"Some environments push cognitive growth better, earlier and longer than others, but different cultures do not produce completely divergent and unrelated modes of thought. The reason for this must be the constraint of our biological heritage."

The idea that different cultures produce different modes of thought is not new. Anthropologists and psychologists have long investigated cultural influences on cognitive development. However, their methods rarely have been equal to the task.

One of the most interesting and oldest lines of cross-cultural work in this area is the study of sensation and perception. More than one intelligence tester noted that performance tests often put foreigners at as much disadvantage as verbal tests did, and they concluded that perceptual as well as verbal habits could vary radically from culture to culture. Illusion. The classical work on perception was done when the Cambridge Anthropological Expedition to the Torres Straits in 1901 to 1905 found that Murray Islanders were less susceptible than Europeans to the Müller-Lyer illusion. Anthropologists found this same lack of susceptibility among the Todas of India. But as soon as researchers used three-dimensional materials with the Todas, cultural differences disappeared. Perhaps the Todas were less subject to the illusion because they were not accustomed to inferring three-dimensions from two-dimensional display.

This work suggests that particular cultural conditions such as the absence of pictures affect perception, and later studies have confirmed this theory. Members of different cultures apparently differ in the inferences they draw from perceptual cues, not in the cues they can distinguish. Given complex input, the principles of selectivity can also vary from culture to culture. Tool. Anthropological linguists like Benjamin Whorf suggest that language differences may reflect cognitive differences. More to the point than Whorf's theory that vocabulary structure influences the perception of reality is the question of how cultures differ in their use of language as a tool of thought. Psychologists who work on development are strongly influenced by Jean Piaget [P.5, May 1970]. But although Piaget has given us our richest picture of cognitive development, it is a view based almost entirely on experiments in which age alone is varied. While Piaget recognizes that environmental influences play a role, his classic experiments were confined to Western-European children, usually from the middle class. Today, many psychologists are doing Piagetian experiments in non-Western settings.

At the Harvard Center for Cognitive Studies, we have attempted to discover what kinds of cultural differences make intellectual differences at what points in development. By comparing children of different ages in extremely different cultures, we can ask the developmental question in its most radical form. And we have found that value orientation and language are two cultural constraints that affect children's development.

Are. In her studies of basic value orientation, Florence Kluckhohn points out the cognitive implications of collective and of individualistic orientations, both for individual coping...
and for social solidarity. This value contrast represents more than alternate ways of seeing how things ought to be. It is a value contrast that is central to the whole subject of culture—a matter of world view and origins and existence.

In 1964, Patricia Greenfield did a series of studies in Senegal, the westernmost tip of former French West Africa, with the idea of examining the main areas of cognitive development: concept formation and conservation in the child. Her early work showed that realizations of the mass of an object remains constant, no matter how much its shape changes. Piaget demonstrated that if you give a five-year-old two tumblers, each half full of water, and say that there is the same amount of water in each. But if, before his eyes, you pour the water from one into the other, he will say, "There is more water in this glass than in the other.

The five-year-old has a different concept of the conservation of substance— but, among the middle-class children of Paris, the same tests at the age of seven will convince the experimenter that the time the child is seven, he will understand that the amount of water in each is the same.

Wolof. The subjects in Greenfield's experiments were all Wolof, members of a small agricultural farming group. She divided the children into nine groups, according to three degrees of education: illiterate, primary, and 13-year-olds in each age level in each category.

The members of the first group had no schooling at all. The traditional Wolof village had an elementary school, they had never attended it. The second group had primary education. Some of these children—Akele, Wolof among the traditional Wolof groups: six- and seven-year-olds, eight- and nine-year-olds, and 13-years-old. There was also a group of adults.

The second major group—the bush school children—attended school in the same village or in a nearby village. She divided this group into three groups: first, second, and third-grade children, corresponding as closely as possible to the three age levels of the school groups. City school children made up the third major group.

