

Watching Wolof youngsters pour water may seem to be lighting the tiniest of candles, but it is only by getting outside our own culture that we can hope to glimpse the nature of man. Jerome Bruner has carried the torch for better education for over a decade, and his Harvard research into the growing infant mind has taught us much about the surprising intelligence and flexibility of the baby. The research Patricia Greenfield brought back from Senegal fits into the body of Bruner's work and concern. Greenfield and Bruner agree that intelligence is largely the internalization of the tools—including language—provided by the culture, and that *culture-free* means *intelligence-free*. This chapter from Bruner's new book, *The Relevance of Education*, throws a strong light on the importance of the education process.

—Elizabeth Hall

# Work with the Wolof



"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."

**T**HE 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 displays.

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.T.*, 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 the children's development.

**Are.** In her studies of basic value orientation, Florence Kluckhohn points out the cognitive implications of collective and of individualistic orientation, both for individual coping

and for social solidarity. This value contrast represents more than alternate ways of seeing how things ought to be. It reflects a contrast in how things *are*—a matter of world view and origins and existence.

In 1963 through 1964, Patricia Greenfield did a series of studies in Senegal, the westernmost tip of former French West Africa. She explored two main areas of cognitive development: concept formation and conservation in the classic Piagetian sense—i.e., in the realization that 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, he will say that there is the same amount of water in each. But if, before his eyes, you pour the water from one glass into a tall, narrow container, he will say that there is more water in this glass than in the other one. The five-year-old has a different concept of the conservation of substance, but—among the middle-class Swiss children that Piaget studied—by the time the child is seven, he will understand that the amount of water in each glass remains the same.

**Wolof.** The subjects in Greenfield's experiments were all Wolof, members of the country's dominant ethnic group. She divided the children into nine groups, according to three degrees of urbanization and education, with three age levels in each category.

The members of the first group had never left the bush. Although their traditional Wolof village had an elementary school, they had never attended it. She divided these rural, unschooled Wolof among three age groups: six- and seven-year-olds, eight- and nine-year-olds, and 11- to 13-year-olds. There also was 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 among first-graders, third-graders and sixth-graders, corresponding as closely as possible to the three age levels of the unschooled groups. City school children made up the third major group. These children lived in Dakar, Senegal's cosmopolitan capital, and—like the second group—included first-, third- and sixth-graders. All the children were questioned in Wolof, although French was the official language of instruction.

In both the conservation and the

concept experiments, the children gave reasons for their answers. With both American and European children, one generally evokes the reason by asking: "Why do you say (or think) that thus and such is true?" Specifically, in a conservation problem, one might ask: "Why do you say that this glass has more water than this one?" Unschooled children met this type of question with uncomprehending silence. When, however, we changed the question to "Why is thus and such true?" unschooled children often answered it quite easily.

Unschooled Wolof 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 of explaining 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 prevalent among the Wolof. Greenfield's concept-formation studies confirm this expectation, for the unschooled children can group a given set of objects or pictures according to only one attribute, although there are several other possible ways to classify them.

Let it be noted that Wolof school children do not differ essentially from Western 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 psychological 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 internal and external. A more developed egocentrism then follows, in which the child can distinguish between inner and outer but still confuses the two. When one attributes inner psychological phenomena, such as emotion, to inanimate features of the world, we have *animism*; when one gives characteristics of the inanimate, external world to one's psychological processes, we speak of *realism*. These two tendencies are supposed to be complementary and universal forms of childish thought.

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

Animism often has been considered the characteristic of primitive thought par excellence. But our findings contradict this opinion. Quite possibly, only the powerful, well-cared-for, competent child sees the world in the pattern of his own feelings, and the child of traditional subsistence cultures like that of the Wolof never passes through the animistic stage. Abram Kardiner has noted that only when the child's every whim is satisfied is he led to believe that his thought is omnipotent. Our claim here is more severe. It is that where the culture gives no support for individualistic orientation, animism does not develop. The world stays on one level of reality—the realistic level.

Other studies support this point. In an experiment done in the United States, Rose Olver and Joan Hornsby showed children an assortment of pictures and asked them to put the similar ones together. Very young children often put things together because they fit into the same story, or whatnot. As they grow older, children increasingly form groups by placing those things together that share a common attribute. This is called superordinate grouping.

