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## Tailor-made Experiments and Evaluating the Intellectual Conse- quences of Apprenticeship Training

JEAN LAVE

*University of California, Irvine*

In order to investigate the transfer of learning skills from an instructional context to a context in which the learning must be applied, an analysis is needed of crucial social and informational features of relevant daily tasks. For example, in studying transfer of learning among traditional tribal tailors in Liberia, West Africa, I have found that it helps a great deal to know how familiar to those tailors are the problems I use to assess learning. Familiarity is not a single, easily observed attribute of objects or events: to arrive at a reasonably accurate description of daily tasks and to rank the familiarity of a set of experimental tasks with respect to them requires extensive observation in tailor shops and discussion with informants, at the very least.

Much of peoples' understanding of what is being asked of them in a given situation comes from contextual cues—the setting, the role characteristics of others in that setting, interactional cues about the texture and quality of requests/responses, etc. Formal experiments are extraordinary in this regard. It might be said that a good experiment is designed in such a way as to minimize contextual cues. So long as “white room with chair, table, and psychologist” is itself a familiar context, which it undoubtedly is to many college sophomores, subjects and experimenters will understand each other reasonably well. But where neither the situation itself nor the expectations implicit in it are mutually understood, experimental situations are probably in general harder to “crack” for their social implications than are other forms of interaction, because of their contextual impoverishment.

Recent attention has focused on various strategies for coping with the drawbacks of experiments as interactive vehicles for exploring human thought processes. For example, see Labov, 1970, on observing people in natural situations, or the work of Scribner (1976) and Cole and Scribner (1974) on situating experiments through manipulating conditions, interviewing subjects about the experiment,

and so on. There is, of course, a long-standing sensitivity in anthropology to differences in cultural categories and content differences across cultures.

Yet another tool for improving the validity of experimental techniques is proposed here: I want to suggest that it is useful to predicate the design and interpretation of particular experiments on knowledge of the culturally typical situations in which particular cognitive operations are performed on particular content within culturally appropriate formats. It seems to me that the content, the “subject matter,” on which a subject is asked to perform mental operations, and those operations themselves, can be adjusted rather easily to take account of cultural differences. More subtle, and probably more important, difficulties arise from differences in formats via which a problem is encountered in everyday life, and whether the operation in question is customarily applied to the content.

The first step in applying these ideas to experiments seeking to assess transfer of learning in different educational environments is to identify the major learning situations that appear to have pervasive influence on cognitive skills. For the tailors in Liberia, two such situations—apprenticeship training and Western-style schooling—have selective impact on children over and above general socialization processes. The next step is to collect information which will make it possible to rank possible tasks with respect to their familiarity, through daily experience, in each learning situation. Among the tailors with whom I worked, experimental tasks had to be placed along two different continua of familiarity to the problem-solvers, because both school and apprenticeship training are important organizers of daily activities. And, of course, the familiarity ranking in one context might not have been applicable in the other.

Almost every task given to the tailors involved a graded series of problems. These were designed to range from very familiar to very atypical, even absurd, problems with respect to content. But the correct answers were common to both the familiar and the absurd variants of the task.

A description of one such set of tasks may make the procedures clearer. This set, involving quantitative reasoning skills, included estimating linear distances, extrapolating a simple function, performing arithmetic operations, and matching two-dimen-

sional figures for similarity of proportions.

For the first of these tasks, the tailors were asked to estimate the size, in inches, of the waistbands of two pairs of trousers; estimate the size of loops of string, then lengths of string, then pieces of wood. This series of problems is ordered in familiarity of content with respect to tailoring practice; it involves the same operations in all cases. The format for presenting the problems was suggested to me by the tailors themselves, as I watched them challenge each other to trouser-waist estimation contests.

The second task included 18 problems in which the tailors were asked to assign values to hip and fly measurements for trousers, given only a knowledge of waist measurements. Some familiar and some quite unusual waist sizes were used. Once again, the format, much of the content, and the operations were borrowed directly from the tailors themselves. Only the unusual content of very large and very small waist sizes fell intentionally outside customary usage.

The third task was arithmetical, and included number recognition and naming; understanding ordered relations between numbers; and adding, subtracting, multiplying, and dividing. Apprentices learn these skills when they are taught to use a measuring tape, and apply them in cutting out and sewing clothes. The familiar problems in this set followed

the format by which these concepts were taught to the apprentices and the format in which they were applied. But neither context was so highly focused and readily identifiable as were the two previous guessing-games.

The fourth task required tailors to choose one of three figures that was most similar in proportions to a fourth, reference figure. Some of the two-dimensional pictures were of trousers, others of geometric figures. Whereas matching proportions probably occurs in tailoring because garments are of different sizes, the experimental task that used drawings on cards and presented four figures simultaneously was different from the three-dimensional, serial presentation familiar to tailors.

