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CONTENTS

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SCIENTIFIC PERSONNEL WORK IN THE ARMY[1]

THE sciences dealing with human nature were brought to bear upon the problems forced upon America by the world war. Anthropology and psychology, economics and statistics, history, sociology and education, were put in service to improve our use of manpower, just as the physical and biological sciences were put in service to increase, economize and mobilize the nation's physical resources.

Consider a few illustrations. At one of the cantonments, within a few months' time, over 30,000 men were given a uniform standard intelligence-test and, as a dircet result of it, 600 men who would have been a detriment and even a positive danger to their fellow soldiers were sent away before time and money were wasted on their military education.

Certain very important institutions were receiving candidates a large percentage of whom were discarded, with little but discouragement and envy to show in return for the expense of their time and the government's money. Yet these candidates were chosen by a system which already represented the acme of common sense administered by extremely able men. A scientific study of some five hundred cases showed where much of the trouble lay and provided a remedy.

Under the pressure of the war the regular army scheme for measuring the qualifications and efficiency of its officers could not be operated. Nor would it have been suitable for the two hundred thousand officers taken from civil life with only a few months of military training. A workable record and rating plan was prepared by an expert in applied psychol-

[1] Address of the vice-president and chairman of Section H, Anthropology and Psychology, Baltimore, December, 1918.

ogy, tested carefully in certain camps, and put into force throughout the army.

At one of the largest naval radio schools the candidates were admitted in part through a series of tests devised for the purpose by one man of science, and their instruction was directed by methods devised by another.

In one of the large munition factories, a number of psychologists were kept constantly at work studying the means of selecting the right individuals as employees and finding the optimum conditions for their work.

Multiply such cases as these many many times; add to them the scientific personnel work done by physiologists and medical men; add further that done by the many modern business men whose work is so based on principles and verified by experiment that we should gladly claim them as fellow scientists —and the total would probably be the greatest increase in scientific control over the management of men ever made in any year in any country.

Until the war-history of the scientific activities of the National Research Council, the various emergency boards and bureaus, and the military organizations themselves is written, nobody will be able to describe or assess this work as a whole or the particular share of it due to applied psychology. I regret also that circumstances have prevented me from speaking, as I had hoped to do, from even a partial study of the records and reports available in manuscript in Washington and elsewhere. I can speak only in a very informal way in reminiscence of the activities seen, or shared, during these eighteen months.

Scientific personnel work has followed two main lines which we may call *mass* work and *analytic* work. These of course shade into each other and almost always cooperate, but the distinction will be helpful, at least for presentation.

MASS WORK

As a result of the prompt, energetic and patient labors of Yerkes and his associates of the psychology committee of the National Research Council, and of the subcommittee of the American Psychological Association, about seventeen hundred thousand soldiers were given a standard examination for intelligence, so devised that a small organization of examiners and clerical helpers could test and report on five hundred or more individuals a day. Within a day or two after a train-load of recruits reached a camp, it was possible for the camp psychologist to give substantial aid in such matters as:

1. The discovery of men whose superior intelligence suggests their consideration for advancement, for example, to posts as non-commissioned officers.

2. The discovery of men whose low grade of intelligence renders them either a burden or a menace to the service.

3. The selection and assignment to Development Battalions of men who are so inferior mentally, that they are suited only for special work.

4. The prevention of undesirable differences of mental strength between different regiments or companies.

5. The early recognition of the mentally slow as contrasted with the stubborn or disobedient.[2]

The history of this work in its early stages has been related by Yerkes, and its later development will doubtless be made public. Amongst the many important contributions to knowledge of the significance of such a test, I quote one from the preliminary report recently issued.

The median scores for recruits from different civil occupations are in summarized form as follows:

45 to 49	50 to 54
Farmer	Stationary gas-engine man
Laborer	Horse hostler
General miner	Horse shoer
Teamster	Tailor
	General boiler maker
	Barber

55 to 59	60 to 64
General carpenter	General machinist
Painter	Lathe hand
Heavy truck chauffeur	General blacksmith
Horse trainer	Brakeman
Baker	Locomotive fireman
Cook	Auto chauffeur
Concrete or cement worker	Telegraph and telephone lineman
Mine drill runner	Butcher

[2] From "Army Mental Tests."