These children lived in Dakar, Senegal's cosmopolitan capital, and, like the second group—including first-, second-, and third-graders—were questioned in Wolof, although French was the official language in instruction. In both the conservation and the concept experiments, the children gave reasons for their answers. With both American and European children, one tries to evoke the reasons by asking why. "Why do you say (or think) that thus and such is true?" Specifically, in a conservation situation, one might ask: "Why do you say this glass has more water than this one?" Unschool children met these type of question with uncomprehending silence. When, however, we changed the question to which a child could not say "thus and such is true!" the Wolof school children often answered it quite easily.

Wolof school children appear to lack Western self-consciousness: they do not distinguish between their own thought or statement about a thing and the thing itself. Thought and the object of thought seem to be one. Consequently, the idea that a statement is meaningless; one can only explain the external event. From all this we might conclude that our relativistic notion that events can vary according to point of view is not present among the Wolof. Greenfield's concept-formations studies confirm this expectation, for the unschooled children could not group a given set of objects according to color, shape, or pictures according to only one attribute, although there are several possible approaches to classify them.

Let it be noted that Wolof school children do not difference essentially from city school children in this respect. It appears that school tends to give Wolof children something akin to Western self-consciousness, for school children can answer questions implying a distinction between their own psycho-somatic reactions and external events, and, as they advance in school, they become increasingly capable of grouping the same items according to several different points of view.

Ego. Piaget has proposed that intellectual growth begins with an egocentric stage, based on the inability to distinguish between inner and outer events. A more developed egocentric then follows, in which the child can distinguish between inner and outer events, but still confuse the two. When one attributes inner psychological phenomena, such as emotions and intentions, to the features of the world, we have animism; when one gives characteristics of the world to one's own psychological processes, we speak of realism. These two tendencies are supposed to be complementary and universal forms of childhood thought.

Their mutual presence indicates the children's preliminary distinction between inner and outer.

Animism has been considered the characteristic of primitive thought- par excellence. But our findings contradict this tradition. Quite possibly, only the powerful, well cared-for, competent child sees the world in the latter manner. If so, this kind of animism children develop their superordinate structures without the kind of egocentric criticism of the European children. Thus, such egocentric cannot be a universal stage. Instead, it appears that these modes of thinking are relative to cultural conditions and values.

It should be clear by now that the kind of implicit egocentrism in which one cannot distinguish different personal viewpoints—the kind that we have been calling realism—is strikingly different from the type that explicitly relates everything to oneself. To use Piaget's terminology, one can say that the egocentrism that ends in realism is diametrically opposed to the kind that ends in "animism," or the tendency to see all physical phenomena as made by and for men. This tendency to egocentrism is an artificialistic type of egocentrism that appears in Rose Oliver and Joan Hornsby's work and is probably typical of individually oriented industrial societies.

U-you. In this country, the transition from primary to the later mode of grouping is handled by egocentrism. That is, the child tends to say that "I" or "you" have to be there, or the action "I" or "you" take toward them. But, in Fildan, Alae, Lou Libc Reid found that Ekimo children do not express the function of things in terms of personal interaction with

This appears that school tends to give that something akin to Western self-consciousness.

children nearly so often as do American children of European descent. The Ekimo child does not seem to have learned the idea that the experimenters' handling of the water—a not unreasonable assumption. This explanation might well account, for example, for the financial exigencies of the native wolf families and other environmental factors that depend for survival upon group action in hunting seal and caribou and community activities. This kind of children's culture never develop their superordinate structures without the kind of egocentrism criticism of the European children. Such, such egocentrism cannot be a universal stage. Instead, it appears that the mode of thinking is relative to cultural conditions and values.

It should be clear by now that the kind of implicit egocentrism in which one cannot distinguish different personal viewpoints—the kind that we have been calling realism—is strikingly different from the type that explicitly relates everything to oneself. To use Piaget's terminology, one can say that the egocentrism that ends in realism is diametrically opposed to the kind that ends in "animism," or the tendency to see all physical phenomena as made by and for men. This tendency to egocentrism is an artificialistic type of egocentrism that appears in Rose Oliver and Joan Hornsby's work and is probably typical of individually oriented industrial societies.

