

these basic facts. Nevertheless, certain ways of thinking may be more powerful than others as a means to the discovery of *new* laws, laws which may be “optional” to survival under certain conditions. Thus Newtonian thinking is fine for some purposes, but Einstein can do the same thing and more. Consequently, it is well to bear in mind that intellectually too there is more than one way to skin a cat—regardless of whether all ways are equally effective for skinning twenty cats, or for that matter, dogs. ←

## CHAPTER 12

# On Culture and Equivalence: I

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**T**he study reported in this chapter has been undertaken to examine how general is the account of the growth in equivalence transformation found in the work of Olver and Hornsby, reported in Chapter 3. Beyond that objective there is yet another. Surely the manner in which a child goes about abstracting equivalence should reflect the nature of his society. In most instances the equivalences imposed on one's environment have much wider limits of option than, say, such things as physical judgments do; for example, do two containers hold the same amount to drink? Whether objects are considered as food, for example, does not depend on their nutritional value alone, but also on custom and dietary taboo. To the Christian, beef and pork are two meats, different in taste but equivalent in function and formal classification. But Orthodox Jews and Moslems would not group the two as food, nor would they meet the Hindus' equivalence requirements. In these instances, cultural training puts an affective brake on functional and formal equivalence.

Nor should the matter be restricted to determination by cultural *content*—whether in a semantic sense two things are conventionally grouped or not. One might expect that certain cultural traits would extend to the kinds of attributes preferred for equivalence grouping or, indeed, the kind of grouping rules employed. It is surely reasonable to expect, for example, that a “rational” or technically sophisti-

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cated culture would place an early and strong emphasis upon the use of functional and formal categories, the better to acculturate its young to the requirements of a technology they would be called on to master.

The first opportunity to explore cultural differences in this kind of activity grew out of broader studies being undertaken in rural Mexico; studies that aimed at elucidating the character structure of Mexican villagers (Maccoby, Modiano, Galvan, 1963). At that time we undertook a pilot study (using the Olver-Hornsby procedure for studying equivalence) to compare North American suburban children with their rural Mexican counterparts.

The task assigned the children was much like that developed by Olver (1961). Items were presented in a series and, as each item was shown, the child was asked to tell in what way it was different from the proceeding items and in what way the items were alike. Each item was presented on a small white card which was read by the investigator. Once an item was presented, it was placed in front of the child so that all previous items in the array could be seen at once. The array used by Olver for the North American children she studied was the familiar one: *banana, peach, potato, meat, milk, water, air, germs, stones*. For the Mexican children, *naranja* was substituted for peach, *frijol* for potato, and *lumbre* for germs. In the testing procedure, the first two items (banana and peach) were shown, and the child was asked, "How are banana and peach alike?" After he answered, the next item, potato, was given with the question, "How is potato different from banana and peach?" And then, "How are banana, peach, and potato all alike?" The parallel procedure in Mexico continued in this way, with the exception of the final item, stones, when the child was asked to tell only the difference.

The child's responses in both settings were scored in terms of five main classes, which describe the kind of attributes he used in order to group or differentiate objects: (1) perceptible characteristics, either intrinsic, such as shape, color, size, or extrinsic, such as the position of the object in time and space; (2) functions of the object, either what it can do (intrinsic functions) or what one can do with it (extrinsic functions); (3) moral or affective labels, indicating that an object is good or bad, liked or disliked; (4) nominal characteristics, abstractions learned by the child, such as the fact that an object is a liquid or a solid, a fruit, or a food; and (5) a grouping not by attribute but by decree; the child merely states, for example, "All these are similar." In the Mexican scoring we noted separately whether or not a child employed a particular form of grouping in his attempt

at differentiation (analysis) or synthesis. We also judged his analysis or synthesis as successful or not on the basis of (1) the understandable differences in six out of seven cases, and (2) the synthesis of at least those items having to do with ingestion.

