
Thought and Language

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4 The Genetic Roots of Thought and Speech

edly rudimentary intellect, belong in a prelinguistic phase of thought development.

In Köhler's opinion, his investigations proved that the chimpanzee shows the beginning of an intellectual behavior of the same kind and type as man's. At the same time, he wrote that "a great many years spent with chimpanzees lead me to venture the opinion that, besides in the lack of speech, it is in the extremely narrow limits in *this* direction that the chief difference is to be found between anthropoids and even the most primitive human beings. The lack of an invaluable technical aid (speech) and a great limitation of those very important components of thought, so called 'images,' would thus constitute the causes that prevent the chimpanzee from attaining even the smallest beginnings of cultural development" (Köhler, 1973, p. 267).

The existence of humanlike intelligence, and the absence of any traces of humanlike speech in anthropoids, as well as the independence of the chimpanzee's actions from its "speech"—these are the major conclusions to be drawn from the Köhler's study.

There is a considerable disagreement among psychologists of different schools about the theoretical interpretation of Köhler's findings. The mass of critical literature that his studies have called forth represents a variety of viewpoints. Köhler himself somehow limited his task. He developed no general theory of intellectual actions. He chiefly discusses the factual findings and turns to theory only when he wants to show that intellectual actions cannot be reduced to those of trial and error, and that, therefore, a "chance theory" is inapplicable here.

Rejecting the "theory of chance," Köhler seems to be satisfied with this only *negatively* defined theoretical position. His position *vis-à-vis* the idealistic concept of unconscious of Eduard von Hartmann, Henri Bergson's "*élan*

I

The most important fact uncovered through the genetic study of thought and speech is that their relation undergoes many changes. Progress in thought and progress in speech are not parallel. Their two growth curves cross and recross. They may straighten out and run side by side, even merge for a time, but they always diverge again. This applies to both phylogeny and ontogeny. The cases of pathological dissolution and involution of functions, as we shall try to prove later, also indicate that the relation between thought and speech is not an unchangeable one. In each case of disturbance or retardation there is a specific balance between impaired thought and impaired speech.

In animals, language and thought spring from different roots and develop along different lines. This fact is confirmed by Köhler's, Yerkes's, and other recent studies of apes (Köhler, 1921/1973; Yerkes and Learned, 1925). Köhler's experiments proved that the appearance in animals of an embryonic intellect—i.e., of thinking in the proper sense—is in no way related to language. The "interventions" of apes in making and using tools, or in finding detours for the solutions of problems, though undoubt-

vital," and the "forces with purpose" of neo- and psychovitalists is also purely negative. For Köhler, all these theories, which explicitly or implicitly presuppose a force that lies beyond experience, are unscientific: "I therefore wish to emphasize that the alternative is not at all between chance and factors outside experience [*Agenten jenseits der Erfahrung*]" (Köhler, 1973, p. 211). At the same time, both groups of Köhler's opponents, i.e., the biologically oriented psychologists (Edward Thorndike, Vladimir Vagner, and Vladimir Borovsky) and the psychologists-subjectivists (Karl Bühler, Johannes Lindworsky, and Erich Jaensch) challenged his major conclusion that the chimpanzee's intelligence cannot be explained in terms of trial-and-error learning.¹ They also disagreed with Köhler's opinion that the chimpanzee's intellectual operations are akin to human ones.

In this context it is particularly important that even those psychologists, like Borovsky, who do not see anything in the chimpanzee's actions beyond the mechanics of instinct and trial-and-error learning ("nothing at all except the already known process of habit formation"), do recognize (a) the factual findings of Köhler and (b) the independence of the chimpanzee's actions from its "speech" (Borovsky, 1927, p. 179). These latter are also recognized by the introspectionists, who shy away from lowering intelligence to the level of even the most advanced behavior of apes.

Bühler says quite rightly that "the achievements of the chimpanzee are quite *independent of language* and in the case of man even in later life, technical thinking, or thinking in terms of tools [*Werkzeugdenken*] is far less closely bound up with language and concepts than other forms of thinking" (Bühler, 1919/1930, pp. 50–51).

We shall return to this thought of Bühler later. Experimental psychological and clinical data we know about indicate that even for human adults, the relation between

speech and thought varies depending on the form of verbal and intellectual activity.

Arguing with Hobhous's² concept of "practical reasoning" in animals and Yerkes's concept of "ideation" in apes, Borovsky posed the following question: "Is there in animals anything resembling the speech habits of men?" "It seems to me," answered Borovsky, "that at the present level of our knowledge there are no grounds to believe that apes or any other animals, except humans, have verbal habits" (Borovsky, 1927, p. 189).