Bricklayer
Cobbler
Caterer

65 to 69
Laundryman
Plumber
Auto repairman
General pipe-fitter
Auto engine mechanic
Auto assembler
General mechanic
Tool and gauge maker
Stock checker
Detective and policeman
Tool-room expert
Ship carpenter
Gunsmith
Marine engine man
Hand riveter
Telephone operator

85 to 89
Photographer

95 to 99
General clerk
Filing clerk

105 to 109
Mechanical engineer

115 to 119
Stenographer
Typist
Accountant
Civil engineer

125 and over
Army chaplains
Engineer officers

Bridge carpenter
Railroad conductor
Railroad shop mechanic
Locomotive engineer

70 to 74
Truckmaster
Farrier and veterinarian

75 to 79
Receiving clerk
Shipping clerk
Stock keeper

80 to 84
General electrician
Telegrapher
Band musician
Concrete construction foreman

90 to 94
Railroad clerk

100 to 104
Bookkeeper

110 to 119
Mechanical draughtsman

120 to 125
Y. M. C. A. secretaries
Medical officers

This table shows conclusively that in the sort of ability measured by the test (1) skilled mechanics and tradesmen, men who work with tools, are in general very closely alike and very low—near the level of the unskilled laborer; (2) clerical workers are in general very high—near the level of professional men. Either the clerical worker is a man of much greater general intelligence than the blacksmith, carpenter, locomotive engineer, machinist, tool maker, gunsmith or assembler; or the ability measured by the test is very much specialized; or both of these statements are true in a more moderate form. The matter is one of great importance. In proportion as it is true that the more intelligent men seek clerical work rather than work in skilled trades, an essentially invidious class distinction will tend to have a real basis in fact; and the management of business concerns will tend to fall into the hands of men trained in the office and salesroom rather than in the shop. In proportion as this representative of our standard tests of intelligence is specialized, overweighting ability to think with words and symbols in comparison with ability to think with materials and mechanisms, our whole procedure in measuring intelligence requires a critical review; and probably the common view of intelligence requires reconstruction.

No less significant is the variability within each occupational group. Taking the measurements as they stand, the 75 percentile unskilled laborer is up to the level of the median general mechanic, tool-room expert, or automobile mechanic, and up to the level of the 25 percentile mechanical engineer. The 75 percentile railroad clerk is at the level of the average accountant or civil engineer. The 75 percentile receiving or shipping cleark is at the level of the 25 percentile physician. This variability would be reduced by longer and repeated tests, but, unless the test as given has a very large probable error, it would still be enormous. It would still imply that there were in the occupations supposed to demand a high minimum standard of intelligence, a very large number of dull men; and in the occupations supposed to give little opportunity for the use of intellect, a very large number of gifted men and consequently a large unused surplus of intellect. Further information concerning the exact nature of the abilities of which the test is symptomatic is evidently important here.

As one considers the use of intelligence tests in the army, the question at once arises, "If for the sake of war we can measure roughly the intelligence of a third of a million soldiers a month, and find it profitable to do so, can we not each year measure the intelligence of every child coming ten years of age, and will not that be still more profitable?" A more extended test such as will place an individual on the scale for intellect for his age with an average error of not over 0.2 the mean square deviation for his age, would

doubtless be desirable. A more varied test which will prophesy ability to work with things and human beings as well as ideas and symbols would doubtless be desirable. Series of tests that could be made public without serious injury from deliberate preparation by tutors would also be desirable, and probably necessary. However, even with these more rigorous requirements, the expense for an annual nation-wide inventory of the intelligence of the ten-year-old cross section would not equal the cost of the war to America alone for five hours.

The results of such a census of intellect, especially if repeated at 14, 18, 22, would give superintendents of schools, commissioners of charity, mayors of cities and governors of states facts which they really need every day in their business.

A second main line of scientific work for large groups of soldiers was carried on by the Committee on Classification of Personnel in the Army under the leadership of Walter Dill Scott.

As a result of work done by him for the army in the first months of the war there was constituted in August of 1917 a Civilian Committee[3] of seven psychologists and three experts in the selection of men for employment. This committee worked first under the jurisdiction of the Adjutant General and later under the General Staff. This committee urged, and was soon entrusted with, the work of planning and carrying out an inventory of the man power of the National Army and establishing Personnel units in each of the sixteen cantonments. By these means each man's special abilities could be considered so that the right man would be put in the right place. These personnel units were found to be of direct practical service, were soon established in the National Guard as well as in the National Army, and were later extended to the Staff Corps and to the Students' Army Training Corps. Schools were established to train officers in the committee's system of interviewing recruits, recording their abilities and training, and using these facts in placing and transferring men.