The Mexican children numbered fifty-seven, from age five to seventeen, living in a *mestizo* village in rural Mexico with a population of some eight hundred people. These children are compared with fifty American children from age six to seventeen, drawn from a suburban metropolitan school near Boston, the sample of children reported in the first study of Chapter 3.

This comparison was undertaken as a pilot study, and it is here reported as a preliminary to the main investigation that will concern us in this chapter—a comparison of rural and urban children in Mexico, where considerations of language could be held constant. Yet it is instructive as just that, for it raises many interesting questions. To begin with, the youngest children of both cultures, from age six to eight, are more similar than any other parallel age groups in their responses to the task. Both Mexican and North American children of this age group are able to differentiate between objects, but they show little or no ability to synthesize. Of ten North American children from age six to eight, six were able to analyze well, but only one could synthesize; of twenty-three Mexican children, 52 percent scored well on analysis, and 13 percent on synthesis. In both samples, the children employed mainly perceptible attributes such as color and form in order to separate objects (80 percent of the Mexicans, 90 percent of the North Americans). It appears as though they were examining the things in their minds and describing the variations they saw. However, purely perceptible attributes do not serve well for synthesizing a diverse array of objects. To do this the child must be able to employ more abstract concepts.

Even in children of six or seven we can note some important differences between the two samples. The North American children tend to use formal, nominal categories. They are more likely to analyze in terms of what one can do with objects (70 percent of the North Americans versus 26 percent of the Mexicans).

These differences, though they have little effect on the relative performances of the younger children, are the seeds of much greater differences to come. At ages nine and ten, while performance at the task of analysis was still similar (seven out of ten North Americans and 63 percent of nineteen Mexican children could analyze successfully), half of the North American children could synthesize well in comparison to only one of the nineteen Mexicans.

The reason for this disparity is not difficult to see. The American children are learning to handle abstract concepts of use, such as the idea that a group of objects all "are necessary for human life." Such concepts in themselves are a synthesis between the child's interest in both the use and "goodness" or "badness" of the objects. The six-year-old may decree that germs are bad; his older brother is more likely to state that they are bad because they cause sickness and so harm people. Similarly, an eight-year-old may say that banana, peach, potato, meat, milk, water, and air are good for you and that these are foods one eats; while the ten or eleven-year-old would more likely comment that these things are necessary for the maintenance of life, thus implying both use and an objective moral standard.

The Mexican child, rather than move in this direction, continues to employ concrete attributes. His perceptual observations become finer and finer. He may note, for example, that a banana and a bean are both crescent-shaped like the moon, or that one fruit tastes both better and more mealy than another, and so forth. He also becomes more and more concerned with the concrete use of objects, such as different ways to cook or eat them. However, he does not employ abstract concepts and, if he gets stuck in trying to explain why a group of things are similar, he is likely to declare them similar or not simply by decree, and leave it at that. This trend showed no relationship with the children's intelligence, as measured both by the block form of Raven's Matrices, and by the Draw-A-Man Test. Nor was there any significant difference between the performances of boys and girls, the girls scoring slightly higher, in accordance with their more rapid rate of maturation.

These differences in style are remarkably consistent in both groups. Even at the age of sixteen or seventeen the Mexican adolescent seldom abstracts, even formally, while the North American develops increasing facility with abstract functions and formal equivalencies, whether at the expense of perceptible and concrete qualities or not.

In general terms, we would contrast the development of North American and Mexican children as follows: the North American child starts out by seeing objects in terms of perceptible and concrete characteristics, but he soon begins to consider them in the light of what he can do with them. Also, he starts to pay attention to abstract qualities and to similarities between objects. At first he may note the "goodness" or "badness" of things, repeating culturally determined labels; but later, as he reasons more, the good objects are those useful to man. By the age of eleven or twelve, seven of ten North American children, in contrast to none of ten Mexicans, employed concepts such

as these. At best the North American child develops an interest in theory, in the abstract equivalencies and differences among objects. At worst he merely manipulates things in a formal and increasingly reductionist manner. In fact, a few of the older children completely lose the ability to analyze, because the concrete attributes of objects have become buried beneath formal and abstract notions.