**I-You.** In this country, the transition from the earlier to the later mode of grouping is handled by egocentrism. That is, things are alike by virtue of the relationship that "I" or "you" have to them, or the action "I" or "you" take toward them. But, using parallel techniques in Anchorage, Alaska, Lee Reich found that Eskimo children do not express the function of things in terms of personal interaction with

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them nearly so often as do American children of European descent. The Eskimo value system puts emphasis on self-reliance but it strongly suppresses any expression of individualism. The Eskimos have a subsistence culture that depends for survival upon group action in hunting seal and caribou and communal stone-weir fishing. Eskimo children develop their superordinate structures without the kind of egocentrism that we observe in European children. Thus, such egocentrism cannot be a universal stage. Instead, it appears to be clearly 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 could say that the egocentrism that ends in realism is diametrically opposed to the kind that ends in "artificialism," or the tendency to see all physical phenomena as made by and for men. This tendency is closely related to animism. It is the artificialistic type of egocentrism that appears in Rose Olver and Joan Hornsby's experiments and that is probably typical of individualistically oriented industrial societies.

**Magic.** In the Senegalese experiments, unselfconscious realism was clear at yet another point. Here, too, one sensed its origins in the indigenous society's lack of control over the inanimate world. As in the classic experiment on the conservation of liquids, Greenfield showed Wolof children two identical beakers, one of them filled with water to a certain level. The Wolof child poured an equal amount in the second beaker. Then the experimenter poured the water from one beaker into a longer, thinner beaker, in which the water level was higher. She then asked the child if the two beakers contained the same amount of water, or if one beaker held more water than the other. The child gave a reason for his answer.

Wolof children tended to support non-conservation judgments with a reason that we had not encountered among American children (although Piaget reports one example in a Swiss four-year-old). The child would say, "It's not the same" because "you poured it," explaining a natural phenomenon by attributing special "magi-

cal" powers to the experimenter. That is, faced with the change in the water, the child bases his causal inference on the experimenter's handling of the water—a not unreasonable assumption. But this explanation mingles contiguous physical events with contiguous social events—a causal chain unacceptable in our society. This kind of magical causation is possible only in a realism in which animate and inanimate phenomena occupy a single plane of reality.

Note well that school suppresses this mode of thinking with astonishing absoluteness. There is not one instance of such reasoning among either bush or city Senegalese children who have been in school seven months or longer. School seems to promote the self-consciousness born of a distinction between the human processes and the physical phenomena.

**Control.** One can argue that just as soon as the child has control of the situation, his realism and magical reasoning will disappear, for a child might be willing to attribute powers to an authority figure like the experimenter that he would not claim for himself. And so it was. We repeated the experiment with one exception: this time the child did *all* the pouring himself.

Among the younger children, two thirds of the group who transferred the water themselves achieved conservation, in contrast to only one quarter of the children who had only watched the experimenter pour. Among the older children the contrast was equally dramatic: eight in 10 of those who did the pouring themselves—as compared with slightly less than half of those who watched the experimenter—achieved conservation. When the child did his own pouring, the reasons he gave were dramatically different from those he gave when an adult was pouring. Magical action virtually disappears among the unschooled children and they justify conservation by saying, "They were equal at the beginning."

**Tiv.** Douglass Price-Williams' study of conservation among Tiv children in Nigeria supports our study. He found that all Tiv children achieve conservation by age eight, in sharp contrast to only half of the much older Senegalese children. But Tiv culture is quite different from Wolof, for it promotes an active, manipulative approach to the physical world. Price-Williams describes the children as spontaneously pouring the earth he used in the exper-

iment, and as reversing the experiment on their own initiative. Unschooled Wolof children never showed such initiative during the experiments, and this single factor may well be the key to the great disparity between the two cultures in their response to conservation tests.