The issue would be quite simple if apes had no rudiments of language, nothing at all resembling speech. We do, however, find in the chimpanzee a relatively well-developed "language"—in some respects (most of all phonetically) not unlike human speech. The remarkable thing about its language is that it functions apart from its intellect. Köhler, who studied chimpanzees for many years at the Canary Island Anthropoid Station, tells us that "it may be taken as positively proved that their gamut of phonetics is entirely 'subjective,' and can only express emotions, never designate or describe objects" (Köhler, 1973, p. 305). But chimpanzee and human phonetics have so many elements in common that we may confidently suppose that the absence of humanlike speech is not due to any peripheral causes. Henri Deltroix absolutely correctly observed that the gestures and mimicries of apes do not bear any objective reference; i.e., they do not carry out a function of signification (Deltroix, 1924, p. 77).

The chimpanzee is an extremely gregarious animal and responds strongly to the presence of others of its kind. Köhler describes highly diversified forms of "linguistic communication" among chimpanzees. First of these is their vast repertoire of affective expressions: facial play, gestures, vocalization; next come the movements expressing social emotions: gestures of greeting,

etc. The apes are capable both of "understanding" one another's gestures and of "expressing," through gestures, desires involving other animals. Usually a chimpanzee will *begin* a movement or an action it wants another animal to perform or to share—e.g., will push the other and execute the initial movements of walking when "inviting" the other to follow it, or grab at the air when it wants the other to give it a banana. All these are gestures *directly* related to the action itself. Köhler mentions that the experimenter comes to use essentially similar elementary ways of communication to convey to the apes what is expected of them.

By and large, these observations confirm Wundt's opinion that pointing gestures, the first stage in the development of human speech, do not yet appear in animals, but that some gestures of apes are a transitional form between grasping and pointing (Wundt, 1900, p. 219). We consider this transitional gesture a most important step from unadulterated affective expression toward objective language.

There is no evidence, however, that animals reach the stage of objective representation in any of their activities. Köhler's chimpanzees played with colored clay, "painting" first with lips and tongue, later with real paintbrushes; but these animals—who normally transfer to play the use of tools and other behavior learned "in earnest" (i.e., in experiments) and, conversely, transfer play behavior to "real life"—never exhibited the slightest intent of representing anything in their drawings or the slightest sign of attributing any objective meaning to their products. Bühler says, "There are facts which warn us against overestimating the achievements of the chimpanzee. We know that no explorer has ever confused gorillas or chimpanzees with men. No traditional tools or methods of using them differing from tribe to tribe (which would point to the transmission from one genera-

tion to another of some invention) have ever been found among them. We do not know of any scratchings in sand or clay, which would constitute a *representational drawing* or even a mere ornament scribbled playfully, nor of any *representational language*, i.e., sounds signifying names. There must be some inner reason for all this" (Bühler, 1930, p. 15).

Yerkes seems to be the only one among modern observers of apes to explain their lack of speech otherwise than by "intrinsic causes." His research on the intellect of orangutans yielded data very similar to Köhler's; but he goes further in his conclusions: He admits "higher ideation" in orangs—on the level, it is true, of a three-year-old child at most (Yerkes, 1916, p. 132).

Yerkes deduces ideation merely from superficial similarities between anthropoid behavior and human behavior; he has no objective proof that orangs solve problems with the help of ideation, i.e., of "images," or trace stimuli. In the study of the higher animals, analogy may be used to good purpose within the boundaries of objectivity, but basing an assumption on analogy is hardly a scientific procedure.

Köhler, on the other hand, went beyond the mere use of analogy in exploring the nature of the chimpanzee's intellectual processes. He showed by precise experimental analysis that the success of the animals' actions depended on whether they could see all the elements of a situation simultaneously—this was a decisive factor in their behavior. If, especially during the earlier experiments, the stick they used to reach some fruit lying beyond the bars was moved slightly, so that the tool (stick) and the goal (fruit) were not visible to them at one glance, the solution of the problem became very difficult, often impossible. The apes had learned to make a longer tool by inserting one stick into an opening in another. If the two sticks accidentally crossed in their hands, forming an

X, they became unable to perform the familiar, much-practiced operation of lengthening the tool. Dozens of similar examples from Köhler's experiments could be cited.

Köhler considers the actual visual presence of a sufficiently simple situation an indispensable condition in any investigation of the intellect of chimpanzee's, a condition without which their intellect cannot be made to function at all; he concludes that the inherent limitations of imagery (or "ideation") are a basic feature of the chimpanzee's intellectual behavior. If we accept Köhler's thesis, then Yerkes's assumption appears more than doubtful.

In connection with his recent experimental and observational studies of the intellect and language of chimpanzees, Yerkes presents new material on their linguistic development and a new, ingenious theory to account for their lack of real speech. "Vocal reactions," he says, "are very frequent and varied in young chimpanzees, but speech in the human sense is absent" (Yerkes and Learned, 1925, p. 53). Their vocal apparatus is as well developed and functions as well as man's. What is missing is the tendency to imitate sounds. Their mimicry is almost entirely dependent on optical stimuli; they copy actions but not sounds. They are incapable of doing what the parrot does so successfully: "If the imitative tendency of the parrot were combined with the caliber of intellect of the chimpanzee, the latter undoubtedly would possess speech, since he has a voice mechanism comparable to man's as well as an intellect of the type and level to enable him to use sounds for purposes of real speech" (Yerkes and Learned, 1925, p. 53).