In contrast, the Mexican child of six or eight is far more similar to his older brothers in terms of intellectual approach. Both are most concerned with concrete perceptible attributes. The difference is that the older child looks more closely at the object and begins to consider more concrete ways to use it. At best he demonstrates a rich interest in, and relation to, the object as an individual thing; he expresses and describes his experience, although he has no interest in theory or abstraction. At worst he merely perceives in terms of concrete but narrow attributes, and when he is in doubt he arbitrarily declares that objects are similar or different by decree.

The American child is taught to abstract, to manipulate concepts, to control things. He is a member of a culture that prides itself on its power over nature. Almost as soon as he learns what things are, he is taught what he can do with them and where they can be found. One American child saw the similarity between banana, peach, potato, meat, and milk, as all very common things which you might easily get at the supermarket. On the other hand, the child from rural Mexico has little or no contact with so large a commercial enterprise as a supermarket. His experience is rather one in which he plants the beans, sees them grow, harvests, and then eats them. His experience is with nature, and it continues for as long as he remains in a farming community. He is more passive than the North American, and his education is more authoritarian, so that, as we have observed in this village, children often isolate the school experience from the rest of life. Actually, no relationship could be established between success at analysis or synthesis and academic achievement. Those children who judge things to be similar or different by decree may be reflecting the attitudes of the adults in their lives; things are so because a parent or possibly a teacher has said so.

On a more general cultural level, the schools are in themselves reflections of larger cultural traits. In a highly industrial and diversified economy such as that of the United States, abstraction is a necessity. Time and money must be equated. Children must at an early age learn the "values" of things, not just whether they taste good or are pleasing, but in terms of money. For the rural Mexican money is less important. He often barter things as needed, or produces his own

food, shelter, and clothing. In his mind, time has little relation to money. We are now investigating these differences more rigorously with a test we have constructed, in order to learn more exactly the villagers' ideas of time and value.

Looked at from the point of view of the general theory of development set forth in this book, the relativity of culture depends on the extent to which any culture shapes skills and preferences beyond the first stages of enactive representation. American and Mexican six-year-olds are not strikingly different in their emphasis on perceptible properties, but with growth, the Mexican child moves toward greater perceptual subtlety, and the North American toward more abstraction. Before this divergence occurs, the principal impact of either culture is probably affective, reflecting child-rearing practices and the like. Only when the child is capable of sufficient mastery of the symbolic forms of his culture can there be a divergence to the fullest limit. In this case, the divergence of the two cultures consists of quite different conceptions of man and society and their reciprocal relations.

#### A CLOSER LOOK AT DIFFERENCE

A comparison of rural Mexican and North American suburban children, while dramatic enough, involves too many things such as language, technology, culture, and so on. The second part of the present study, then, concentrates on a limited comparison of rural and urban Mexican children and seeks to discern in what measure urban culture makes its impact on the growth of intellect.

The sample included fifty-two children from the village already mentioned and one hundred two children from a housing development in Mexico City. Within each population, two age groups were tested, children from eight to ten and from twelve to thirteen. In the city this included a complete third-grade class (forty-nine children), and a sixth-grade class (fifty-three children). In the village there was a wide variation in the ages of children within specific grades, so the children chosen by random means were not necessarily in the same grade at school. Table 1 contains the vital statistics.

The same list as had been used with the rural Mexican group was used for both these groups to test for equivalence. In the village, the children were tested individually with the items printed on cards and read out by the tester. The child's responses were taken down verbatim. In the city, the test was group-administered, with the tester reading out the items and the child writing down his responses.