A modern army is specialized into over two hundred occupations each as essential in its way to success in war as is the combat work of infantrymen, machine gunners or signallers. An army fights with a force of specialists ranging from artists to automatic-screw operator, bacteriologist to butcher, cargador to cupola tender, detective to dog trainer. The Committee on Classification of Personnel had to fill such orders for man power as:

One hundred and five artists, scene painters, architects, etc., for camouflage work for the Engineer Corps.

Three thousand typists, needed at once.

Forty-five enlisted men capable of leadership who are competent in the distribution and handling of oils and gasolines, fit to receive commissions in the Quartermaster Corps.

Professors of mathematics equipped to teach in the Field Artillery schools.

Meteorologists and physicists able to learn quickly to make meteorological observations and predictions.

Six hundred chauffeurs who speak French.

Electric crane operators.

In August, 1918, nearly four hundred such requisitions calling for over two hundred thousand men were filled. They had to be filled promptly in almost every case, and each had to be filled so as to leave the best possible material to fill every other requisition.

From one point of view this work was simply that of an enormous and glorified employment agency; and the scientists and business men engaged in it would be content if they had done nothing more than conduct an efficient agency for supplying to the army the skill it needed, when and where it needed it. From another point of view the work was a continuous study of human nature and application of scientific management.

In connection with the inventory of each man's abilities, tests to measure proficiency in each of about a hundred trades were devised, in the eight months from March, 1918. By the end of October these tests were in regular

[3] Just before the close of the war, the members of the committee and the group of associates whom they had organized were being commissioned.

operation in twenty-one cantonments, and about 125,000 men had been tested. Their operation made it sure that a man said to be a journeyman ship-carpenter really could do the work of a journeyman ship-carpenter if he was to be sent to the Emergency Fleet Corporation as such; that a man said to be a skilled truck-driver really could drive a truck as required in war-work, if he was to be sent to France for that work; that in general each man's statements and reported career were checked by objective test and measurement.

These trade tests were devised to fit the needs of the army in the war emergency and did so. They would need modification and extension to meet the needs of employers, labor unions, civil-service examining boards and the like. But the principles and methods according to which they were made have been fully justified. To the question "How well does individual A know trade I?" we can obtain a definite quantitative answer and can reduce its probable error to harmless dimensions. Just as we framed standard, workable, convenient, inexpensive, objective instruments to make sure that men assigned to certain work in the army could do that work satisfactorily, so we could upon order frame instruments which labor unions or civil service boards could use as admission examinations, which economists or business men could use in investigations of wages and production, or which a local survey could use in an intimate study of the total life of a community.

With respect to this inventory of manpower and organized effort to put the right man in the right place, it is probably no exaggeration to say that every thoughtful person who became well acquainted with its operation wished that it might be to some extent continued in peace time. "Why," we have been asked, "could not a progressive state inventory all its man power and plan for using it wisely for the purposes of peace?"

The special difficulties caused by geographical distribution and migration could probably be overcome, at least in certain of our states. The cooperation necessary from all citizens might be obtained. A system adequate for recording in usable form the essential facts for a state's entire population might be less expensive and quicker in action than would have been expected to be the case before the army methods were worked out.

An even greater difficulty lies in the fact that we lack laws, customs and experience concerning the use of such information; and it is hard to see just how efficient use of it to answer reasonable queries by federal and state bureaus, chambers of commerce, labor unions, boards of education and other reputable organizations could be encouraged and improper uses by futile or even disreputable concerns could be avoided. If a state could be sure that the information would be used by the right persons in the right way, it might therefore reasonably consider trying to make and maintain such an individualized inventory of its man power.

ANALYTIC WORK

What is called, for lack of a better term, analytical personnel work, is more or less clearly distinguished from the mass work so far described in several ways. It affects fewer individuals; it affects them in more specialized ways; it depends more upon insight and experiment to learn what to do and less upon executive energy and organization for doing it. To such work many men have contributed, and I can only illustrate it.