**Mastery.** It may be that a collective value orientation develops when the individual lacks power over the physical world. Lacking personal power, he has no notion of personal importance. He will be less likely to set himself apart from others and from the physi-

"It may be that a collective value orientation develops when the individual lacks power over the physical world."

cal world; he will be less self-conscious; and he will place less value on himself. The very same Wolof children who lack self-consciousness when they are questioned about their "thoughts" also seem, in the conservation experiment, to be hindered by a lack of experience in manipulating the physical world. Thus, mastery over the physical world and individualistic self-consciousness should appear together in a culture.

Is there, however, developmental reason for this dichotomy between individual mastery and a collective or social-value orientation? Is there a point in child rearing at which a choice is made? Jacqueline Rabain-Zempléni studied the Wolof child in his traditional bush setting from the time of his weaning (age two) to his integration into a peer group (age four). Her findings confirm our interpretation of later intellectual development among the Wolof children and show how Wolof child-training practice and infant experience dramatically foreshadow these developments.

Her work shows that adult members

(Continued on page 74.)



of a Wolof family evaluate and interpret 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 motivations, intentions 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.** Rabain-Zempléni confirms our hypothesis that Wolof children lack manipulatory experience, 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 Rabain-Zempléni, Wolof society does the reverse. The Wolof treat the newborn child as a person full of personal desire and intention; after he reaches the age of two, adults increasingly subordinate his desires to the ends of the group. He becomes less and less an individual and more and more a member of a collectivity.

**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, Lilyan Kesteloff contrasts *negritude* with the values of Western civilization. In opposition to the individualism of European cultures she places "solidarity born of the cohesion of the primitive clan." This strong element of collective 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.

**Honka.** Our second cultural constraint is language. We presented pictures in sets of three to Wolof children and asked them to choose the two out of each three that were alike. In each set, two pictures were similar in color, two were similar in 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

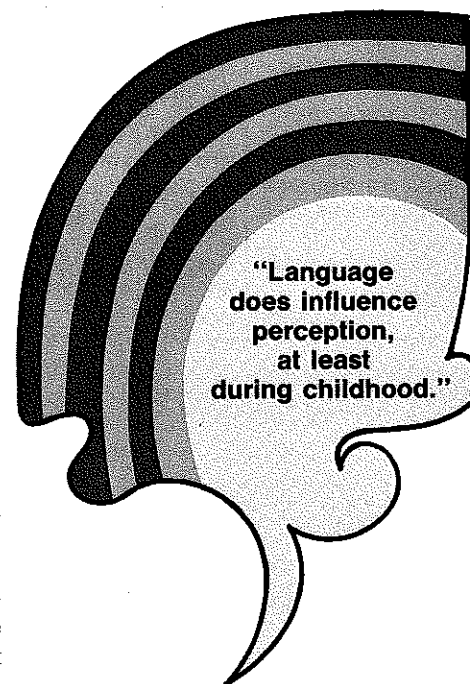
without the aid of French words. Specifically, in one set of three pictures, the French word *bleu* must be used to describe the basis of grouping, for there is no single word for blue in Wolof. In another set, color-grouping involves two orange pictures and a red one. The Wolof language has a single word (*honka*) 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 groups 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 predominantly orange pictures and one predominantly 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, and 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 20 children. We begin to wonder whether the lexical features of language should be assigned as large a role in thought as