In his experiments, Yerkes applied four methods of teaching chimpanzees to speak. None of them succeeded. Such failures, of course, never solve a problem in principle. In this case, we still do not know whether or not it is

possible to teach chimpanzees to speak. Not uncommonly the fault lies with the experimenter. Köhler says that if earlier studies of chimpanzee intellect failed to show that it had any, this was not because the chimpanzee really has none but because of inadequate methods, ignorance of the limits of difficulty within which the chimpanzee intellect can manifest itself, ignorance of its dependence on a comprehensive visual situation: "The experimenter should recognize," quipped Köhler, "that every intelligence test is a test, not only of the creature examined, but also of the experimenter himself" (Köhler, 1973, p. 265).

Without settling the issue in principle, Yerkes's experiments showed once more that anthropoids do not have anything like human speech, even in embryo. Correlating this with what we know from other sources, we may assume that apes are probably incapable of real speech. What are the causes of their inability to speak, since they have the necessary voice apparatus and phonetic range? Yerkes sees the cause in the absence or weakness of vocal imitativeness. This may very well have been the immediate cause of the negative results of his experiments, but he is probably wrong in seeing it as the fundamental cause of the lack of speech in apes. The latter thesis, though Yerkes presents it as established, is belied by everything we know of the chimpanzee's intellect.

Yerkes had at his disposal an excellent means of checking his thesis, which for some reason he did not use and which we should be only too happy to apply if we had the wherewithal. We should exclude the auditory factor in training the animals in a linguistic skill. Language does not have to depend on sound. There are, for instance, the sign language of deaf-mutes and lip reading, which is also interpretation of movement. In the languages of primitive peoples, gestures are used along with sound, and play a substantial role (Levy-Bruhl, 1918). In princi-

ple, language does not depend on the nature of its material. If it is true that the chimpanzee has the intellect for acquiring something analogous to human language, and that the whole trouble lies in its lacking vocal imitativeness, then it should be able, in experiments, to master some conventional gestures whose psychological function would be exactly the same as that of conventional sounds. As Yerkes himself conjectures, the chimpanzees might be trained, for instance, to use manual gestures rather than sounds. The medium is beside the point; what matters is the *functional use of signs*, any signs that could play a role corresponding to that of speech in humans.

This method has not been tested, and we cannot be sure what its results might have been; but everything we know of chimpanzee behavior, including Yerkes's data, dispels the hope that they could learn functional speech. Not a hint of their using signs has ever been heard of. The only thing we know with objective certainty is not that they have "ideation" but that under certain conditions they are able to make very simple tools and resort to "detours," and that these conditions include a completely visible, utterly clear situation. In all problems not involving immediately perceived visual structures but centering on some other kind of structure—mechanical, for instance—the chimpanzees switched from an insightful type of behavior to the trial-and-error method pure and simple.

Are the conditions required for the apes' effective intellectual functioning also the conditions required for discovering speech or discovering the functional use of signs? Definitely not. Discovery of speech cannot, in any situation, depend on an optical setup. It demands an intellectual operation of a different kind. There are no indications whatever of such an operation's being within the chimpanzees' reach, and most investigators assume

that they lack this ability. This lack may be the chief difference between chimpanzee and human intellect.

Köhler introduced the term *insight* (*Einsicht*) for the intellectual operations accessible to chimpanzees. The choice of term is not accidental. Gustav Kafka pointed out that Köhler seems to mean by it primarily *seeing* in the literal sense and only by extension "seeing" of relations generally, or comprehension as opposed to blind action (Kafka, 1922, p. 130).³

It must be said that Köhler never defines *insight* or spells out its theory. In the absence of theoretical interpretation, the term is somewhat ambiguous in its application: sometimes it denotes the specific characteristics of the operation itself, the structure of the chimpanzees' actions; and sometimes it indicates the psychological process preceding and preparing these actions, an internal "plan of operations," as it were. Bühler particularly insisted on the internal character of this process (Bühler, 1930, p. 12). Borovsky also assumes that if the ape shows no visible signs of "sizing up" the task, it must be doing this through inner muscular activity (Borovsky, 1927, p. 184).

Köhler advances no hypothesis about the mechanism of the intellectual reaction, but it is clear that however it functions and wherever we locate the intellect—in the actions themselves of the chimpanzee or in some preparatory internal process (cerebral or muscular-innervational)—the thesis remains valid that this reaction is determined, not by memory traces, but by the situation as visually presented. Even the best tool for a given problem is lost on the chimpanzee if it cannot see it simultaneously or quasi-simultaneously with the goal. By "quasi-simultaneous perception" Köhler means instances when tool and goal had been seen together a moment earlier, or when they had been used together so many times in an identical situation that they are to all intents

and purposes simultaneously perceived psychologically (Köhler, 1973, pp. 99–100). Thus the consideration of “insight” does not change our conclusion that the chimpanzee, even if it possessed the parrot’s gifts, would be exceedingly unlikely to conquer speech.