Early in the war, the problem of selecting from a given number of men those best fitted for rapid training as gun pointers on shipboard was referred to the Subcommittee on the Psychology of Special Abilities, and at their request referred to Dr. Raymond Dodge. He studied the task of the gun-trainer and pointer, the situations and responses involved, the methods of testing their ability then in use, the men from whom selections would be made, and the practical conditions which any system of selection for this work must meet. He had the problem of imitating the apparent movements of the target which are caused by the rolling and pitching of the gun-platform as a distant object would appear to a gun-pointer on a destroyer, a battleship or an armed mer-

chantman. He solved this by moving the imitation target through an 84-phase series of combined sine curves at variable speeds by a simple set of eccentrics, motor-run. He had the problem of imitating the essentials of the control of the gun by the gun-pointer and of recording in a fuller and more convenient form the exact nature of the gunner's reactions in picking up the target, in getting on the bulls-eye, in keeping on, in firing when he was on, and in following through. He solved these by a simple graphic record showing all these reactions on a single line that could be accurately measured, or roughly estimated.

Subsequently he made an apparatus that could be used not only to test a prospective gun-pointer's ability, but also to train both gun-trainers and firing gun-pointers four at a time. The demand for these instruments has been so great that sixty have been built by the Navy for use at shore training stations. The success of this led to further similar work, especially on the problem of the listener, the lookout and the fire control party.

The selection of military aviators is interesting as showing the complexity of a single concrete personnel problem. To be a successful military aviator in the United States Army under the conditions of the great war required first, that the individual be able to complete a theoretical and practical course on the ground (in a School of Military Aeronautics); second, that he be able to learn to fly satisfactorily within a reasonable time in an Aviation School or "Flying School"; third, that he possess the mental and moral make-up qualifying him for a commission in the army; fourth, that he prove competent in actual military work "over the lines" as pursuit pilot, bombing pilot, or pilot carrying an observer, or as a pilot instructor.

If we had perfectly accurate measures of a hundred thousand men available for the four traits: (1) ability in the ground school; (2) ability in the primary training in the fundamentals of flying; (3) standing in the composite of manhood and devotion characteristic of the ideal commissioned officer; (4) fitness for the actual work of a military aviator at the front; we should still have a complex problem. For these four abilities are very imperfectly correlated. The correlation of (1) and (2) is apparently not over .3. The correlation of (1) and (3) is probably not over .5. That of (1) and (4) is almost certainly not over .4. That of (2) and (3) may be as low as .3. That of (2) and (4) and that of (3) and (4) are not known, but it is certain that neither is very near 1.00.

Consequently, even if perfect prophecies could be made in respect to a man's fitness for each of the four requirements, the use of them to give the maximum of satisfaction of (3) and (4) (general officer quality and actual success as a military aviator) with the minimum of waste of time and money in respect to (1) and (2) is a problem demanding careful analysis.

A far greater difficulty of course was to discover means of prophesying abilities in a school such as had never before existed, in an art which only a few score men in the country had learned, and in a form of warfare which was only three years old and was changing its nature radically every few months.

Progress was necessarily slow and piecemeal, and anything like a complete and precise bill of specifications of the successful military aviator in terms of traits observable in a young man at work and at play on the ground is still remote.

Some of the steps in the progress may serve to illustrate further the analytic side of personnel work. In a study of the qualities used by examining boards to select future aviators, it was apparent that amount of schooling was the closest symptom of success in the work of the ground school. An experimental investigation was then undertaken to decide whether the score in a systematic test of intelligence or mental alertness might not be a useful addition to the scores for amount of schooling. Such a test was devised which gave a better prophecy of success in the ground school than amount of schooling, the correlations being, respectively, about *.50* and *.25*. Application of the partial correlation technique showed that the test score was the primary factor, amount

of schooling having its significance in this case chiefly indirectly as evidence of the possession of the abilities measured by the test. The correlation of the test score, independent of schooling, with success in the ground school was about .4. The correlation of amount of schooling, independent of the test, with success in the ground school, was less than .2. Amount of schooling is thus shown to be useful rather as a rough symptom of breeding, social status and viewpoint than as an index of intellect. That is better measured by a systematic test.

It could be affirmed a priori that the score in the test of mental alertness would not select against success in ability at flying itself, general fitness to be an officer, or success in actual warfare over the lines. But it might be that, if very accurately prophetic symptoms of these were at hand, they should be used pure, undiluted by mental alertness.

