

Learning, Teaching, and Apprenticeship

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L' *APPRENTISSAGE* (apprenticeship) usually seems to leave indelible impressions in the minds of the people who have been subjected to it. I realized this myself only recently when, in the autumn of 1987, I was asked to write a report on research which had been financially supported by the Conseil du Patrimoine ethnologique (Council for Ethnological Heritage) of the French Ministry of Culture in the field of *la culture technique* (technological culture?).¹ Almost none of the sixty or so books, papers, brochures, and unpublished documents I had to read for this occasion was specifically devoted to apprenticeship. But quite a few alluded to it in terms suggesting that the subject had come to the authors rather than the other way round—that is, unexpectedly for them. Chance meetings like that are not uncommon in research. But nevertheless, I found it rather strange, and perhaps disturbingly so, that so many authors claiming to belong to ethnology and whose works were meant to be useful for preserving *les savoir-faire menacés* (endangered know-how) could be so unprepared to meet apprenticeship as a topic of interest in their fieldwork. I include myself in this criticism, since before working on my report, I was as unprepared and naïve as anybody else about the matter.

These thoughts were duly expressed in the report I wrote, and for once there was a follow-up, since a seminar on the theme *Savoir faire et pouvoir transmettre* (Knowing how to do and being able to transmit) was organized in January 1990.² The idea was that if ethnologists could be relied upon to describe techniques, more than that was necessary. For technographic descriptions tell us how people do things,³ or at least how people are seen to do things; but, with the exception of some of the simplest tasks, they do not enable us to do those same things ourselves. Now, this is exactly the kind of solution that people in charge of preserving “endangered know-how” would love to have at their disposal. How convenient if disappearing crafts and arts could be filed and stored on shelves like books and archives! (A dream, by the way, that is not restricted to some museum keepers.) Unfortunately or not, however, such a

dream cannot be made real. As everyone may easily realize for himself, mere descriptions of bicycle riding or of violin playing never enabled anybody to ride a bicycle or to become a good violinist. To know how people do things and to know how to do them oneself are two different matters.

As it happens, the point I have been trying to make here has already been made in a much better way by Maurice Bloch in a recently published paper on "Language, Anthropology, and Cognitive Science."⁴ Bloch shows quite convincingly that in order to understand human actions and human culture we must clearly distinguish between, on the one hand, what he calls a linguistic or linguistic-like knowledge, and, on the other hand, a kind of knowledge which is put to use by experts in the course of familiar actions routinely and efficiently performed. This second kind of knowledge, Bloch says, not only is nonlinguistic, but must be so if it is not to impede efficient action. As long as we need to think about what to do next on a bicycle or at the wheel of a car, we are certainly not experts at bicycle riding or at car driving. As it were, practical knowledge has to be forgotten, or rather embodied into psychic automatisms, to be of real use in practice.⁵

My only objection to Bloch's thesis is perhaps his use of the terms *linguistic/nonlinguistic* to distinguish the two kinds of knowledge. For the same distinction obtains in language and language related activities. Jerome K. Jerome noticed this long ago. In *Three Men on the Bummel* he tells how a young Frenchman becomes all but unable to utter the word *have* after being taught by a well-meaning English friend how to pronounce it more correctly.⁶ In speech, as in any other activity, knowledge may be more of a hindrance than a help as long as we need to be aware of it, so to speak. So I am inclined to prefer *awareness* or *explicitness* to *linguistic-likeness* as a criterion for distinguishing the two kinds. I even wonder if we should not go one step further and adopt two different words for the two different kinds. This, after all, would only put us nearer to the current usage. For it is *explicit* (or linguistic-like) knowledge which is usually meant by the term *knowledge*, whereas *implicit* (or nonlinguistic) knowledge is more ordinarily denoted by the term *skill*. As it happens, moreover, *knowledge* and *skill* have nearly exact parallels in French (*connaissance* and *habileté*).