It appears that school tends to give that something akin to Western self-consciousness.
of a Wolof family evaluates and interprets the child's motor activity in terms of the relation of this activity to the people around him. That is, the Wolof child's first steps are not treated as beginning mastery of the walking process, but as evidence of the child's desire to move nearer to another person. In such a culture one would expect less mastery of physical acts and less differentiation of the physical from the social.

A social interpretation of an act not only relates the actor to the group, but also relates the group — including the actor — to physical events. When, on the other hand, adults interpret the child's early actions in terms of motor competence, other people are irrelevant, and the act becomes separated from the motivation, intention and desires of the actor himself. It would appear that there is a developmental reason for the dichotomy between physical mastery and a collective orientation and that it appears at the very beginning of life.

Image. Rabab-Zemplini confirms our hypothesis that Wolof children lack manipulatory experiences, for she notes that manipulation of objects is an occasional and secondary activity for the child from two to four and that, furthermore, the Wolof child's "self-image does not have to rest in the same way as in Europe on the power which he has over objects but rather on that which he has over other bodies." She also notes that children and adults often talk about relations between people but they rarely discuss natural phenomena.

At the same time, the Wolof culture discourages personal desires and intentions that would isolate the Wolof child from the group. Thus, the collective orientation is systematically encouraged as socialization progresses. Western society recognizes individual intention and desire as a positive function of age. But according to Rabab-Zemplini, Wolof society does the reverse. The Wolof treat the newborn child as a person full of personal desires and intentions; after he reaches the age of two, adults increasingly subordinate his desires to the end of the group. He becomes less and less an individual and more and more a member of a collective.

Poets. On a broader cultural level, this very same quality has been recognized by the poets of negritude or the African Personality as setting off black from white. In her book on Aimé Césaire, originator of the negritude concept, Liliane Krutkeoff contrasts negritude with the values of Western civilization. In opposition to the individualities of European cultures she places "solidarity born of the cohesion of the primitive clan." This strong element of collectivity or social values is particularly clear in the modern concept of African socialism, which — unlike Western socialism — is supposed to be a modernization of existing ideals and social conditions rather than a radical revolution.

These world views and ideologies are strongly reflected in cognitive growth. Bear in mind, however, that the distinctions we propose are not all-or-none. We do not know to what extent this social or collective orientation may be typical of nonindustrial, traditional, or, perhaps, oral cultures. Although our evidence comes from Africa, it may not be a valid description for every African society. Finally, we do not really know what causes what in the whole complex of features that we have discussed.

Hengka. Our second cultural constraint is language. We presented pictures in sets of three to Wolof children and asked them to choose the one that was different. In each set, two pictures were similar in color, form, and two were similar in the function of the pictured object.

The children spoke either French or Wolof. It is impossible to verbalize the three possible color groupings in Wolof without the aid of French words. Specifically, in one set of three pictures, the French word blanc must be used to describe the basis of grouping, for there is no single word for blue in Wolof. In another set, color-grouping involves two orange pictures and a red one. The Wolof language has a single word (roku) for both orange and red, so that unless the children use the French word orange, they cannot contrast the red pair with the third member of the set. For the first set of three pictures, Wolof codes the relevant colors almost as well as French.

On lexical grounds, then, one would at very least expect that children who speak only Wolof would be less color-oriented and more functionally oriented in their groupings than children who speak two languages and that, in a forced-choice situation, both of these groups would form fewer color and more functional groupings than do children who speak only French.

Surprise. The results, however, were unambiguously contrary to our expectations. The unschooled bush Wolofs could use nothing but color as a grouping principle, even when they had a chance to make second-choice groupings. In sharp contrast, the other groups of children used color less and less with age; increasingly they turned to shape or function to make their groupings. Obviously, the lack of color words does not stop monolingual Wolofs from grouping by color. But does it make their color discrimination less accurate? Recall that one set of pictures consists of two predominately orange pictures and one predominately red one. We counted it an error when a child who claimed to be grouping by color selected one orange and one red picture as being most similar. If such errors of discrimination are due to language coding, Wolof monolinguals should make them most frequently, Wolof bilinguals next most frequently, French monolinguals not at all. The results are exactly as predicted. At every age, bilinguals make fewer errors of this kind than Wolof monolinguals, and French monolingual children make no such errors at all.