Yet, as we have said, the chimpanzee has a fairly rich language of its own. Yerkes’s collaborator Learned compiled a dictionary of thirty-two speech elements, or “words,” which not only resemble human speech phonetically but also have some meaning, in the sense that they are elicited by certain situations or objects connected with pleasure or displeasure, or inspiring desire, malice, or fear (Yerkes and Learned, 1925, p. 54). These “words” were written down while the apes were waiting to be fed and during meals, in the presence of humans and when two chimpanzees were alone. They are affective vocal reactions, more or less differentiated and to some degree connected, in a conditional-reflex fashion, with stimuli related to feeding or other vital situations: a strictly emotional language.

In connection with this description of ape speech, we should like to make three points. First, the coincidence of sound production with affective gestures, especially noticeable when the chimpanzees are very excited, is not limited to anthropoids—it is, on the contrary, very common among animals endowed with voice. Human speech certainly originated in the same kind of expressive vocal reactions.

Second, the affective states producing abundant vocal reactions in chimpanzees are unfavorable to the functioning of the intellect. Köhler mentions repeatedly that in chimpanzees, emotional reactions, particularly those of great intensity, rule out a simultaneous intellectual operation.

Third, it must be stressed again that emotional release as such is not the only function of speech in apes. As in

other animals and in man, it is also a means of psychological contact with others of their kind.⁴ Both in the chimpanzees of Yerkes and Learned and in the apes observed by Köhler, this function of speech is unmistakable. But it is not connected with intellectual reactions, i.e., with thinking. It originates in emotion and is clearly a part of the total emotional syndrome, but a part that fulfills a specific function, both biologically and psychologically. It is far removed from intentional, conscious attempts to inform or influence others. In essence, it is an instinctive reaction, or something extremely close to it.

There can hardly be any doubt that biologically this function of speech is one of the oldest and is genetically related to the visual and vocal signals given by leaders of animal groups. In a recently published study of the language of bees, Karl von Frisch (1923)⁵ describes very interesting and theoretically important forms of behavior that serve interchange or contact and indubitably originate in instinct. In spite of the phenotypical differences, these behavioral manifestations are basically similar to the speech interchange of chimpanzees. This similarity points up once more the independence of chimpanzee “communications” from any intellectual activity.

We undertook this analysis of several studies of ape language and intellect to elucidate the relation between thinking and speech in the phylogenetic development of these functions. We can now summarize our conclusions, which will be of use in the further analysis of the problem.

1. Thought and speech have different genetic roots.
2. The two functions develop along different lines and independently of each other.
3. There is no clear-cut and constant correlation between them in phylogenesis.
4. Anthropoids display an intellect somewhat like man’s

in certain respects (the embryonic use of tools) and a language somewhat like man's in *totally different respects* (the phonetic aspect of their speech, its release function, the beginnings of a social function).

5. The close correspondence between thought and speech characteristic of man is absent in anthropoids.

6. In the phylogeny of thought and speech, a prelinguistic phase in the development of thought and a preintellectual phase in the development of speech are clearly discernible.

II

Ontogenetically, the relation between thought and speech development is much more intricate and obscure; but here, too, we can distinguish two separate lines springing from two different genetic roots.

The existence of a prespeech phase of thought development in childhood has only recently been corroborated by objective proof. Köhler's experiments with chimpanzees, suitably modified, were carried out on children who had not yet learned to speak. Köhler himself occasionally experimented with children for purposes of comparison, and Bühler undertook a systematic study of a child on the same lines. The findings were similar for children and for apes.

"The child's actions," Bühler tells us, "were of exactly the same type as those we are familiar with in chimpanzees . . . indeed there is a phase in the life of the child, which one might well designate as the *CHIMPANZEE-AGE*. In the case of this particular child it was about the 10, 11 and 12 [sic] months. . . . It is in the chimpanzee-age, therefore, that the child makes its first small discoveries. They are, of course, exceedingly primitive

discoveries, but they are of the greatest importance for its mental development" (Bühler, 1930, p. 48).

What is most important theoretically in these as well as in the chimpanzee experiments is the discovery of the independence of the rudimentary intellectual reactions from language. Noting this, Bühler comments, "It has been said that language is the prelude to the coming of man. That may be, but even before language comes *thinking in terms of tools*, i.e., the realization of mechanical connections and the invention of mechanical means for mechanical ends. To put it briefly, before the advent of speech, action comes to have a *subjective meaning*; i.e., it becomes consciously purposive" (Bühler, 1930, p. 51).

