

The Teachable Age

Some Evidences from a Study by E. L. Thorndike

“**I**N general, nobody under forty-five should restrain himself from trying to learn anything because of a belief or fear that he is too old to be able to learn it. Nor should he use that fear as an excuse for not learning anything which he ought to learn. If he fails in learning it, inability due directly to age will very rarely, if ever, be the reason.”

Thus in the final chapter of his forthcoming book E. L. Thorndike, professor of psychology at Teachers' College, Columbia University, sums up the evidence of the first extensive and systematic inquiry as to whether infancy, childhood and adolescence have an advantage over the adult years in the ability to learn. That volume, *Adult Education*, sponsored by the American Association for Adult Education, marshalls in detail the findings of past studies and of new and elaborate research by the author and his associates. The excerpts comprised in this article are published in advance of the book by courtesy of the Macmillan Company.

Although psychology has offered no generally accepted account of the effect of age on ability to learn, there were many existing facts on learning by adults, measured in experiments such as the improving ability to toss shot into a glass, or to refrain from winking when a rubber hammer struck a glass plate in front of the eye, in writing shorthand, memorizing, or arithmetical problems. “Summaries or samples,” commented Professor Thorndike, after reviewing these in detail, “demonstrate that the adults in question made large amounts of improvements and made them at rapid rates in all sorts of mental operations—in simple sensorimotor abilities, in observing details, in simple association or habit formation, in learning elaborate systems of motor and mental habits, in memorizing (save when that ability has been already brought to a rather high status), and in other still more complex functions which have been tested.”

Furthermore, a study of existing data assembled by various scientific students of the comparative abilities of old and young in learning of various kinds—throwing basketball goals, for example, or acquiring skill in archery, or forming simple habits by the sorting of cards, or learning mathematical games or matters which require a mixture of reasoning and memory, disclosed in general that the differences between young and old were small in comparison with the differences within each group. “On the whole, if we did have to estimate on the basis of this chapter's reports, we should estimate adult ability as very close to that of the late 'teens.”

Obviously the pre-existing

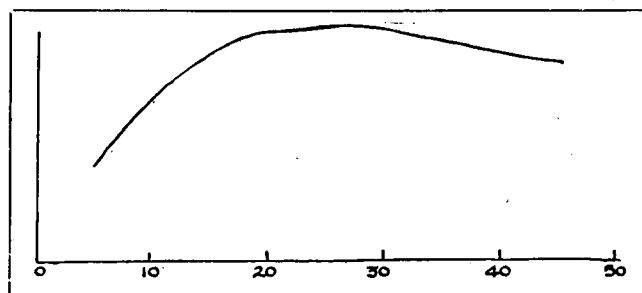
facts needed to be checked by larger and more specific data on the comparative learning of young people and their elders if the relation of age to learning was to be measured with any degree of precision, and with this aim Professor Thorndike and his associates conducted three extensive series of experiments covering long periods of learning. One concerned learning to read, write, compute, and form certain simple habits in the case of adult prisoners, covering a range of intellect from near the average to very low levels. A second concerned the learning of typical high school subjects, such as algebra, English, civics, and biology by adult pupils in public evening high schools, covering a range of near average to very high levels. The third, also drawing on pupils of average or high intelligence, reported the learning of typewriting and stenography by adults in secretarial schools. The investigation also included intensive experiments in learning to write with the left hand, to typewrite, and to understand the artificial language Esperanto.

Thus six grown-ups who had always written with the right hand undertook to learn to write with the left; two left-handed persons tried their right. This was the upshot, carefully measured in terms of the Thorndike Handwriting Scale:

“Somehow the adult starts in writing with the wrong hand with nearly as great facility as the child of eight or nine has in writing with the right hand, after two years of schooling. . . . In general, the gain of these eight adults from less than sixteen hours of practice was greater than the gain proposed by experts as suitable to be accomplished by children using the right hand in two years of growth and schooling, including one hundred or more hours of special practice in handwriting. . . . Any group of individuals of capacity for sensorimotor learning equal to the capacity of our group of eight, should then be able to learn new trades, new features of a trade, new games of skill, and the like, with a degree of success comparable to that observed in this experiment.”