But even among children who speak only Wolof, mistakes are relatively rare — we never found more than three color errors in a group of 30 children. We begin to wonder whether the lexical features of language should be assigned a large role in thought as it's food for thought.

Send me the New Republic for 23 weeks and bill me $4.30 or 46 weeks for $8.25

Mail to: Circulation Department
The New Republic, 281 W. Center St., Marion, Ohio 43302

Name
Address
City State Zip

Today, twenty-five cents won't buy a good cup of coffee and a fresh doughnut.

But for less than a quarter you can nourish an active mind. The New Republic is the food of controversy, of intellect, of polemic, of honest journalism, and forthright opinion.
has been claimed by Benjamin Whorf and others.

These perceptual errors decrease with age until at last they are completely eliminated in all groups. It appears that age brings increasing accuracy in perceptual discriminations. This would appear to be a universal trend, even when the lexicon of a culture hinders such discrimination. One may conclude that, with age, reality in some way overcomes the oppositions of language.

Navaho. David McNeill suggests that such findings prove merely that people learn to see, that language influences memory but does not affect perception. Some research reinforces this view. In a classic experiment, John Carroll and Joseph Cassagrande asked children which of two objects (for example, a yellow block and a blue rope) would go best with a third item that was like one of the pairs in color and like the other in shape. The subjects were Navaho-dominant and English-dominant Navaho children and white children from three to 10 years. The experimenters expected the Navaho-dominant group to be more sensitive to form than the other groups, because in Navaho the form of an object dictates the verb of handling. The Navaho-dominant Indian children did indeed classify by form more frequently than did the English-dominant group, but, alas, the white children, who knew no Navaho used form most frequently of all.

But language does influence perception, at least during childhood. As early as 1940, Polish center produced color-matching errors by teaching children an artificial vocabulary in which certain colors were indistinguishable. Later, when the children learned different words for the different colors, they continued to show perceptual discriminations. Ernie Lenneberg, on the other hand, claims that the influence of language on perception diminishes with age, for he finds that the absence of certain color terms, which impairs color memory in Zuni adults and present color perception in Wolof children, does not affect present color perception in Zuni children.

Coding. McNeill's hypothesis about language affecting only the memory pattern is plainly false. Yet his notions of a linguistic label plus a correct visual image may still hold. In fact, Howard Rankin shows that linguistic coding in the form of labels can help when it is a matter of ordering shapes relative to one another, when it is not necessary to remember exact forms, but such labeling can hinder performance when the task requires a precise image of the same stimuli (as in a mental jigsaw puzzle).

Perhaps different cultures vary in their tendency to use linguistic coding. Unskilled Wolof children, for instance, tend to explain their grouping choices by pointing to the common pictorial elements. This method may counteract the detrimental effects of an inexact vocabulary by bypassing language altogether. In assessing cross-cultural studies, we do well to remember that most cultures are non-technical, traditional, and less verbally oriented than our own.

It appears from this and other work that the presence of labels in a language encoding can affect the ordering of stimuli by providing a way to relate them across time or space. The potential influence of linguistic encoding becomes stronger as cognitive conditions become more difficult. But actual linguistic influence depends upon whether labels are available to a given person and are activated in a particular situation.

Concept. There has been much controversy about the role of superordinate words in conceptual thought. In contrast to French—and to English—the Wolof language has neither the word "color" nor the word "shape." It is clear from the results of our experiments that the lack of the word "color" does not hinder the Wolof from forming color groupings. Does the absence of the general term, however, mean that the Wolof have no general concept of color?