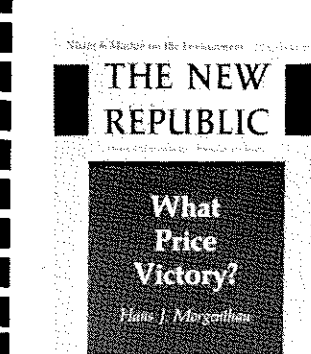
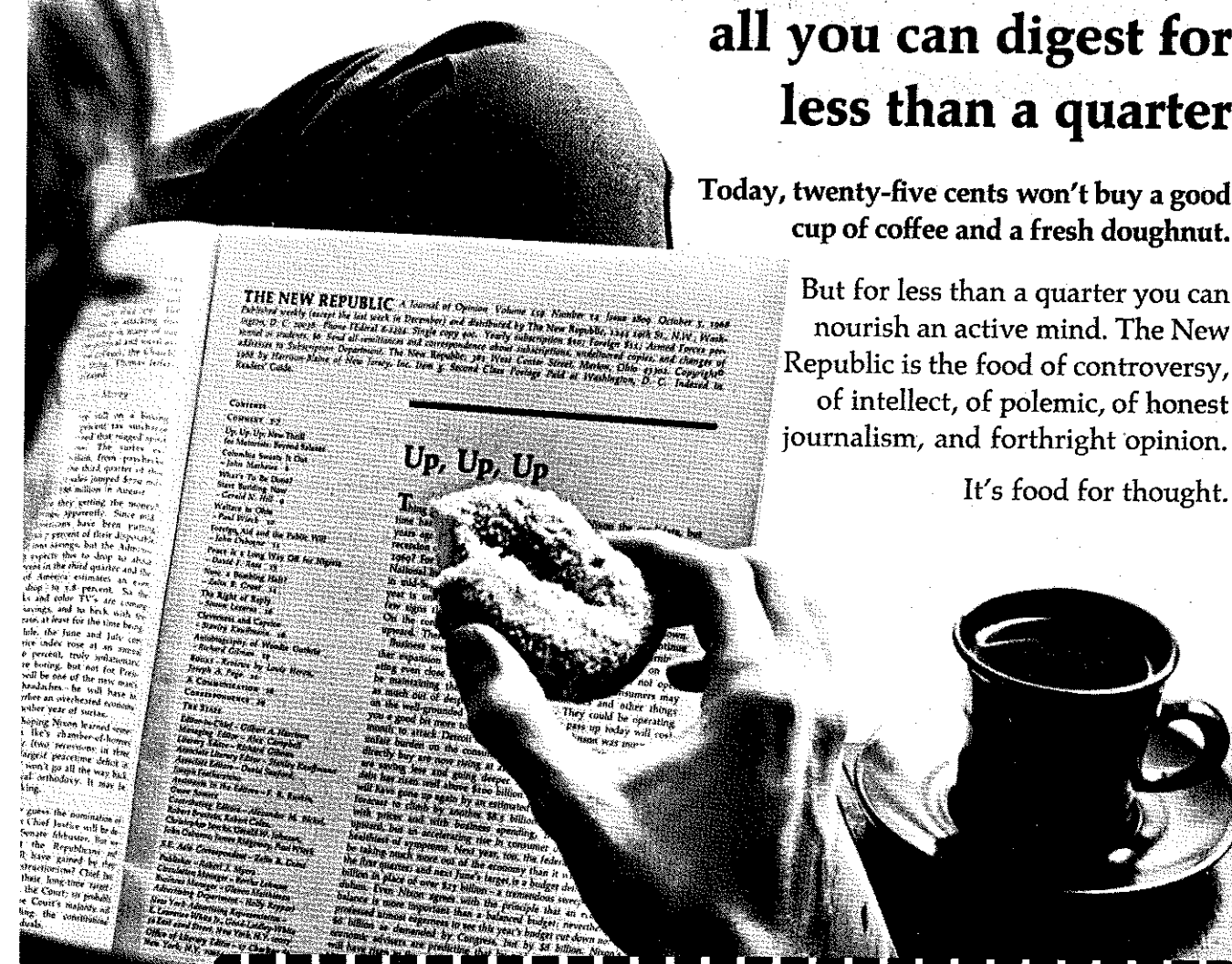
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has been claimed by Benjamin Whorf and others.

These perceptual errors decrease with age until at last they are completely eliminated in all groups. It appears that age brings increasingly accurate 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 increasingly 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 Casagrande 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 pair 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 children 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 ones, 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 1915, W. Peters experimentally 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, the corresponding perceptual discriminations appeared. Eric Lenneberg, on the other hand, confirms the notion that this 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 adults.