In the experiment in the learning of typewriting by four adults, the two older subjects did better than the younger. The superiority of their gain was due partly to a superiority in intelligence.

Esperanto was chosen for the third experiment “because it represents the learning of a coherent, consistent, intellectual, logical system, and whatever is true of learning it may be expected to be applicable in large measure to the learning of other highly systematic and intellectual things, such as Latin, Greek, French, German, Italian and other languages; algebra,



ABILITY TO LEARN

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trigonometry, calculus and other features of mathematics; physics, chemistry, astronomy, and other physical sciences; botany, physiology, economics, psychology, sociology, education, and other biological and social studies, insofar as these can be learned as systematic organized facts and principles." The results of this test indicated that "the difference between age 22 and age 40 in ability to learn a logical systemic language is small, and is confined largely to the oral test. Assuming that the units of our tests correspond roughly with truly equal steps of difference in knowledge of Esperanto, ability to learn falls off about 20 per cent from age 22 to age 42, or about one part in a hundred per year.

WITH the aid of data furnished by the courtesy of the International Auxiliary Language Association we were able to compare the ability of adults to learn Esperanto with the ability of children of 14 to 18 and of still younger children. Pupils 19 to 18 years old in a good private school, having over twice as much class study as the group 35 years old and over (and more than twice as much home study, if they did not shirk their assignments), gained little more than half as much. Younger groups of ages around 9 and 11 show still slower rates of gain, despite the fact that in one group they were children of exceptionally high intelligence. The facts are in flat contradiction to the doctrine that childhood is the period for easiest learning to read, write, or understand the hearing of a language, and that the early teens are the period next most advantageous. Exactitude in pronunciation was not tested in our experiments. It is probable that the superiority of adults would be somewhat less in learning a natural language, abounding in irregularities which must be mastered largely by sheer habituation. But we are convinced that the gain made in fifty or a hundred or five hundred hours of study of French or German or Italian or Spanish or Latin by a group of any age from 20 to 40 will be greater than the gain made by a group aged 8 or 10 or 12 of equal native capacity."

The study of the learning of prisoners covered records in reading, spelling, vocabulary and other school subjects of 283 men enrolled in the school at Sing Sing for one or more terms. These records were compared with the time required by school children to make like progress.

"The men made on the average 82 per cent of the gain which children make during the same months of schooling. The children, however, had four times as long a school day and spent more hours on reading, writing, spelling, and arithmetic during nine months than these adults did during eleven. Moreover, the norms stating the gains of children are for children of average intellect, while these adults were in general below average intellect. So it seems certain that these adults learned these school subjects more rapidly than they would have learned them at the age of ten or twelve. . . . On the whole the results with these adult men of low level of intellect support the conclusions that the curve of ability to learn in relation to age from 22 to 42 is a very slow decline and is no greater for inferior intelligence than for superior."

The study of students in the public evening schools covered 886 pupils from 14 years of age to 30 and over who were taking one or more of the usual secondary subjects. Their records showed: "The pupils of age 30 or over gain decidedly more than those of age 14 to 16, a

little more than those of age 17 to 19, the same as those of age 25 to 29, and less than those of age 20 to 24. Unfortunately there are only 17 in the group aged 30 or over." These records were corrected for differences in intelligence score, attendance and home study, with little change in the results shown by the school records alone. Taking those who gained most—the students aged 20 to 24—as the standard, the "ability to learn" as measured in this corrected reading is:

59 for age 14 to 16 years.
85 for age 17 to 19 years.
100 for age 20 to 24 years.
89 for age 25 to 29 years.
87 for age 30 years or over.

A careful study of students in professional schools of shorthand and typewriting showed no demonstrable difference between the two groups aged 17-19 and 20-24, while those of more than 24 learned almost as well as the younger.

Among a number of corroborative studies there was an analysis of the grades of 465 candidates for the M.A. degree at Teachers' College, divided by age into groups 20-29, 30-39, and 40-49. The median grades obtained by the first two were the same, .32; that of the forty-year-olds, .41. "The essential result is that the older ages do a little better. . . . After 50 there is a drop, but the number of cases is scant at these late ages, so that the exact amount of the drop is not certain."