The bases on which the equivalence and difference judgments were

TABLE 1  
Composition of Sample

	Age Eight through Ten			Age Twelve and Thirteen		
	Boys	Girls	Total	Boys	Girls	Total
Village	18	15	33	9	10	19
Mexico City	27	26	53	24	25	49

made were classified within the categories mentioned earlier in this chapter (p. 258). As before, we also noted the differences and the equivalence responses separately. The protocols were also classified in terms of success and failure in both the equivalence and the differentiation tasks. Success on the differentiation task was considered to be achieved if six out of seven possible differences given were comprehensible. For the equivalence task, a successful performance constituted getting all the food words plus *air* and *water* into a group. The criteria for success at the equivalence task are similar to those used in Chapter 3 in classifying superordinate-groupings structures, except that sometimes we allowed complexive groupings which were logical and not too all-inclusive. The scoring for success at formulating differences was less problematic, since any attribute that distinguishes the new attribute from the others was considered adequate, even if the other items were defined only by exclusion (for example, "This is red and one of the others are red.")<sup>2</sup>

By about age nine, the difference is plain. More than twice as many urban as rural children succeed at the equivalence task. By twelve, the difference has become fourfold (Table 2 and Figure 1).

We are struck by how much closer Mexico City is to Boston than to a *mestizo* village. Data on the younger groups mentioned in the pilot study are also included. One might well assume that, had we selected a group of six-year-olds in Mexico City, they would have

<sup>2</sup> As a reliability check on the food list, the children were also given another array of concepts including: *horse* and *cow*, *chicken*, *lion*, *snake*, *mosquito*, *man*, *tree*, and *mountain*. An analysis of the attributes used showed no significant differences between the reactions to the two tests as measured by the use of perceptible, functional, and formal attributes. The two lists appear only slightly different in difficulty. For example, of the total village sample 51 percent passed the equivalence test on the food list and 48 percent on the animal list. Of the urban sample, 73 percent were scored as passing on the food list and 67 percent on the animal list.

TABLE 2  
Percent of Children Succeeding on Equivalence and Difference Tasks

	Age		
	6-7	8-10	12-13
Equivalence			
Mexican village	13*	16	26
Mexico City	...	44	82
Boston suburb**	10	60	80
Difference			
Mexican village	52*	84	95
Mexico City	...	79	96
Boston suburb**	60	70	80

\* This group includes twenty-three children.

\*\* Each American group comprises ten children.

been much like the others. While the urban sample shows a superiority in formulating equivalences, the two groups are similar in their ability to describe differences. Indeed, at age nine the village children show a slight though nonsignificant superiority.

What causes this difference in the ability to formulate equivalences? Note what kinds of attributes are demanded by the task. While successful equivalence must relate the items of the list, it must not be senselessly inclusive ("All these things are found in the world") or so arbitrary as to contain no principle of including anything more ("I like all these things"). Equivalence on the basis of such shared perceptible attributes as color and shape is easy enough up to a point, but the more a list becomes thus diverse, the more this method becomes powerless to cope, and, as we have seen in Chapter 3, it leads to the kind of complexive groupings that can easily become arbitrary or overinclusive. Adequate superordinate groupings call for the use of functional and formal attributes.

Though functional extrinsic attributes ("I can eat all of these") are more powerful than perceptible ones for formulating equivalence, they too break down on items such as *air* and *fire*. The same is true of such nominal classifications as "foods" or "solids." Some children who seem particularly wedded to formal classification turn to part-whole equivalence when the simple nominal classification no longer serves. Thus they may say that all the other objects contain air. However, many children would reject such a solution as inelegant, and they would seek a more powerful conceptualization, one which would serve

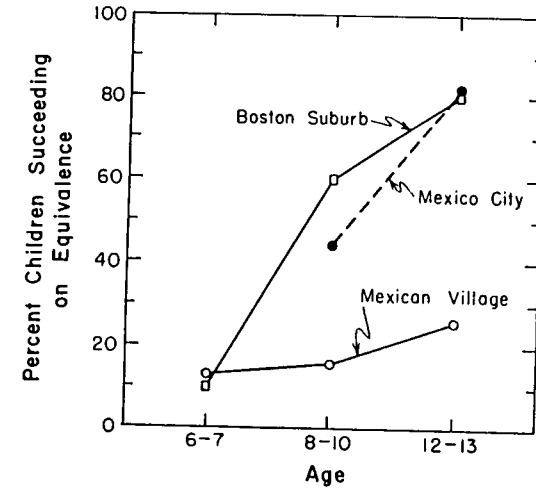


Figure 1. Percent children succeeding on equivalence.