Basically, as I see it, knowledge and skill may not differ by content, although they often do so for secondary reasons. An expert car driver may not necessarily "know" much more or much else than a well-taught beginner. The difference, acquired by training, is that he "knows" and uses this knowledge otherwise. Incidentally, we have

one more difficulty here, in that the same term *knowledge* denotes both the fact of knowing (*cognizance*, a word that my English dictionary puts together with *consciousness*, *awareness*, *wakefulness* and so forth) and the things or items known. Again, I would propose restricting the use of the term *knowledge* to the fact of knowing something, and to use *information* to designate the thing thus known. Defined that way, *knowledge* means "to mentally possess some information," implying the ability to acquire it, to store it in the memory, and to retrieve it reasonably quickly and correctly when needed. In other words, I understand the concept of knowledge as tightly connected to the concept of information. It belongs, as Maurice Bloch has it, to "thinking the way we think we think,"⁷ which is also the way we try to make our thoughts available to others, and the way we build ever more powerful thinking processes into machines.

Now what about skill? Theoretically at least, we can analyze skill as we would knowledge. For there is an information content in any skill, which can be "extracted" as they say in the jargon of *informatique* (computer science). The problem is that, even assuming that the relevant information is extractable to the last bit, what we get in the end is a sum of knowledge, not a skill.

Besides, are we right to make such an assumption? I do not think so, for the reasons against it are many, and some are quite formidable.

The "extraction of knowledge" can be simply too difficult, too expensive, or of too little profit to make it worthwhile. Computers are now said nearly to equal the best experts at chess playing. But I never heard of a computer being able to ride a bicycle. The nose of human experts has not as yet been superseded in the composition of wines and perfumes, and there are no clear indications that it will be in the foreseeable future. And as industrialists have learned the hard way sometimes, there is no such thing as a wholly automated plant, meaning that even if only a handful of employees are left where formerly hundreds or thousands were working, the abilities and skills of those employees can make the difference between smooth functioning and good profits on the one hand, and repeated failures and bankruptcy on the other. As I happened to read once in an advertisement, "the most sophisticated computer still needs someone to press the button in time."⁸

A second kind of difficulty in the attempts at "knowledge extraction" is that the research entailed by it can either exceed the scientific possibilities of the moment or lead to an endless accumulation of less and less relevant information. Just think of what it would take to describe an activity as simple as walking in bio-

mechanical and neurophysiological terms! A related example is the mechanical problem of equilibrium in bicycle riding: it seems to be one of the most baffling *casse-têtes* in the whole history of mathematics, and has eluded the efforts of many mathematicians for more than a century. (I myself am fond of bicycle riding. In my opinion, it is one of the most beautiful and clever inventions of Western civilization, and as the philosopher Michael Polanyi once said, bicycle riding is a perfect example of something that can be learned but not taught.) My last example is quite different. Everyone in Western Europe has heard of Dutch Elm Disease (graphiola), the disease that destroyed nearly every elm in France and Britain some years ago. Graphiola is caused by a fungus, the fungus itself being carried by an insect that digs tunnels under the bark of the trees. Now, elm, insect, and fungus together make up exactly that kind of nicely complex biological system loved by so many scientists because they can spend their whole lives studying it without any risk of ever exhausting the opportunities for further research. It appears that this is exactly what has happened. Research on graphiola was profusely funded for more than ten years. A lot of very interesting results were no doubt achieved, but no cure was found, and the scientists did not even realize that a cure had been proposed and put to use by an administrator of the Parisian public gardens during a preceding episode of the same sickness in the 1850s. Some knowledge is indispensable for efficient action. But too much knowledge, or irrelevant knowledge, obviously impedes action. It has been argued that if computerization has not enhanced office productivity as much as expected, it is largely because of the very ease with which information is produced and handled. The time spared in easier access to useful information is counterbalanced by the time lost in dealing with irrelevant or erroneous information. A prime component of any skill is perhaps the ability to identify and get rid of irrelevant information quickly and effortlessly.⁹

Until now, skill has been considered something static, as it were. We have assumed that, theoretically at least, any particular skill was made of a limited number of "items" (whatever they may be) which can be retrieved and made explicit by "knowledge extraction." Such an assumption is no idle thought: it underlies an interesting attempt by Wendell H. Oswalt¹⁰ to assess the level of complexity of tools by analyzing them into *techno-units*. And I hope to have made clear that my point is not to prove that the idea of knowledge extraction is absurd (it is not) or impossible (who knows?). My point has been only to show that there are very practical obstacles and limits to what can be done in that direction, and that we should think much

more about these obstacles and limits if we are not to let ourselves go astray.