The next step was to rank-order the tasks (Table I). Our hypothesis is that the more unfamiliar the problems, the less we should find learning-transfer effects from tailoring experience. The Table presents the rank-ordering of the same tasks from two points of view—school-taught skills and tailor-apprenticeship learning. The same general hypothesis applies to both the tailoring and the school-ordered tasks; however, the tasks are differently ordered.

A set of predictions relating learning context to performance follows from the two kinds of rank-ordering. We expect tailoring experience to have a

TABLE I

		Familiar Tasks		→ Unfamiliar Tasks	
TAILORING		waistband estimates	string loop estimates	string length estimates	wood length estimates
		extrapolating waistband measures to hip/fly measurements (familiar waist sizes)			extrapolating unfamiliar waist sizes
		tailors' arithmetic problems			nontailors' arithmetic problems
					matching two-dimensional proportions, trousers, geometric figures
SCHOOL EXPERIENCE		Familiar Tasks		→ Unfamiliar Tasks	
		nontailors' arithmetic problems	tailors' arithmetic problems		estimating lengths of waistband, string loops, and wood
					extrapolating waistband measurements to hip and fly
					matching two-dimensional proportions, trousers, geometric figures

major effect on waistband estimates and a gradually decreasing influence on ability to estimate the other items accurately. Formal schooling should have no effect on such estimations, because tailoring is not taught in Monrovia schools. On the extrapolation task, tailoring experience should have a strong effect on familiar sizes and a decreasing effect as sizes become less and less familiar. Again, we would not expect schooling to have an effect. On the arithmetic problems, both tailoring experience and schooling should make a big difference, although the major impact of schooling should be on those problems that have no counterpart in tailoring practice. The content and the format in which the "nontailor" arithmetic problems were presented were similar to school-book problems, and should lead to considerable transfer, even though the content is buttons and spools of thread. The two-dimensional figures task is unfamiliar from both apprenticeship and school points of view. The task was only tenuously related to tailoring, and geometric ratios and proportions are not taught in their school. Thus, neither school nor tailoring experience should account for variance in the task.

The analysis of the data is still in progress. However, my preliminary results, based on regression analysis, in which tailoring experience is used to predict test performance, support the predictions made above. The amount of variance predicted by apprenticeship and school experience fall in the ways predicted from the two task orderings in the Table. My purpose here is to illustrate an approach to the study of transfer in particular and experimental design in general that draws heavily on a detailed knowledge of the circumstances in which skills are acquired and used outside the experimental situation. A familiar context borrowed for experimental purposes is probably worth a thousand words of literal-minded explanation in conveying the experimenter's intentions.

It was relatively easy to utilize native formats and familiar content/operation combinations in the transfer experiments I have sketched here, because the cognitive operations in question were not narrowly specified ahead of time, but only at a meta-operational level of transfer. People in all cultures "experiment" with each other every day—play at discovering someone else's skills and mental processes. Bending within-culture, customary experiments for psychological investigation seems a worthwhile use of anthropological field techniques. The next step, of course, is to work with native thinkers on ratings and rankings on scales of familiarity to consult with them in developing variations on native experimental designs.

[ED. NOTE: A long-standing problem in educational psychology, currently recognized as a central problem in cross-cultural psychology, is to determine the extent to

which knowledge gained in one setting can be applied to other settings. In educational psychology, this centers around the concept of transfer of training: do certain training techniques result in more, or broader, transfer than others?

In cross-cultural psychology, two aspects of this issue arise. First, there has been a good deal of interest in how education affects cognitive development. This has been addressed by comparing schooled and nonschooled populations with respect to their performance on selected cognitive tasks. In the present context, this method can be viewed as a means of assessing the transfer of school-based learning versus community-based learning. However, such a procedure assumes that performance on the tests reflects general transfer of cognitive operations, not transfer that is specific to knowledge applicable only within the school context. This assumption is strong and, quite possibly, unwarranted.

The second aspect of the transfer problem in cross-cultural psychology is closely linked to the first. We need methods for determining transfer both inside and outside the specific domain in which the "transferable" experiences occurred. If we could solve this problem, we would simultaneously learn more about the generality or specificity of our tasks. Looking at the problem of transfer from this broader perspective, it becomes possible to ask questions about both the transfer of school-based learning and learning produced by a variety of educational contexts. Professor Lave, a social anthropologist by training, continues a tradition that dates back at least to Gregory Bateson in her discussion of the transfer of apprenticeship-based, as well as school-based skills among Liberian tailors. For further details concerning this work-in-progress, the interested reader should write directly to the author.]

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## The Development of the Conception of Social Class

ROBERT L. LEAHY *Graduate Faculty*  
*The New School for Social Research*

Although a number of investigations have been concerned with the effects of social class on performance, little is known of the child's view of the stratification system. Theories of the function of stratification often make implicit assumptions that persons share a