The preintellectual roots of speech in child development have long been known. The child's babbling, crying, even his first words, are quite clearly stages of speech development that have nothing to do with the development of thinking. These manifestations have been generally regarded as a predominantly emotional form of behavior. Not all of them, however, serve merely the function of release. Recent investigations of the earliest forms of behavior in the child and of the child's first reactions to the human voice, by Ch. Bühler, Hetzer, and Tudor-Hart,⁶ have shown that the social function of speech is already clearly apparent during the first year, i.e., in the preintellectual stage of speech development. Quite definite reactions to the human voice were observed as early as during the third week of life, and the first specifically social reaction to a voice during the second month (Ch. Bühler, Hetzer, and Tudor-Hart, 1927, p. 124). These investigations also established that laughter, inarticulate sounds, movements, etc., are means of social contact from the first months of the child's life.

Thus the two functions of speech that we observed in

phylogenetic development are already present and obvious in the child less than one year old.

But the most important discovery is that at a certain moment at about the age of two the curves of development of thought and speech, till then separate, meet and join to initiate a new form of behavior. Stern's account of this momentous event was the first and the best. He showed how the will to conquer language follows the first dim realization of the purpose of speech, when the child "makes the greatest discovery of his life," that "each thing has its name" (Stern, 1914, p. 108).

This crucial instant, when speech begins to serve intellect, and thoughts begin to be spoken, is indicated by two unmistakable objective symptoms: (1) the child's sudden, active curiosity about words, his question about every new thing, "What is this?" and (2) the resulting rapid, saccadic increases in his vocabulary.

Before the turning point, the child does (like some animals) recognize a small number of words that substitute, as in conditioning, for objects, persons, actions, states, or desires. At that age the child knows only the words supplied to him by other people. Now the situation changes; the child feels the need for words and, through his questions, actively tries to learn the signs attached to objects. He seems to have discovered the symbolic function of words. Speech, which in the earlier stage was affective-conative, now, as was shown by Meumann, enters the intellectual phase. "This process," writes Stern, "may be called the intellectual one in a strict sense of this word. The understanding of the relation between sign and meaning, which appears at this stage, is something entirely different from the mere use of images and associations between them. The understanding that any object should have its own name becomes the first general concept acquired by the child" (Stern, 1914, p. 109).

At this point, the knot is tied for the problem of thought and language. Let us stop and consider exactly what it is that happens when the child makes his "great discovery," and whether Stern's interpretation is correct.

Bühler and Koffka both compare this discovery to the chimpanzee's inventions. Bühler observes, "Look at it from whatever side you will, at the decisive point a psychological parallel to the discoveries of the chimpanzee will appear" (Bühler, 1930, p. 58). The same idea has been developed by Koffka: "The function of naming things [*Namengebung*] is a discovery by the child that has a complete analogue in the inventions of chimpanzees. Both are structured actions. The name enters into the structure of the object, just as the stick becomes part of the situation of wanting to get the fruit" (Koffka, 1925, p. 243).⁷

We shall discuss the soundness of this analogy later, when we examine the functional and structural relations between thought and speech. For the present, we shall merely note that the "greatest discovery of the child" becomes possible only when a certain relatively high level of thought and speech development has been reached. In other words, speech cannot be "discovered" without thinking.

In brief, we must conclude that

1. In their ontogenetic development, thought and speech have different roots.
2. In the speech development of the child, we can with certainty establish a preintellectual stage, and in his thought development, a prelinguistic stage.
3. Up to a certain point in time, the two follow different lines, independently of each other.
4. At a certain point these lines meet, whereupon thought becomes verbal, and speech rational.

III

No matter how we approach the controversial problem of the relation between thought and speech, we shall have to deal extensively with *inner speech*. Its importance in all our thinking is so great that many psychologists, Watson among others, even identify it with thought—which they regard as inhibited, soundless speech. But psychology still does not know how the change from overt to inner speech is accomplished, or at what age, by what process, and why it takes place.

Watson says that we do not know at what point of their speech organization children pass from overt to whispered and then to inner speech because that problem has been studied only incidentally. Our own researches lead us to believe that Watson poses the problem incorrectly. There are no valid reasons to assume that inner speech develops in some mechanical way through a gradual decrease in the audibility of speech (whispering).

It is true that Watson mentions another possibility: "Perhaps," he says, "all three forms develop simultaneously" (Watson, 1919, p. 322). This hypothesis seems to us as unfounded from the genetic point of view as the following sequence: loud speech, whisper, inner speech. No objective data reinforce that *perhaps*. Testifying against it are the profound dissimilarities between external and inner speech, acknowledged by all psychologists including Watson.

"They really think aloud," observes Watson. "The reason why children are so talkative probably is due to the fact that at an early age their environment does not force a rapid shift from explicit to implicit language. . . . Even if we could roll out the implicit processes and record them on a sensitive plate or phonograph cylinder, it is possible that they would be so abbreviated, shortcircuited and economized that they would be unrecognizable unless

their formation had been watched from the transition point where they are complete and social in character, to their final stage where they will serve for individual but not for social adjustments" (Watson, 1919, pp. 322–324).

