilation alongside and around the sensorial and motor centres, which constitute the huge main part of the human cerebral cortex.

VII. TOOLS AND THINKING

27. We read in Aristotle: "Anaxagoras says that man is the "most intelligent animal, because he possesses hands". Thus the realization of a deep natural connection between the spiritual

and the material world already appears in the first philosophical thoughts of antiquity. Later ages receded from this opinion; Aristotle quotes him to reprove him, and here Galen agrees: "Because he was the wisest, he therefore possesses hands, as "Aristotle rightly judged. Because not the hands taught man the "arts, but reason". And also Charles Bell, in accordance with the aim and the purport of his book, holds with this opinion: "the possession of the ready instrument is not the cause of "man's superiority... So, we rather say with Galen, that man "has hands given to him, because he is the wisest of creatures, "than ascribe this superiority and knowledge to the use of his "hands." (Bell, p. 249).

This "use of his hands" is the using of tools. It has been repeatedly stated that the use of tools and human thinking are not independent of each other. Above, in chapter II, attention has already been drawn to the fact that intelligence, *i.e.* human thought, is required for using and even more for making and inventing implements. For it demands the capacity of reviewing beforehand and imagining the results of what does not yet exist, or rather only exists in the mind.

This connection of course cannot mean that human thought at first spontaneously came into existence, by means of the biological growth of the brains, and that after that tools were invented and handled. Such an opinion overlooks the fact that human thought, compared with animal thought, not only shows a quantitative increase, but also a qualitative change of character. Its coming into existence of its own accord would be a miraculous creation, lying beyond the province of science. Moreover the infinitely slow development of the first stone implements over a period of thousands of centuries contradicts such an opinion; it displays all the features of a laborious growth on its own accord, hence an autonomous development, which is totally different from what an even slowly growing deliberate reasoning would have invented. Intellect is not a given capacity that previously existed in a dormant state; it consists of thoughts, which form and change according to the stimuli and necessities of life. It is well-known how, from a study of later ages which were more highly developed technically, technical imperfections, as experienced in the practical use of tools, had a stimulating