Consequently the significance of the test score for these was determined and compared with other symptoms. To make a short story out of a long and laborious inquiry, it was found that the test score correlated positively (about .3) with ability to learn to fly, and also with general officer-quality. Had the war lasted its correlation with success at the front would have been determined. It was also shown that dilution of a more valuable symptom by the test score was in all probability impossible, since the test score retained a positive partial correlation, independent of such more valuable symptom. Thus, although what we may call athletic mechanical ability (as in sailing a boat, riding a horse or motor-cycle, or shooting) sems to correlate much more closely with ability to fly well, than does the test score, a properly weighted composite of the two correlates still more closely. The same will hold of a composite with courage, or with nervous stability. So the test score may be used as an aid in selection for fitness for one of the four requirements, without fear of selecting the less fit for any other one of the four.

Almost as soon as the training of reserve military aviators began, in June and July, 1917, Burtt, Troland and Miles at Cambridge, and Stratton at San Diego, began a tryout of tests such as their consideration of the reactions involved led them to think might be prophetic of success in learning to fly. Later the writer investigated the physical, personal, educational and athletic records of men reported as superior and inferior by the flying schools as far as such reports were obtainable. Cooperation of the Committee on Classification of Personnel in the Army with the Personnel and Training Sections of the Division of Military Aeronautics, secured the detail of Dr. Henmon and Dr. Stratton in April, 1918, to study this problem further with a hundred men who learned to fly easily, a hundred men who learned to fly slowly or poorly, or not at all, and a hundred men taken for a test prophecy. It had already become apparent that no one trait of body or mind was clearly and closely correlated with success in flying—that a large number of factors were involved, so that a series of tests each properly weighted, must be combined to give a prophecy close enough to be of practical value. This series was made available for forty-five of the "unknowns" and a prophecy submitted to the effect that five of these cadets would show as many discharges or transfers for inability to learn to fly as all the other forty. This prophecy was verified and provision was made by the army for continued research along these lines under Captain Stratton, and for four special examining units under the direction of Captain Henmon to apply the tests to candidates for cadetships on a flying status.

In the spring and summer of 1918 Eno, aided by Fry, had been working on an apparatus to mimic to some extent the reactions involved in pointing a plane quickly and accurately at a target and to record these reactions in a precise and usable form. Dunlap had developed a systematic test of the changes produced by oxygen-want in an individual's ability in a complex sensory-motor performance somewhat equal in difficulty to the work of a man in combat flying. This was adopted as a regular feature of the differential test of a flyer's ability to withstand oxygen-want in

high altitudes. Parsons was testing the significance of the duration of nystagmus after rotation for future success in flying in the case of naval aviators; and his negative results were corroborated by the writer, and supported by Dodge's analysis of the reaction themselves. Shepard had devised and was standardizing tests of observation of a modifiable landscape. Other work helped to differentiate the qualities of a successful flying officer from those of a successful officer in general.

The formal procedure which was to go into operation for the selection of some twelve hundred aviation cadets per month from the Students' Army Training Corps, beginning in November, 1918, was in fact based in large measure on work done by men of science and the Personnel and Training Sections of the Air Service. Working together they had replaced the practise of selecting for flyers on the basis of general officer quality, by a bill of specifications of the sort of man demonstrably fit to complete the course in the ground school, learn to fly in a reasonable time, and give promise of achievement as a flying officer at the front. At the same time means were provided to do this without diverting from any other staff corps or from the line, men who, though fit to be flyers, were still fitter for other service.

I ought, in justice to the analytic personnel work, to give a wider sampling of its results, but I can not resist the temptation to use the few minutes remaining for two general reflections concerning psychology in relation to personnel practise in general.

The applied psychology or human engineering which has been developing so rapidly in the last decade has learned, in the war, if not before, that nothing short of the best in either ideas or men can do its work. Applied psychology is much more than cleverness and common sense using the facts and principles found in the standard texts. It is scientific work, research on problems of human nature complicated by conditions of the shop or school or army, restricted by time and labor cost, and directed by imperative needs.