There are no grounds for assuming that the two processes, so different *functionally* (social as opposed to personal adaptation) and *structurally* (the extreme, elliptical economy of inner speech, changing the speech pattern almost beyond recognition), may be *genetically* parallel and concurrent. Nor (to return to Watson's main thesis) does it seem plausible that they are linked together by whispered speech, which neither in function nor in structure can be considered a transitional stage between external speech and inner speech. It stands between the two only phenotypically, not genotypically.

Our studies of whispering in young children fully substantiate this. We have found that structurally there is almost no difference between whispering and speaking aloud; functionally, whispering differs profoundly from inner speech and does not even manifest a tendency toward the characteristics typical of the latter. Furthermore, it does not develop spontaneously until school age, though it may be induced very early; under social pressure, a three-year-old may, for short periods and with great effort, lower his voice or whisper. This is the one point that may seem to support Watson's view.

We discussed Watson's view not only because it is very typical of theories of language and thought, and not only because it helps to elucidate the opposition between the phenotypical and genetic approaches, but also because it contains a correct methodological moment. While disagreeing with Watson's thesis concerning the role of whispering, we believe that he has hit on the right methodological approach: To solve the problem, we must look for the intermediate link between overt and inner speech.

We are inclined to see that link in the child's egocentric speech, described by Piaget (see chapter 2). Observations made by Lemaître and some other authors who studied the inner speech of schoolchildren support our point of view. These observations showed that the inner speech of schoolchildren is labile and immature; i.e., it is a genetically "fresh" function. Besides its role of accompaniment to activity and its expressive and release functions, egocentric speech readily assumes a planning function, i.e., turns into thought proper quite naturally and easily.

If our hypothesis proves to be correct, we shall have to conclude that speech is interiorized psychologically before it is interiorized physically. Egocentric speech is inner speech in its functions; it is speech on its way inward, intimately tied up with the ordering of the child's behavior, already partly incomprehensible to others, yet still overt in form and showing no tendency to change into whispering or any other sort of half-soundless speech.

We should then also have the answer to the question of *why* speech turns inward. It turns inward because its function changes. Its development would still have three stages—not the ones Watson found, but these: external speech, egocentric speech, inner speech. We should also have at our disposal an excellent method for studying inner speech "live," as it were, while its structural and functional peculiarities are being shaped; it would be an objective method since these peculiarities appear while speech is still audible, i.e., accessible to observation and measurement.

Our investigations show that speech development follows the same course and obeys the same laws as the development of all the other mental operations involving the use of signs, such as counting and mnemonic memorizing.⁸ We found that these operations generally develop in four stages. The first is the primitive or natural stage, corresponding to preintellectual speech and

preverbal thought, when these operations appear in their original form, as they were evolved at the primitive level of behavior.

Next comes the stage that we might call "naive psychology," by analogy with what is called "naive physics"—the child's experience of the physical properties of his own body and of the objects around him, and the application of this experience to the use of tools: the first exercise of the child's budding practical intelligence.

This phase is very clearly defined in the speech development of the child. It is manifested by the correct use of grammatical forms and structures before the child has understood the logical operations for which they stand. The child may operate with subordinate clauses, with words like *because*, *if*, *when*, and *but*, long before he really grasps causal, conditional, or temporal relations. He masters syntax of speech before syntax of thought. Piaget's studies proved that grammar develops before logic and that the child learns relatively late the mental operations corresponding to the verbal forms he has been using for a long time.

With the gradual accumulation of naive psychological experience, the child enters a third stage, distinguished by external signs, external operations that are used as aids in the solution of internal problems. That is the stage when the child counts on his fingers, resorts to mnemonic aids, and so on. In speech development it is characterized by egocentric speech.

The fourth stage we call the "ingrowth" stage. The external operation turns inward and undergoes a profound change in the process. The child begins to count in his head, to use "logical memory," that is, to operate with inherent relations and inner signs. In speech development this is the final stage of inner, soundless speech. There remains a constant interaction between outer and inner operations, one form effortlessly and frequently

changing into the other and back again. Inner speech may come very close in form to external speech—as was shown by Delacroix—or even become exactly like it when it serves as preparation for external speech—for instance, in thinking over a lecture to be given. There is no sharp division between inner and external behavior, and each influences the other.

In considering the function of inner speech in adults after the development is completed, we must ask whether in their case thought and linguistic processes are necessarily connected, whether the two can be equated. Again, as in the case of animals and of children, we must answer, "No."

Schematically, we may imagine thought and speech as two intersecting circles. In their overlapping parts, thought and speech coincide to produce what is called verbal thought. Verbal thought, however, does not by any means include all forms of thought or all forms of speech. There is a vast area of thought that has no direct relation to speech. The thinking manifested in the use of tools belongs in this area, as does practical intellect in general. Furthermore, investigations by psychologists of the Würzburg school have demonstrated that thought can function without any word images or speech movements detectable through self-observation. The latest experiments show also that there is no direct correspondence between inner speech and the subject's tongue or larynx movements.