**Coding.** McNeill's hypothesis about language's affecting only the memory pattern plainly is false. Yet his notions of a linguistic label plus a correct visual image may still hold. In fact, Howard Ranken shows that linguistic coding in

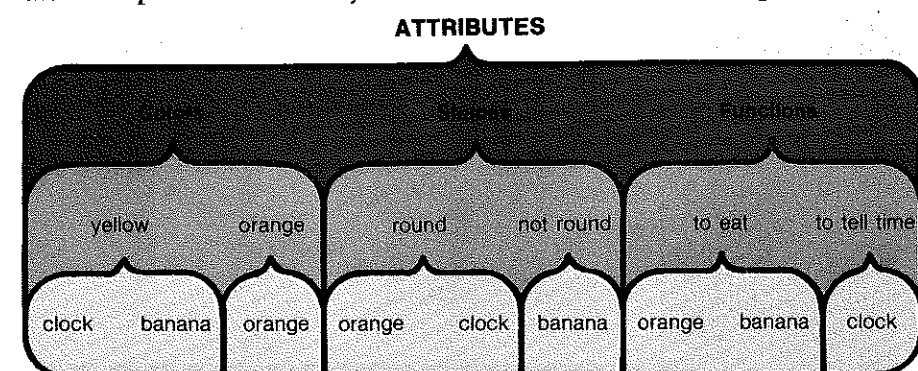
the form of labels can help when it is a matter of ordering shapes relative to one another, when it is not necessary to remember exact forms, but such labeling can hinder performance when the task requires a precise image of the same stimuli (as in a mental jigsaw puzzle).

Perhaps different cultures vary in their tendency to use linguistic coding. Unschooled 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 word, 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:

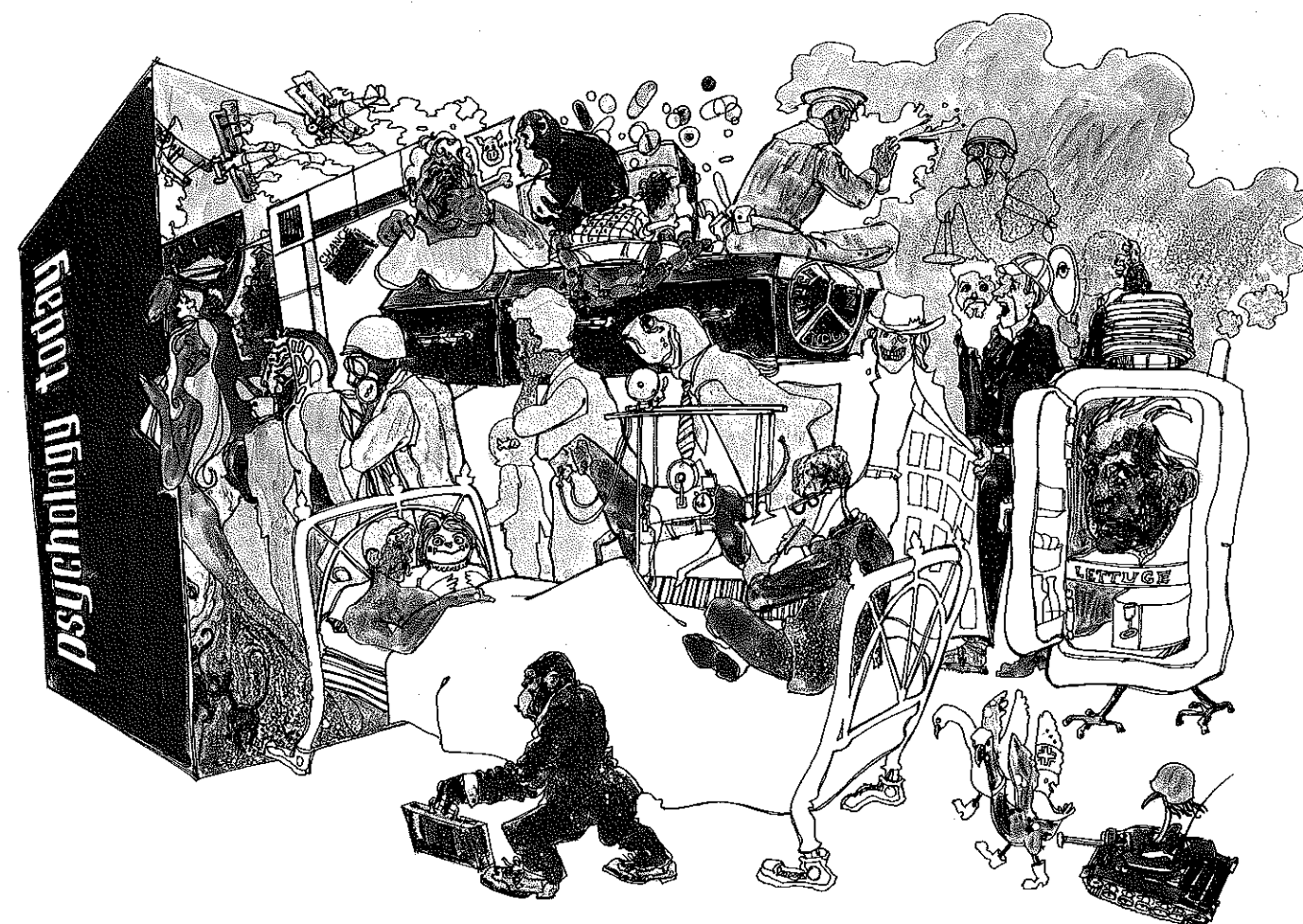


If a person uses the superordinate words "color" or "shape" to deal with his arrangement of the pictures, he is operating at the top of the hierarchy and has access to the entire hierarchy. If he is pressed, he should be able to supply more than one kind of attribute. For he is plainly contrasting, say, 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 one level lower 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, if a 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 sixth-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 Wolof children are questioned in



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French, there is little relationship between use of superordinate terms and variety of grouping attributes. So we must conclude that abstract terms indicate a child's access to the conceptual hierarchy only if he has thoroughly mastered the semantic implications of the terms. Such apparently is the case under normal conditions of spontaneous use in the context of one's native language.

**Depth.** Superordinate class words are not just a luxury for people who 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 an important correspondence between linguistic and conceptual structure. But it relates not to words in isolation but to their depth of hierarchical imbedding both 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 of limited 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 use of a 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 status 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 trend. Although the grouping choices of the unschooled Wolof group got increasingly systematic with age, their explanations showed a somewhat different form. Instead of explicitly connecting the common attribute to every member of their groupings by saying, "they are all the same color," or "they are all red," unschooled Wolof children said nothing more than "red."

Consider the matter in purely grammatical terms. Let us assume 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, occupies a definite position in the reasoning of all the youngest Wolof groups, especially the unschooled, but disappears in all groups with advancing age. Other differences set the unschooled children apart from all the school children. In the unschooled groups, labeling increases with age. But the use of sentences remains at a constantly low 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 on 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 superiority is slightly on the side of the French. The contrast is most dramatic between Wolof school children questioned in French and unschooled children questioned in Wolof. Some 97 per cent of the 11- to 13-year-old Wolof monolinguals indicate grouping with labels; 90 per cent of the Wolof sixth graders doing the experiment in French use sentences.

**Link?** Is there any direct relation between grammatical and conceptual structure? A child can frame an explicit superordinate structure with either labels or sentences. Using labels, he says, "These . . . round"; he can express the same structure in sentence form by adding a form of the verb to

be; "These (or "they") are round." Among Wolof children, a particular mode of reference is strongly associated with a particular conceptual structure. When a school child frames a reason in sentence form, the probability that he will form a superordinate structure is on the average almost three times as great as when he uses simple labeling. For an unschooled 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. Vygotskii points out, forces one to use language out of the immediate context of reference. The writer cannot use simple pointing, nor can he count on labeling that depends on the present context. Writing, then, is training in the use of linguistic contexts that are independent of immediate referents. Indeed, the linguistic independence of context achieved by certain grammatical modes appears to favor the development of the more self-contained superordinate structure used by the school children.

Note the recurrent theme that has been running through all our results: it is always schooling that makes qualitative differences in directions of growth. Wolof children who have been to school are more different intellectually from unschooled children living in the same bush village than they are from city children in Mexico City or Brookline, Massachusetts. Similar results demonstrating the huge impact of school have emerged from the Bel-

gian Congo and from South Africa.

How, then, do school and language interrelate? We may hypothesize that French is a powerful factor in the cognitive growth of the children we have studied because it is a written language. All the language features that we have discussed in relation to concept formation become necessary when one must communicate away from the context of immediate reference. And it is precisely in this respect that written language differs from spoken. But school itself provides the same opportunity to use language out of context—even spoken language—for, to a very high degree, what one talks about are things not immediately present.