IN one experiment to test "sheer modifiability" or plasticity, the younger people studied were clearly the superior. In this, 24 subjects, 12 of them averaging about 22, the other twelve about 42, were blindfolded, and told to draw lines of specified lengths in one quick jerk of a pencil. They never saw the lines they drew. First there were 600 trials on which no verdict was given by the experimenter; then 600 on each of seven days, on which he replied "right" or "wrong"; then after a lapse of days, another 600 without comment. Through all the trials, the younger were clearly the superior. Another experiment with a code of letters seemed to verify this result. Considering these findings in relation to his other studies, Professor Thorndike concludes:

"The general tendency from all our experiments is for an inferiority [in learning ability] of about 15 per cent as a result of 20 years from 22 on. Learning representing an approximation of sheer modifiability unaided by past learning shows considerably more inferiority than this. Actual learning of such things as adults commonly have to learn shows considerably less."

In addition to the facts disclosed by experimental observation, Professor Thorndike also recorded the opinions of nearly a hundred grown-ups aged from 20 to 40 and over on their experience in learning of many varieties at various ages—on learning to dance or skate or play the piano; to like olives, spinach, tomatoes or raw oysters; to speak in public or play chess; and likewise their changes in attitude or opinion toward unpleasant things, such as thunderstorms or snakes, and toward political, religious and social views.

"In general the testimony of this group indicates (1) that almost anything is learnable at any time up to fifty, (2)

that the experience of these individuals leads them to expect more difficulty in learning from forty on than from thirty to thirty-nine, except with making and breaking food habits, (3) that the difficulty expected from 30 up to 40 is no greater than for childhood or adolescent years in the case of intellectual acquisition pure and simple, and (4) that, in general, age seems to them to influence the power of intellectual acquisition very much less than it influences motor skill. There is evidence also that (5) the difficulty expected in learning at late age is in part due to a sensitiveness to ridicule, adverse comment, and undesired attention, so that if it were customary for mature and old people to learn to swim and ride bicycles and speak German, the difficulty might diminish.

"None of the expected differences in difficulty are of very great magnitude. The greatest is for swimming, skating, and dancing, and even for them a substantial minority consider that it would be as easy or easier for them to learn at 40 or over as it was at the time of learning. If the absolute differences were very great there would be unanimity concerning the direction of the difference.

"The real differences are probably in most cases less than the expected, for the following reasons: These individuals, who surveyed their learning in retrospect, probably underestimated the amount of time spent in the water or on the ice, etc., etc., in childhood's learning. They probably confuse interest in learning with ability to learn to some extent. So far as they were prejudiced at all, they were probably prejudiced in favor of the orthodox doctrine that, after adolescence, each year in some mysterious way weakens the power to learn.

"The facts reported in this chapter seem to us to show that adults learn much less than they might, partly because they underestimate their power of learning, and partly because of unpleasant attention and comment. The facts are also in harmony with the assumption that adults learn less than they might because they do not care enough about learning. There is nothing in the testimony that need weaken our conclusions, previously made from the experimental results."

In a chapter tracing the causes of age-changes in learning ability, Professor Thorndike cites as possible factors capacity, inner growth, the degenerative effect of age, training and the action of disuse upon ability to learn. Important among these is inner growth or development. Though this probably varies for different abilities, "its general mode or average seems from our results to be somewhere near 20, though psychologists in general would probably be inclined to set it somewhat earlier." "Consequently we can assert with reasonable surety that the fact of inner growth favors adults in comparison with children. Unless it is counterbalanced by factors acting in the opposite direction, inner growth gives the person from 25 to 45 as good an ability to learn as he had from 20 to 25, a better ability than he had from 15 to 20, and a much better ability than he had from 5 to 15."

OF the degenerative effects of age, little is known, "though there can be but little doubt that at some time between 20 and 90 the inner developmental forces which make the ability to learn give way in most persons to other inner influences which make it wane." The influence of training "should (with occasional exceptions due to the formation of bad habits) cause an increase in the ability

to learn with age, so long as each year of age brings training with it." Disuse—the failure to keep on learning—might, on the other hand, favor a decrease in the ability to learn.