Nor are there any psychological reasons to derive all forms of speech activity from thought. No thought process may be involved when a subject silently recites to himself a poem learned by heart or mentally repeats a sentence supplied to him for experimental purposes—Watson notwithstanding. Finally, there is "lyrical" speech, prompted by emotion. Though it has all the ear-

marks of speech, it can scarcely be classified with intellectual activity in the proper sense of the term.

We are therefore forced to conclude that the fusion of thought and speech, in adults as well as in children, is a phenomenon limited to a circumscribed area. Nonverbal thought and nonintellectual speech do not participate in this fusion and are affected only indirectly by the processes of verbal thought.

IV

We can now summarize the results of our analysis. We began by attempting to trace the genealogy of thought and speech, using the data of comparative psychology. These data are insufficient for tracing the developmental paths of prehuman thought and speech with any degree of certainty. The basic question, whether anthropoids possess the same type of intellect as man, is still controversial. Köhler answers it in the affirmative, others in the negative. But however this problem may be solved by future investigations, one thing is already clear: In the animal world, the path toward humanlike intellect is not the same as the path toward humanlike speech; thought and speech do not spring from one root.

Even those who would deny intellect to chimpanzees cannot deny that the apes possess something *approaching intellect*, that the highest type of habit formation they manifest is embryonic intellect.

Thorndike, who studied the behavior of marmosets, and who concluded that there are no signs of intelligence in it, nevertheless admitted that monkeys show the most advanced form of animal behavior. Thorndike's experiments showed that like humans, monkeys are able to drop ineffective movements and to acquire new effective movements almost instantly. In this respect they differ

remarkably from the lower animals, like cats, dogs, and chickens, which are able only gradually to inhibit movements that turned out to be ineffective (Thorndike, 1901).

Some other authors, like Borovsky, question the very existence of an intellectual function superimposed upon habits, and not only in animals but also in humans. Obviously for them the problem of the humanlike character of the ape's intelligence must be reformulated.

In what concerns our own point of view, we believe that at least in their use of tools, apes prefigure human behavior. To Marxists, Köhler's discoveries do not come as a surprise. Marx said long ago that "the use and creation of implements of labor, although present in embryonic form in some species of animals, are a specific characteristic of the human process of labor" (Marx, 1920, p. 153). Georgy Plekhanov elaborated on this thought, saying that "zoology introduces into history a *homo* already capable of producing and implementing some primitive tools" (Plekhanov, 1922, p. 138). It is remarkable that Plekhanov mentions the production and use of tools, i.e., the intellectual operations, rather than instinctual activity, like building dams by beavers.⁹

Therefore, we may say that *theoretically* the most recent achievements of zoopsychology do not appear as something absolutely new for Marxism. Engels, while elaborating Hegel's distinction between reason and intelligence, pointed out, "Man and animals have all forms of intellectual activity in common; *induction, deduction, abstraction, analysis* (cracking a nut is a beginning of analysis), *synthesis* (animal cunning), and, as their unity, *experiment* (when an unexpected obstacle emerges). Typologically all these methods, i.e., all ordinary logical constructions employed by science, are common to animals and man. Only the developmental level differs" (Engels, 1925, p. 59).¹⁰ Engels further speaks affirmatively about animal verbal

behavior, mentioning an *objective* criterion of understanding that animals are able to achieve: "Teach the parrot to repeat obscenities (which is a favorite pastime of sailors returning from tropical countries) and to understand their meaning in a restricted sense, then tease it, and you would see that the parrot will let loose the choicest invective precisely as Berlin's *Frau* green-grocer would do. When begging, the parrot will use words for which it will be rewarded with a tidbit" (Engels, 1925, p. 93).¹¹

We have no intention of alleging that Engels credited animals with the ability to think and speak on the human level, nor do we ourselves think so. Later we shall define the legitimate limits and actual meaning of Engels's statements. But for now we merely wish to elaborate that there are no good reasons to deny the presence in animals of embryonic thought and language of the same type as man's, which develop, again as in man, along separate paths.¹² An animal's ability to express itself vocally is no indication of its mental development. A great aptitude in the parrot for learning speech shows no connection with the level of its development of intelligence.

Let us now summarize the relevant data yielded by recent studies of children. We find that in the child, too, the roots and the developmental course of the intellect differ from those of speech—that initially thought is nonverbal and speech nonintellectual. Stern asserts that at a certain point the two lines of development meet, speech becoming rational and thought verbal. The child "discovers" that "each thing has its name," and begins to ask what each object is called.