**Psyche.** How exactly does the school process relate to the decline of a "realistic" world view and the rise in self-consciousness discussed earlier? When a word is considered to be as "real" as the thing for which it stands, the psychological attitude (and philosophical position) is called nominal or verbal realism. School separates word and thing and destroys verbal realism by presenting a situation in which words are systematically and continually "there" without their referents.

When names—or symbols in general—no longer inhere in their referents, they must go somewhere; and the logical place is the psyche of the language user. Thus, the separation of word and thing demands a notion that words are in a person's head, not in his referents. Meaning varies with the particular speaker, and the notion of psychological relativity is born. Implicit in this notion is the distinctness of oneself and one's own point of view. Thus, the individual must conceptually separate himself from the group; he must become self-conscious, aware of having a particular slant on things, a certain individuality.

The destruction of nominal or verbal realism may thus be the wedge that ultimately fragments the unitary solidarity of a "realistic" world view. Once thought has been dissociated from its objects, the stage is set for symbolic processes to run ahead of concrete fact, for thought to be in terms of possibility rather than actuality. At this point, symbolic reference can go beyond the capacities of visual images, and the way is opened for Piaget's stage of formal operations. So school and the written language may have a privileged position in the shift from a collec-

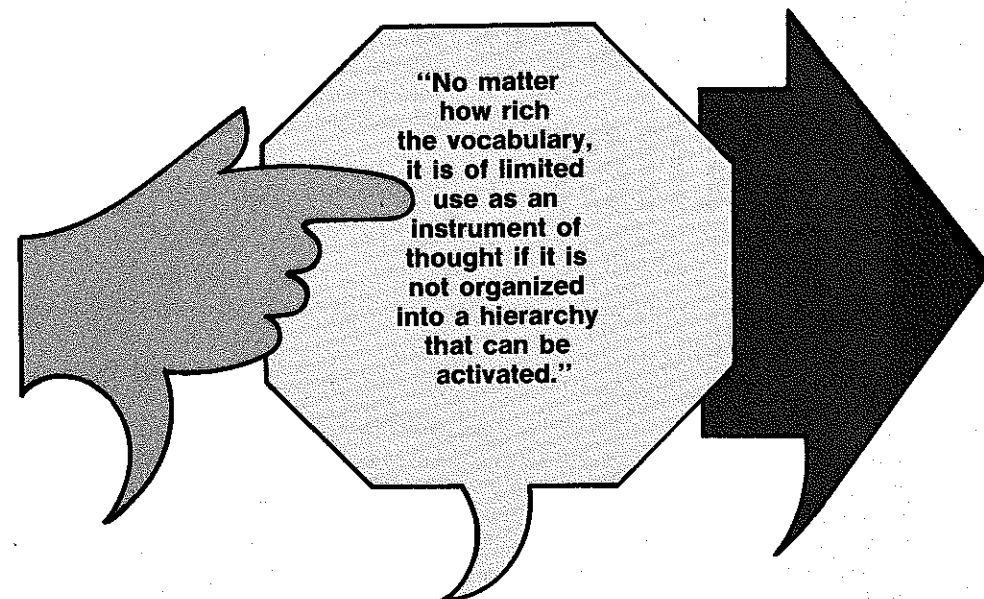
tive to an individualistic orientation.

None of this supports a complete cultural determinism. Species-specific behavior does not appear out of the blue. It has an evolutionary history, and that history reflects itself in the early growth of the young. We are primates, and our primate heritage affects our growth. All cultures must work on the stuff of the biological organism, specifically on man's primate constraints.

One of the huge discontinuities in man's evolution was his capacity for language and symbolism, and this only gradually achieves realization through 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 Hottentot. But again it was Sapir who pointed out that peoples differ from each other precisely in extracting the powerful tools for organizing thought from their use of language. Intellectual nurturing that fully develops language as a tool of thought requires years and complex training.

**Reach.** As Heinz Werner pointed out, "Development among primitive people is characterized on the one hand by precocity and, on the other, by a relatively early arrest of the process of intellectual growth." His remark is telling with respect to the difference we find between school children and those who have not been to school. The unschooled stabilize earlier and do not go on to new levels of operation.