The secret of success in applied psychology or human engineering is to be rigorously scientific. On every occasion when the principles of sound procedure were relaxed because of some real or fancied necessity, the work suffered. The chief principles in much of this personnel work concerned obtaining data from the sources possessed of fullest and most intimate knowledge, working only with data of measured reliability, determining the significance of facts by their proved consequences and correlations, and verifying conclusions by a prophecy and experiment. Whenever we made the extra effort and sacrifice necessary to tap the best sources of information about a man, rather than the next to the best, there was a gain. When we took pains to compute the reliability coefficients of all our data before going further with them, we saved time in the long run. Every failure to check apparent meanings by objective correlations was disastrous. An unverified hypothesis may possibly be a relatively harmless luxury if all one does with it is to think; to act on it is a grave danger.

Making psychology for business or industry or the army is harder than making psychology for other psychologists, and intrinsically requires higher talents. The scientist doing work for the inspection of other men of science is in large measure free to choose his topics, and to follow up any one important outcome regardless of what task he originally set himself. The scientist who is assigned a problem and is without credit if, instead of its answer, he produces something eventually far more important, has to be more adaptable, more persistent and more ingenious, if he is to succeed equally often. It is relatively easy to be scientific when you can direct your talent in any one of ten thousand directions; yourself asking the questions for which you proceed to find answers! Psychology applied to the complicated problems of personnel work represents scientific research of the most subtle, involved, and laborious type.

I have by intention omitted the names of the psychologists who have shared in this work, save where identification seemed necessary.

The list would be far too long. At the close of the war over a hundred psychologists had received or were about to receive commissions in the army; many more were doing work equal in merit to that done by the men commissioned; many were fulfilling the regular duties of teaching and devoting to war work the time previously given to scholarship, research and personal affairs; many more were carrying the extra burdens of regular work due to the more direct national service of others. If there were any differences in sacrifice or in achievement, they may well be left hidden in the more important fact that the psychologists of America worked to help win the war and worked together.

E. L. THORNDIKE

PUMPELLY'S REMINISCENCES[1]

PHYSICISTS and farmers are agreed that after the cider has been squeezed out, what remains of two apples can be contained in less than the volume of one. So it is with these "Reminiscences": by squeezing out the rich juice of the narrative, as some impatient and matter-of-fact man of the street might advise, the remains of the two large volumes could be reduced to a single small one; but how disappointed that compressed record, with every story dried to mere pomace, would have left the lingering reader! The detailed narratives of deliberate pages like these are not only of deep interest to many sympathetic contemporaries of the author, but of immense value to their studious successors; for the well-filled books reveal the deeper meaning that lies behind a mere chronicle of events and dates. Would that more of our eminent men might employ the leisure of their later years—if perchance their later years are spent in leisure—in writing out their memories, for the enjoyment of their younger friends and the edification of posterity. Yet with respect to the Reminiscences before us, posterity should be warned not to take them as the record of an average geologist of our times; for while all notable men are of their own pattern, Pumpelly's life has been the very extreme of individuality. Furthermore, contemporary parents of boys who gather minerals and fossils should, in spite of the disregard of America's leading educator's advice shown by our protagonist in the training of Raphael junior, beware of letting their sons embark upon an erratic education of the kind here set forth, in the hope that they will repeat the extraordinary career to which it led; unless they miraculously possess a Pumpellian heart, head and body—a pure and guileless heart, a clear and sagacious head, and a strong and courageous body; and of that rare endowment our sons have not one chance in many thousands.

Aldrich's "Bad Boy" was a little chocolate saint along side of young Raphael in his native New York town of Owego about the middle of the last century, where his piratical adventures, after reaching the high level of a stabbing affray in a quarrel over the division of booty among the members of the gang, were cut short by a wise mother's appeal to family pride, clinched by a more corporeal argument. A few years later a daring climb up the cliff of West Rock at New Haven, where the lad was attending a preparatory school, ought alone to have qualified him for admission to the geological course at Yale, had he not soon afterwards, on reaching the responsible age of seventeen, suddenly decided to forego the advantages there offered and, improving vastly on his grandfather's trite device of entering upon a life of adventure by running away to sea, announced to a well-selected one of his two parents that he wished to study in Germany. She, after the manner of her tactful kind, presented the proposition to her husband, who, after the fashion that has prevailed with men in his difficult position since the days of Eden, assented; and in 1854 mother and son crossed the Atlantic in a sailing vessel to Hamburg.

Hanover was selected as a first station of educational progress, and there two professors were promptly chosen; one was a riding

[1] *My Reminiscences.* By RAPHAEL PUMPELLY. New York, Henry Holt and Co. 1918. With illustrations and maps. Two vols., 844 pages, numbered consecutively.