If we now take a dynamic, or simply a historical point of view, we are facing another problem which, in my opinion, is that of the respective roles of knowledge and skill in technical change and innovation. In a way, the whole history of technology in modern times largely appears as an endeavor to capture skill and convert it into knowledge. This endeavor culminated in the first half of our century with Taylorism, and its supportive ideology, scientism, but it can easily be traced back much further into the past. Military drilling in Europe from the sixteenth century aimed at producing the same kind of obedient executants that became in demand later along assembly lines, and the histories of music, of dance, of sports (horsemanship, for instance), and so forth, would reveal similar if less radical tendencies. For the sake of successful collective action, it was thought that every participant had to obey explicit rules, directives, and orders coming from a unique center at the top, and that accordingly individual skills had to be put under strict supervision or, better still, disposed of. This powerful trend toward centralization (often confused with rationalization) has perhaps been one of the main forces in the shaping of European civilization since antiquity. It supposed the belief that knowledge was all there was of interest within the human mind, and that skill was either unimportant or even nonexistent. Action was simply the application of knowledge, invention just a consequence of scientific progress or an anticipation of it.

From that perspective, an inescapable outcome of progress would be the displacing, and finally the complete annihilation, of skills in favor of knowledge and of science—with Big Brother lurking in the background. This has been a chilling prospect for poets, utopians, revolutionaries of anarchist shadings (the Marxists have always solidly sided with the scientists and Taylorists), and simply humanists. A big library could easily be gathered of literary works expressing fears for this kind of future or the need to fight it. Rare indeed are those who have understood that, for good or bad, this future could never come to be, precisely because skill is indestructible. Otis T. Mason was one of those perspicacious few. Here is what he wrote in *The Origin of Invention*, a book nobody reads anymore: "It is sometimes said that the substitution of unerring machinery has taken away the cunning of the human hand. The case is not nearly as bad as that, however. No change of apparatus can deprive the human race of geniuses, for the man of knack will be found excelling in the handling of the new machines."¹¹

It seems to me that the recent story of industry, especially of information technology and automation, vindicates Mason's view very obviously and strikingly. We expected bigger and bigger machines, and more and more centralized networks. But, as usual, would-be futurologists were in the dark. We certainly got big machines and big networks. But we also got small machines, young geniuses, addicts and pirates, practical jokes and revolutions, bugs and viruses, and so on. In sum, what really happened was not what was anticipated by our wise men a generation ago. The order of the machines did not prevail over the unruliness of things and men. Human skill survived and appears now to be going as strong as ever.

Skill is indestructible. Either it cannot be entirely reduced to knowledge, or new skills will infallibly develop there when old skills have been suppressed here. As I see it, there is a kind of race between skill producing—developing new ways of doing things in real practice—and skill capturing—analyzing skill to put it into words, figures, formulae, diagrams, codes, algorithms, and so forth. This race is probably one of the prime movers of technical change, and perhaps of scientific change as well—but only on the condition that it is never won, *id est* that skill capturing never completely catches up with skill producing. For it would stifle innovation. Generally speaking, an outcome such as that is not plausible. But I am not sure that it could not happen here or there, locally, in particular cases. And the case I would like to mention now is the one I alluded to at the beginning of this paper, apprenticeship.

Good ethnographic studies of apprenticeship are few and far between. Outside the European culture area, Maurice Bloch quotes two (by Esther N. Goody and J. Lave) for Africa, and I am myself aware of the work by two colleagues (Marie-Noëlle Chamoux and Philippe Sagant) for Mexico and Nepal respectively.¹² In the European culture area, I just have no precise idea. I have not been able to undertake a systematic search of the extant literature, and suspect that our main source will prove to be memoirs and descriptive and autobiographical novels. Whatever it may be, the fact is that in the sixty or so documents I had to read for the *Conseil du Patrimoine* in 1987, there was little other than this kind of biographical information. Authors seemed to have reported as faithfully as they could what their informants had told them rather spontaneously, but they did not seem to have asked many questions nor to have been in a position to observe apprenticeship in real life. Informants were usually aged or retired workers; apprenticeship had clearly been important for them, but this importance was not

really grasped by the authors, if only because they were rather unprepared to grasp it.