Some psychologists, notably Delacroix, do not agree with Stern that this first "age of questions" occurs universally and is necessarily symptomatic of a momentous discovery (Delacroix, 1924, p. 286). Wallon suggested that there is a period when a child views a word as an attribute

of, rather than as a substitute for, an object: "When a one-and-a-half-year-old asks the names of objects, nothing indicates that this is something more than a simple attribution. Only systematic generalization of such questions would prove that what we see is an embryonic function of signification, rather than passive and accidental association" (Delacroix, 1924, p. 287).

Koffka takes a stand between Stern's and that of his opponents. Like Bühler, he emphasizes the analogy between the chimpanzee's invention of tools and the child's discovery of the naming function of language, but the scope of this discovery, according to Koffka, is not as wide as Stern assumes. The word, in Koffka's view, becomes a characteristic of the structure of an object on equal terms with its other characteristics.

But a characteristic such as a name is detachable [*verschiedbar*] from the object. One may see things, without hearing their names: "We ourselves, in a naive way, will call a dress blue even in the dark when we actually cannot perceive its color. But since the name is a characteristic of all objects, a child completes all structures according to this rule" (Koffka, 1925, p. 244).

Bühler also observed that each new object appears for a child as a problem, a problem to which he has the general schema of a solution—enunciating a word—but not always the particular means—a definite word. When he lacks the word for a new object, he demands it from adults (Bühler, 1930, p. 57).

We believe that this view comes closest to the truth and resolves the dispute between Stern and Delacroix. The data on children's language (supported by anthropological data) strongly suggest that for a long time to a child the word is a property, rather than the symbol of an object; a child grasps the external structure of a word-as-object earlier than the inner symbolic structure.

We choose this "middle" hypothesis among the several

offered because we find it hard to believe on the basis of available data that a child of one-and-a-half to two years is able to "discover" the symbolic function of speech. Our point of view finds support in the experimental data, which show that the functional use of signs even more elementary than words is beyond the capacity of a child of this age. Studies in the child's speech also showed that for a long period of time a child is unaware of the symbolic role of language and uses words as simple attributes of things. Observations of handicapped children (notably the case of Helen Keller) revealed, according to Bühler, that deaf-and-mute children experience no instant discovery of speech, but rather acquire it gradually, through a series of "molecular" changes (Bühler, 1930, p. 59).

The hypothesis we prefer fits in with the general pattern of development in mastering signs that we outlined in the preceding section. Even in schoolchildren the functional use of a new sign is preceded by a stage of "naive psychology," i.e., by a period of mastering the external structure of the sign.

The preintellectual character of an infant's babbling is well known. Meumann suggested that the first words are also purely affective, expressing feelings and emotions; they are devoid of objective meaning, reflecting, like an animal's "language," purely subjective reactions (Meumann, 1902). Both Stern and Delacroix challenged some aspects of Meumann's position. But at the same time both of them agreed that the first words have no permanent and objective meaning, so that in this respect they are like the swearing of the "learned" parrot.

Thus, Stern's thesis of "discovery" calls for reappraisal and limitation. Its basic tenet, however, remains valid: It is clear that, ontogenetically, thought and speech develop along separate lines and that at a certain point these lines meet. This important fact is now definitely established, no matter how further studies may settle the details on

which psychologists still disagree—whether this meeting occurs at one point or at several points, as a truly sudden discovery or after long preparation through practical use and slow functional change, and whether it takes place at the age of two or at school age.

We shall now summarize our investigation of inner speech. Here, too, we considered several hypotheses, and we came to the conclusion that inner speech develops through a slow accumulation of functional and structural changes, that it branches off from the child's external speech simultaneously with the differentiation of the social and the egocentric functions of speech, and finally that the speech structures mastered by the child become the basic structures of his thinking.

This brings us to another indisputable fact of great importance: Thought development is determined by language, i.e., by the linguistic tools of thought and by the sociocultural experience of the child. Essentially, the development of inner speech depends on outside factors; the development of logic in the child, as Piaget's studies have shown, is a direct function of his socialized speech. The child's intellectual growth is contingent on his mastering the social means of thought, that is, language.

We can now formulate the main conclusions to be drawn from our analysis. If we compare the early development of speech and intellect—which, as we have seen, develop along separate lines both in animals and in very young children—with the development of inner speech and verbal thought, we must conclude that the later stage is not a simple continuation of the earlier. *The nature of the development itself changes*, from biological to sociohistorical. Verbal thought is not an innate, natural form of behavior, but is determined by a historical-cultural process and has specific properties and laws that cannot be found in the natural forms of thought and speech. Once we acknowledge the historical character of verbal

thought, we must consider it subject to all the premises of historical materialism, which are valid for any historical phenomenon in human society. It is only to be expected that on this level the development of behavior will be governed essentially by the general laws of the historical development of human society.

The problem of thought and language thus extends beyond the limits of natural science and becomes the focal problem of historical human psychology, i.e., of social psychology. Consequently, it must be posed in a different way. This second problem presented by the study of thought and speech will be the subject of a separate investigation.¹³