"If, then, a man ceased at 30 to learn, he would, other things being equal, lose gradually such gains in ability to learn as he had acquired by school or other training in learning before 20. Even if there was no natural process of fall in the power to learn, corresponding to its rise in childhood and adolescence, a man might yet lose the power to learn for the same reason that he loses the names of early teachers, or the facts of algebra or Latin."

"On the whole, the facts about age changes in general, age changes in animal learning, and our results with man justify a rather vigorous skepticism concerning inner degeneration as the *sole* cause of the drop in learning power from 22 to 45. Disuse has substantial claims to some recognition. The decline is then not only small in amount, it is also probably in part avoidable by the simple expedient of continuing to learn. Adult learning is itself probably a partial preventive or cure for adult inability to learn."

"WE have shown that the decline from the acme of ability to learn (located probably at some point between 20 to 25) to about 42 is only about 13 to 15 per cent for a representative group of abilities; and that ages 25 to 45 are superior to childhood, and equal or superior to early adolescence (14-18) in general ability to learn."

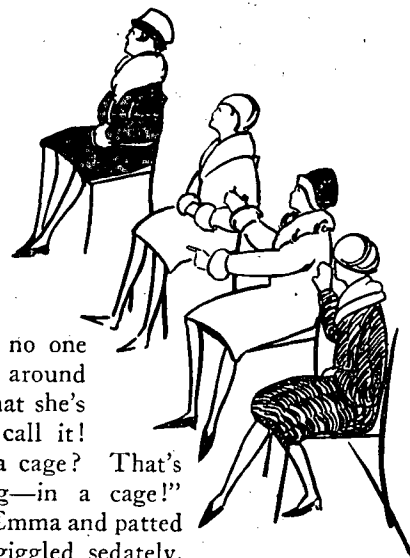
In the way of learning as well as in the capacity to learn, comparatively little difference between young and old was apparent in another group of experiments designed to test such characteristics of the learning process as memory, thinking and reasoning, and carelessness and impulsiveness at different ages. "We may, in general plans for adult education, figure on a slight age loss in intelligence from 22 to 42, such as was found in the case of strength, speed, and skill. . . . Individual differences amongst those of the same age will enormously outweigh differences between ages in adult intelligence. . . . The present indications are that memory loss from disuse is a little greater in the later than in the earlier adult years. . . . The net result from three lines of evidence seems to be that the older manifest little more caution and care in intellectual operations than the young adults or adolescents."

"Such few age differences as do appear are usually explainable as the products of special experiences associated with age rather than as products or symptoms of a general inner change in the mind's ways of working. If we had a hundred boys of 16 and a hundred men of 36 study algebra or French or history or civics for a year and had a record of the thinking of each individual in doing so, I very much doubt whether we could do much better than guess at which was young thinking and which was old thinking, except for references to special adult experiences or signs of special interests. In their experiences, interests, and motives adults obviously differ from adolescents, but in the nature of the learning process they are substantially alike, so far as we can see. Our studies of the matter are, however, subject to the limitations of our abilities and facilities; and they should be checked by other observers with other materials. If they are verified, we may conclude that the general laws of learning are substantially the same from fifteen to fifty."

Mother's Day

By ELEANOR R. WEMBRIDGE

Drawings by Helen B. Phelps



THE four girls were undeniably good-looking, but hardly of impartial mind or judicial temper. Far from it. They sat in a row, ranging in age from eighteen to twenty-five, all very handsome, and all very angry. They were wrapped in fur coats to fashion

which innumerable rabbits and small rodents had been sacrificed. Four platinum wedding rings adorned their hands. They made a formidable array of youth, vigor, brave drapery, and red rage.

Emma, the oldest and relatively the mildest in temper, sat at the end in gray squirrel, her jaw set, but her blue eyes not quite so snapping as the black ones of Rose, the firebrand next her, who evidently was the commanding line officer, while Emma was chief of staff. Elsie was similar to Rose in temperament, when Rose gave her a chance to show it, while Gert was scarcely more than a gay shy school-girl. The latter's coat was the least expensive, for naturally the bank account of Gert and George was seven years behind that of Emma and Neil. The sisters represented not only steps of age, but an increasing scale of expenditure upon their persons, up to Emma, a model of serene elegance.