Curiously, however, the results are more interesting than could be expected. One general idea came out especially clearly from what the informants said: learning in apprenticeship and learning at school are diametrically opposed processes. This idea was so prevalent that I called it “the stereotype of apprenticeship,” and I was able to compile a whole table showing point by point how apprenticeship and school learning oppose each other. Here it is:

APPRENTICESHIP	SCHOOL LEARNING
Apprenticeship implies an individual agreement between master and apprentice.	Schools are open to all children, they are public places in that sense.
This agreement (contract) conforms to the customs of the professional group involved.	Conditions within schools are determined by law.
Access to apprenticeship must be gained by negotiations, in which family and neighborhood relationships are important.	Access to school is a right, and even a legal obligation.
The apprentice is expected to do real, if often menial, productive work.	The schoolboy's or schoolgirl's work consists in exercises.
The apprentice enters a professional group composed mainly of adults of diverse ages and qualifications.	The schoolboy or schoolgirl enters a class where all the children are about the same age and where the only adult is the teacher.
The apprentice must usually submit to rites of passage at his entry into the group.	The main rites of passage take place when leaving school (exams?).

The apprentice must often learn by himself; sometimes, he must do it stealthily, because what he has to learn is concealed from him.	The teacher speaks, teaching is "dispensed" according to a program.
Apprenticeship transmits knowledge and skills, but also values, a social identity, a tradition.	School transmits knowledge mainly, if not exclusively.
Successful apprenticeship gives access to professional life.	After school (except, of course, in the case of some specialized professional schools) one still has to find access to professional life.
Etc.	Etc.

I have put "etc." at the end of each column because I am pretty sure that this table could be made longer and because I feel that the selection of relevant opposed traits would be different in countries other than France. Besides, I do not think too much of this table myself: it is a "just so" exercise, and the two opposed pictures are certainly simplistic, if not caricaturish. But pending further research, we can only make do with what we have, and I think this is what we have. It is certainly not the truth, but there must be some truth in it.¹³

That said, I can only add that the race to which I alluded earlier has been nearly won in France, as far as our social ways of teaching and learning are concerned. Teaching and learning now are nearly universally understood as *formal* teaching and learning, and their object is equally understood to be "knowledge" and nothing else. The result, in my opinion, is that the young are deprived of the opportunity to acquire real skill at the very age when they are most able to acquire it, so that the longer they remain at school, the less fit they are to find jobs afterward (except of course those who manage to reach the top of the pyramid). Our schooling system is now turning out jobless people at a disheartening rate. This has begun to be realized, in the face, of course, of extremely strong opposition by the teachers' unions. Since four or five years ago, however, the discussion has taken a new turn. Germany, with its one million apprentices, is taken as a model against the less than 100,000 apprentices left today in France. (I do not know the real

value of these numbers, I only quote them because they are currently circulated in the press.) And it has nearly become a cliché to impute to apprenticeship the comparatively low rate of joblessness among the young in Germany as against France.

I shall stop here. I can only regret that we know so very little about apprenticeship, especially from the ethnologists' point of view. For in my opinion, the stakes are immense.

ECOLE DES HAUTES ETUDES EN
SCIENCES SOCIALES

NOTES

1 François Sigaut, *Rapport au Conseil du Patrimoine ethnologique sur le thème "Culture technique,"* mimeograph, 42 pp., November 1987.

2 See *Savoir faire et pouvoir transmettre*, ed. Denis Chevallier (Paris, 1991).

3 "Broadly speaking, technology is the way people do things," wrote Lynn White, Jr., in "Technology and Invention in the Middle Ages," *Speculum*, 15 (1940), 141.