One set of pictures used with the Wolof consisted of a yellow clock, a banana, and an orange. Suppose we represent the hierarchical structure of the three pictures in this way.

```
yellow  orange  clock
banana orange  clock
banana  orange  yellow
```

If a person uses the superordinate words "color" or "shape" to deal with his arrangement of the pictures, he is operating at the top of the hierarchy and has access to the entire hierarchy. If he is pressed, he should be able to supply more than one kind of attribute. For he is plainly contrasting, say, color with shape or with use. By the same reasoning, his exclusive use of names like "round" or "yellow" would mean that he was operating on one level only in the hierarchy. He would be cut off from the top of the hierarchy and would therefore be less likely to operate in branches other than the one in which he found himself.

If this reasoning is correct, then one would expect that, if a subject ever used an abstract word like "color" or "shape," he could vary his method of grouping when he was asked to make a first and second choice of pairs for each of the three sets of pictures. But if he used only a concrete word like "red," then he would form nothing but color groupings in all six tasks.

Access. Our results do indeed indicate that there is a significant association between use of superordinate words like "color" and "shape" and the number of attributes used for grouping. And this relationship holds when all other factors such as knowledge of French and school level are held constant. Thus, the native Wolof child uses a superordinate word, his chances of grouping by a variety of attributes are twice as great as those of a child who uses no superordinate vocabulary. Recall that when a Wolof child uses the word "color," he is introducing a French word into a Wolof linguistic context.

We also carried out the experiment in French with French third-grade children. If a French child uses an abstract "top-of-the-hierarchy" label, he is almost certain to vary his basis of grouping at least once. But when a native Wolof child is questioned in French about his"
French, there is little relationship between use of superordinate terms and variety of grouping attributes. So we must conclude that the point is not to indicate a child’s access to the conceptual hierarchy only if he has thoroughly mastered the semantics of the terms. Such apparently is the case under normal conditions of spontaneous use in the context of a native language.

Depth. Superordinate class words are not a hallmark of a language which do not have to deal with concrete phenomena, as Roger Brown hypothesizes. In a way quite different from that envisaged by Whorf, we seem to have found a important correspondence between linguistic and conceptual structure. But it relates not to words in isolation but to their depth of hierarchical embedding in the language and in thought. This correspondence has to do with the presence or absence of higher-order words that can be used to integrate different domains of words and objects into structures. No matter how rich the vocabulary it is difficult to use as an instrument of thought if it is not organized into a hierarchy that can be activated.

Consider the grammatical aspect of language. Superordinate structure is different from the general word like color or shape, just as the grammar of a language is different from its vocabulary. To indicate a superordinate group, one must explicitly state that the attribute is shared by every member of the group. Thus, "they are all the same color" would have the same structural state as "they are all red." Previous work has shown that one's structure of such groupings becomes increasingly superordinate with age.

Change. Senegalese children conform to the usual developmental progression. Although the grouping choices of the untaught Wolof group got increasingly systematic with age, their descriptions showed at the younger age than the older age, "they are all the same color," or "they are all red," untaught Wolof children said nothing.

Consider the matter in purely grammatical terms. Let us assume that there are three stages of symbolic reference. The first is the mere pointing at an object. The second consists of nothing more than a verbal tag, which replaces or accom- panies the pointing. In the third stage, this label is integrated into a complete sentence.

Among French monolinguals, not even first-graders point. Pointing, however, occurs at a definite position in the reasoning of all the youngest Wolof groups, especially the un- taught, but disappears in all groups with advancing age. Other differences set the untaught children apart from all the school children. In the un- taught groups, labeling increases with age. But the use of sentences re- mains at a constant level. In all the school groups, both Wolof-French bilingual and French monolingual, sentence placement ("they are all red") becomes the rule with age and increased schooling.

There is, let it be noted, virtually no difference in any measure between the oldest French monolinguals and the oldest Wolof-French bilinguals when the experiment is run in French. When we carry out the experiment in the native language of each group, the super- ordinate group is a slightly one of the French. The contrast is most dramatic between Wolof school children speaking French and untaught children questioned in Wolof. Some 97 percent of the 11- to 13-year-old Wolof-French monolinguals indicate grouping with labels, 90 percent of the Wolof sixth graders doing the experiment in French. But among Wolof-French monolinguals, the 11- to 13-year-olds get 68 percent.