"We may as well hurry this thing up," snapped Rose. "I got all kinds of work waiting for me. And I shan't come again. It sounds so good in an office to ask to get off because your sister's pinched! I'm about through." She threw up her chin and tapped the floor with her neatly buckled slipper.

"We've talked it over and decided that I'd better take her," suggested Emma more quietly. "But they got to let me alone. I just can't bother with her unless I have complete charge. I'm too nervous to put up with interference, and Neil wouldn't stand for it either."

Elsie shrugged her shoulders. "Neil is one saint, I'll say. Luke wouldn't bother with her at all, and I don't mind saying so. He says Ma wouldn't keep out, and you know she won't. She likes butting in too well."

"Nobody's asking Luke to take her," retorted Rose. "Em is the only one she'll listen to, Em or me. But I'm away all day and

so are you. There is no one but Em who can stick around at home and watch what she's up to. Great job, I call it! Why not put her in a cage? That's where monkeys belong—in a cage!"

"Sh—Sh," warned Emma and patted her arm, while Gert giggled sedately.

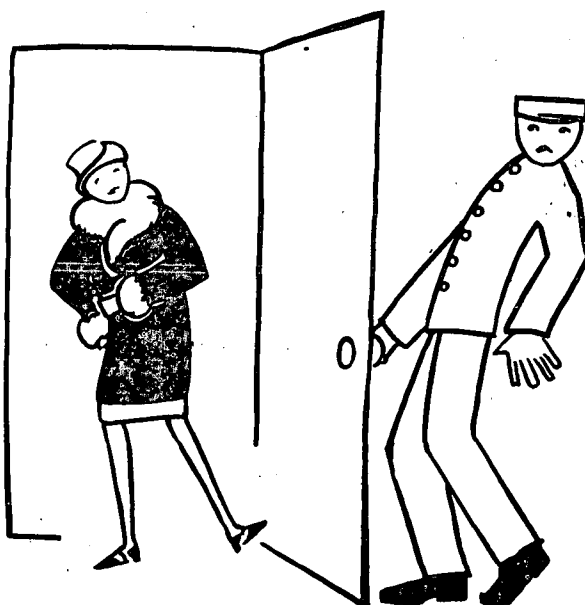
"If that is what you've decided, we may as well have them in and tell them so," ventured the Court. "Whom shall we have first?"

The girls conferred in whispers, then Rose announced, "Leave the kid till last. There is no use giving her the satisfaction of listening in. She'll have to do what we say or get locked up. Let's see the others and get it over with"—at which the bailiff stuck his head out of the door and shouted "Glukens!"

At the sound of this proclamation, the gaze of the four girls became rigidly directed to the ceiling. They scorned to glance at anything so base as the elder Glukenses who presently hesitated upon the threshold, peering in. The newcomers tried unsuccessfully to catch the stony eyes of the girls, which shot past them as if they were not there. Failing in this, they sought two chairs on which they sat in some discomfort.

Mrs. Glukens was large, vigorous and sharp-eyed. Heading her line of daughters like a huge engine attached to smaller but trimmer cars, she wore the same expression on her face that such an engine might be supposed to exhibit, if the train had suddenly reversed and were dragging the engine protestingly toward the rear. Imagine a steer in full chase hauled back by his tail; a Fourth of July enthusiast whose Roman candles are suddenly shooting out of the wrong end; a cautious gardener whose hose has unexpectedly twisted and doused him in the face, and you have Mrs. Glukens, a defendant before the bar of four daughters whom she had scolded and spanked, deprived of their pay, their beaux, their morning sleep and their evening entertainment, for twenty years of glorious dictatorship. She had made them do anything on earth, and now she could not even make them look at her.

As for Mr. Glukens, he was merely the legal background, the supposed head of the house. A thin, elderly man, he occupied a



Plump little Maisie shot into the room as if she had had her ear to the door