4 See Maurice Bloch, "Language, Anthropology, and Cognitive Science," *Man*, 2 (1991), 183-98.

5 As I learned after writing this, Maurice Bloch's point is nothing new. One of the first authors to make it was General Pitt-Rivers, who as early as 1874 felt it necessary to distinguish between an "automaton" and an "intellectual" mind; see Augustus Lane-Fox Pitt-Rivers, "Principles of Classification," *Journal of the Anthropological Institute*, 4 (1875), 293-308; rpt. in his *The Evolution of Culture and Other Essays*, ed. J. L. Myres (Oxford, 1906), pp. 1-19, esp. p. 5; see also the useful comment by Ian Hodder, "This is not an article about material culture as text," *Journal of Anthropological Archaeology*, 8 (1989), 250-69. More recently, the psychologist Pierre Mounoud was able to compile a small glossary with the different terms used or proposed by a number of authors to denote the two kinds of knowledge (in unpublished commentary to the seminar "Apprentissage, cognition et culture," directed by Blandine Bril at the Ecole des Hautes Etudes en Sciences Sociales, Paris, 13 Dec. 1991).

6 See Jerome K. Jerome, *Three Men on the Bummel* (1900; rpt. Bristol, 1945), ch. 12.

7 Bloch, "Language, Anthropology, and Cognitive Science," p. 190.

8 The extant literature on this topic is already pretty large. The most significant and instructive examples I came across are Antoine Riboud, *Modernisation, mode d'emploi: Rapport au Premier ministre* (Paris, 1987) and *Pour une automatisation raisonnée de l'industrie*, special number of the *Annales des Mines*, January 1988.

9 On the mathematics of bicycle equilibrium, see Y. Le Henaff, "Pourquoi les cyclistes tiennent-ils en équilibre?" *La Recherche*, 196 (1988) 246-48 (includes the quotation by Michael Polanyi). On Dutch Elm Disease, see D. Fleury, "La science a-t-elle une mémoire?" *La Recherche*, 197 (1988), 406-10. On computers, excess information and office work productivity, see Martin N. Baily, "What Has Happened to Productivity Growth?" *Science*, 234 (1986), 443-51, and Daniel Clement Dennett, "Information, Technology and the Virtue of Ignorance," *Daedalus*, 115, no. 3 (1986), 135-53.

10 Wendell H. Oswalt, *An Anthropological Analysis of Food-Getting Technology* (New York, 1976).

11 Otis T. Mason, *The Origins of Invention: A Study of Industry Among Primitive Peoples* (London, 1895), p. 26.

12 See Esther N. Goody, "Towards a Theory of Questions," in *Questions and Politeness: Strategies of Social Interaction*, ed. Esther N. Goody (Cambridge, 1978), pp. 17–43; Jean Lave, *Cognition in Practice* (Cambridge, 1988); Marie-Noëlle Chamoux, "La transmission des savoir-faire: Un objet pour l'ethnologie des techniques?" *Techniques et Culture*, 3 (1978), 46–83, and "Apprendre autrement," in *Demain l'artisanat*, ed. Pierre Rossel (Paris, 1986); and Philippe Sagant, "Traditions enfantines: L'apprentissage des techniques au Népal oriental," in *De la voûte céleste au terroir, du jardin au foyer*, ed. B. Koechlin et al. (Paris, 1987), 629–35. See also Esther N. Goody, "Learning, Apprenticeship and the Division of Labor," in *Apprenticeship: From Theory to Method and Back Again*, ed. Michael William Coy (Albany, 1989), 233–56. As could be expected, good ethnographic studies of apprenticeship are less rare than I thought when writing this. Most recent references can be found in Pierre R. Dasen, *Savoirs quotidiens et éducation informelle* (Geneva, 1987) and in Coy. However, if the dimensions of the field are kept in mind, I still feel justified in saying that good ethnographic studies are few and far between.

13 As could also have been expected, the opposition between apprenticeship and school learning is nothing new either. The most current usage is to oppose "informal" and "formal" learning situations, which is rather unfortunate since "informal" situations are only so by schooling standards and are usually quite formal in their own terms; see Blandine Bril, "Apprentissage et culture," in *Savoir faire et pouvoir transmettre*, pp. 15–21. It is also quite obvious that there must be some relationship between the formal/informal opposition on the one hand and the knowledge/skill opposition on the other, although an exact fit (formal learning = knowledge; informal learning = skill) is out of the question. I have a feeling that these concepts are still too empirical to be more than moderately helpful.