In short, some environments push a certain form of 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. That heritage makes it possible for man to reach a form of intellectual maturity that can elaborate a highly technical, industrial society. Less technical 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 industrial man is a matter of one's values. But, however one judges, let it be clear that a decision *not* to intervene in the intellectual development of those who live in less technically developed societies cannot be based on the careless claim that it makes little difference.



#### Answers to Woman & Man Questions:

1. a. William Masters.
2. True. A study of chemists' salaries showed that, with seniority held constant, women who held Ph.D.s earned less than men with B.A.s.
3. a. A husband may not collect Social Security based on his wife's earnings.
4. c. The mother's attitude toward breast-feeding.
5. c. Two hundred per cent more.
6. False. Fewer than two per cent were women.
7. c. It was a joke, put in as a last-minute attempt to get the bill defeated.
8. c. In 1966.
9. c. Women earn half as much as men.
10. True. In the United States, only one per cent of the engineers are women.
11. b. One in eight women is the sole support of a family.
12. False. Men lose slightly more.
13. False. There is only one woman Senator.
14. a. Shirley Chisholm.
15. c. In 1968.
16. b. The sea horse.
17. True. Women drivers have fewer accidents than men drivers.
18. e. All of the above.
19. b. Equal Pay Act of 1963.
20. True. Negroes were granted the right to vote 50 years before women were.
21. c. The idea was Mrs. Greene's, but since women could not be inventors, Whitney built the machine for her.
22. b. English women were fully enfranchised in 1928.
23. False. They develop from female structures.
24. a. A human relations director at a large university.
25. False. Two out of three wanted permanent jobs.
26. d. Forty per cent less than men.
27. False. Clitoral orgasms are not a sign of emotional or sexual immaturity.
28. b. He is within his rights since the Public Accommodations Section of the Civil Rights Act does not forbid discrimination based on sex.
29. True. In 1900 the typical woman worker was 26 and single, now she is 41 and married.
30. c. Georgia ratified the 19th Amendment in 1970.
31. False. The reverse is true.
32. True. At the last count, a majority of men saw no objection to the idea of a woman President of the U.S.
33. b. Abigail Adams.
34. a. In 1734.
35. d. Both b. (Real physiological changes) and c. (Cultural stereotypes associated with the menstrual cycle).
36. c. Sigmund Freud.
37. c. Ninety-nine and six tenths per cent. (According to a Chase Manhattan Bank survey.)
38. c. In Denmark 75 per cent of dentists are women.
39. False. The length of the penis has little bearing on whether or not a woman will reach orgasm.
40. b. Five. (California, Florida, Nevada, Pennsylvania, Texas).
41. False.
42. True. One of the major sources of Hitler's electoral support in the period 1930 to 1933 was recently enfranchised women.
43. a. Higher than it is today.
44. True. In some states if a woman is sued for divorce, she cannot take back her maiden name.
45. b. Forty per cent.
46. b. In 1957.
47. True. In childhood, males are more likely than females to have severe psychological problems. In adulthood, the reverse is true.
48. a. None.
49. a. The healthy man.
50. c. Five hundred thirty-nine.
51. True. Four times as many boys as girls stutter.
52. c. Alexandre Dumas.
53. c. Seventy-seven per cent.
54. d. The absence of frequent, prolonged coitus.
55. c. Seventy per cent of women in professional or technical occupations are either nurses or teachers.
56. c. U.S.S.R.
57. a. George Eliot.
58. b. The first female jockey to race in the U.S. (1969).
59. c. Wisconsin was the first state to ratify the 19th Amendment.
60. c. Selling shoes is a commission job; selling underwear is usually a low-paid salary job.
61. a. She was married.
62. b. Contributing to the delinquency of a minor.
63. a. Iran.
64. c. From 66 to 85 per cent of women display a fear of academic excellence.
65. True. In the past 10 years women have lost 50 seats in state legislatures.
66. c. In 1966.
67. a. Norway. (The life expectancy for women is 75.6 years.)
68. a. None.
69. a. None. There are no women training in the U.S. to be astronauts.
70. b. Four states permit the husband complete control of his wife's earnings.