Link? Is there any direct relation between grammar and concept structure? A child can frame an explicit superordinate structure with either labels or sentences. Using labels, he says, "These red," or "red." Expressing the same structure in sentence form by asking a form of the verb to be; "These (or "they") are round." Among Wolof children, a particular instance of reference is strongly asso- ciated with a particular conceptual structure. When a school child frames a sentence form, the probability that he will form a superordinate structure is on the average almost three times as great at when he uses simple labeling. For an untaught child, this same probability of a superordinate structure is almost six times as great when his reasons are sentences rather than labels.

Force. We are led to the hypothesis that school affects grouping operations through the training embodied in the written language. This hypothesis has a good theoretical basis. The written language, as Lev S. Vygotzky points out, forces one to use language out of the immediate context of reference. The writer cannot use simple pointing, nor can be counted on labeling that de- pends on the present context. Writing, then, is training in the use of linguistic contexts that are independent of immediate references. Indeed, the linguis- tic independence of context achieved by written language appears to favor the development of the more self-contained superordinate structure. In school children, words are systematically and continually "there" without their referent. Wolof-French monolinguals, from 11 to 13 years old, are almost no longer inhere in their re- ferent, they must go somewhere; and the best way of doing it is the psyche of the language user. Thus, the separation of word and thing demands a notion that words and things are more different and more independent than it refersents. Meaning varies with the particular speaker, and the notion of psychologically independent reference is a simple example. Implicit in this notion is the distinctiveness of oneself and one's point of view. Thus, a school child must learn that mentally and conceptually separate himself from the group; he must become self-conscious, aware of his part in relation to things, a certain individuality.

The destruction of nominal or verbal solidarity brings into play the metaphor of the child, which dominates and ultimately fragments the unitary solidi- darity of a "realistic" world view. Once thought has been disintegrated from its objects, the stage is set for symbolic processes to run ahead of concrete fact, for thought to exist without possibility other than actuality. At this point, symbolic reference can go beyond the capacities of the child, for who, at this young age, can think of himself as the ruler? As the function of symbols grow, the way is opened for Piaget's stage of for- mal operations. So school and the written language is a privileged position in the shift from a collec- tive to an individualistic orientation.

Gian beach and from South Africa. How, then, do school and language interaction determine that behavior has no effect out of the blue. It has an evolutionary history, and it affects the individual child's ability to think of himself as the ruler and the ruler of the world. We are primates, and our primate heritage affects our group. But it affects individuals, the nature of the social system and technology. It is the raw material that man's evolution was his capacity for language and symbolism, and this only justified, gradually achieved realization became possible by formal training. Edward Sapir may have been quite right in pointing out that no human language can be shown to be more sophisticated than any other and that the speech used by the member of the Academy is no more complex than that of a Hunter-gatherer. But again it was Sapir who pointed out that people are more different from each other as an effect of the powerful tool for organizing thought from their use of language. Intellectual nurturting that fully de- velop language as a tool of thought requires years and complex training. So the serious child, and even the adult, has not outgrown the need for formal training. Sapir said, "Development among primitive people is characterized on the one hand by a relative emphasis on growth and on the other by a relatively early arrest of the proc- ess of intellectual growth." His remark is telling with respect to the learning environment we find between school children and those who have not been to school. The way we now use language is not the way they do now go on to new levels of operation.

In short, some environments push a certain level of growth, others retarde, and still others are not. The school is quite different from the home, from the market, from the church, from the local community. In other words, different cultures do not produce complete or completely differently and independently of thought. The reason for this must be the constraint of our biological heri- tage. That heritage makes it possible for man to reach a form of intellectual maturity that can elaborate a highly technical, industrial society. Less techni- cal societies do not produce so much symbolic embedding nor so many ways of looking and thinking. Whether one wishes to judge these differences on some universal human scale as favoring an industrial man is a matter of one's values. But, however one judges, it be clear that a decision not to intervene in the intellectual development of those who live in less technically de- veloped societies cannot be based on the careless claim that it makes little difference.