for the inclusion of new items and imply a deeper understanding of the relationship among the concepts, beyond the mere fact that they can be arbitrarily acted on. The child might, for example, describe the array of items as being "necessary for life" or "used by man to stay alive." To be able to make such a classification, the child must go beyond both sensory impressions (perceptual attributes) or his own personal experience (extrinsic functional) to a general, abstract, and theoretical statement which in fact represents a new capacity in grasping truth. The children who remain on a concrete level of equivalence classifications, whether perceptual or functional, succeed less often in uniting the items, whereas those able to make more abstract or generalized classifications are more likely to find similarities.

A comparison of the urban and village children in Figure 2 reveals how few village children use either nominal or intrinsic functional bases in the equivalence task. Even the older village children continue using perceptible or extrinsic functional attributes. In contrast, urban children are already on their way toward functionalism and formalism by the ninth year.

The over-all picture is quickly summarized. Village children show a strong increase in extrinsic functional grouping and in nominal ones, as well as a small increase in the use of perceptible bases. City children show a sharp drop in the use of perceptible attributes and a sharp rise in both intrinsic functional and nominal groupings. The

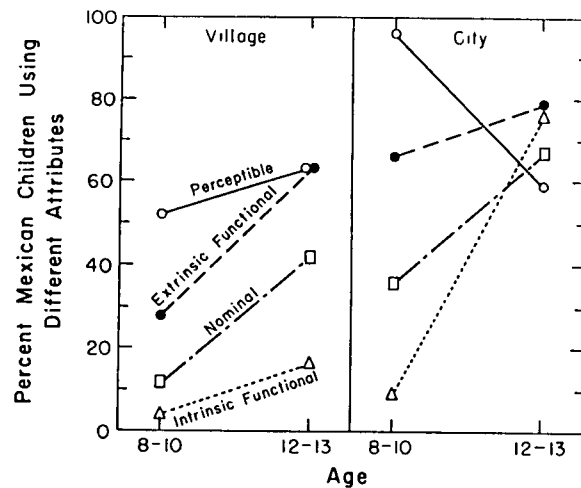


Figure 2. Percent Mexican children using different attributes.

rural child at age twelve is perceptually oriented or, when functional, very concretely so. He asks what something is used for without regard to its abstract properties. The urban child is more sophisticated linguistically, more abstract. Consider now the attributes used by children in characterizing differences (Table 3).

The differences between the younger children of village and city virtually disappears as one shifts from equivalence judgments to judgments of difference. By age twelve, however, there is a striking contrast: again the village children fall far behind in the two more abstract bases for grouping—nominal and intrinsic functional. And the falling behind is highly reliable statistically.

There is still a puzzle encountered in comparing Figure 2 and Table 3. There are rural children who, on the task of finding differences, use attributes that they then do not use in formulating equivalence. For example, 64 percent of rural children from age eight to ten use extrinsic functional attributes to characterize differences, but only 28 percent use them in formulating equivalence. Or, at age twelve, the difference on the same attribute is 84 percent and 63 percent. In other words, there appears to be a group of village children who have the ability to use attributes but resist using them for the equivalence task. Formulating equivalence judgments may depend more on cultural traits than on individual capabilities.

TABLE 3  
Percent of Children Who Use Various Attributes in Formulating Differences

	Age			
	Eight to Ten		Twelve and Thirteen	
	Village	City	Village	City
Perceptible	92	94	90	80
Extrinsic functional	64	68	84	85
Nominal	8	21	26	71
Intrinsic functional	0	9	5	47

In a word, then, there is indeed a patterning of growth going on in the child between eight and twelve with respect to his approach or resistance to equivalence judgments, his preference for attributes, and the manner of specialization in his use of mind. The perceptual, concrete, difference-sensitive, organically oriented, village child is by age twelve in sharp contrast to the more abstract, functional, similarity-sensitive, cosmopolitan city child of the same age.

#### SOME INFERENCES ABOUT INTELLIGENCE

Unfortunately, growth data are not available on the children with respect to intelligence and other characteristics. But the older group of children were tested for intelligence by using the relatively language-free Raven's Progressive Matrices Test. Intelligence, though related to school achievement ( $r = 0.50, p < 0.01$ ) was unrelated to success in the equivalence task or in the use of attributes. Incidentally, success on the equivalence task proved to be unrelated to school achievements (a type of achievement based more on a child's ability to memorize and obey authority than to think).

It would seem, and strikingly so, that we are dealing here with a matter of culturally derived preference, preference which through habit becomes finally a personal style. It is reasonable to suppose that within the context of a cultural style one can find variations in the effectiveness with which a child operates. It is doubtful, however, whether the kinds of intelligence tests now available are designed to elucidate such matters.

## CULTURE AND ABSTRACTION

A city child coming from an industrial society starts by dealing with objects in terms of their perceptible, concrete characteristics. He soon comes to consider them in the light of what he can do with them. In time, he is led to more abstract formulations as to how things are, how they are alike and how different. Some go so far that they lose the sense of the concreteness of things and become buried in a dry nominalism. They are like people who see a painting immediately in terms of its style, period, and influences, but with no sense of its uniqueness.

Peasant children do not change that much. They are much more similar to their older brothers: they both look. The older one looks at things more closely and considers more concrete ways to use them. While the older peasant child can say how things are alike, he feels more at home with their differences, for that is where reality lies for him. He does not think in generalities. At his best he shows a rich interest in and relation to individual people, individual objects, or particular events. At his poorest he sees only the concrete and the particular and walls himself off from anything beyond immediate experience.

Essentially, such cognitive styles reflect the demands of a culture. The modern industrialized world demands abstractions by its very arrangements, its stimuli, its contrasts, its laws of justice and exchange. What is demanded of the peasant, on the other hand, is that he pay attention to his crops, the weather, and the particular people around him.

The culture is reflected in its institutions—school, family, or work group. The child in an urban school is more likely to learn to manipulate concepts, to use his knowledge beyond school. In an industrialized society, when a child learns what things are, he is taught what he can do with them and where they can be found. In a peasant village, schooling does not get you a better job or even necessarily make you a better farmer. Some boys who do best at school lack the money to continue their education. The urban child can both live at home and advance to higher schools.

The villager tends to be more concrete and more authoritarian in moral outlook. His values are traditional and conservative, and economic scarcity reinforces moral realism. Traditional authoritarianism is rooted in work relations and in the family, where children are taught to obey without question. Unlike the urban world, the small village offers no alternatives to the influence of the family. Even those

games by which an industrial society teaches reciprocity and abstract rules of justice are not played within the village (Maccoby, Modiano and Lander, 1964). Observers have noted that many a villager who migrates to the city feels freer when liberated from the restraints of village life (Lewis, 1959).

If the peasant child is not dulled by village life, he will experience the uniqueness of events, objects, and people. But as the city child grows older, he may end by exchanging a spontaneous, less alienated relationship to the world for a more sophisticated outlook which concentrates on using, exchanging, or cataloguing. What industrialized, urban man gains in an increased ability to formulate, to reason, and to code the ever more numerous bits of complex information he acquires, he may lose in a decreased sensitivity to people and events. ✓

An earlier collaboration of the Center for Cognitive Studies:  
Jerome S. Bruner, Jacqueline J. Goodnow, and George A. Austin.  
*A study of thinking*, Wiley, 1956.

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