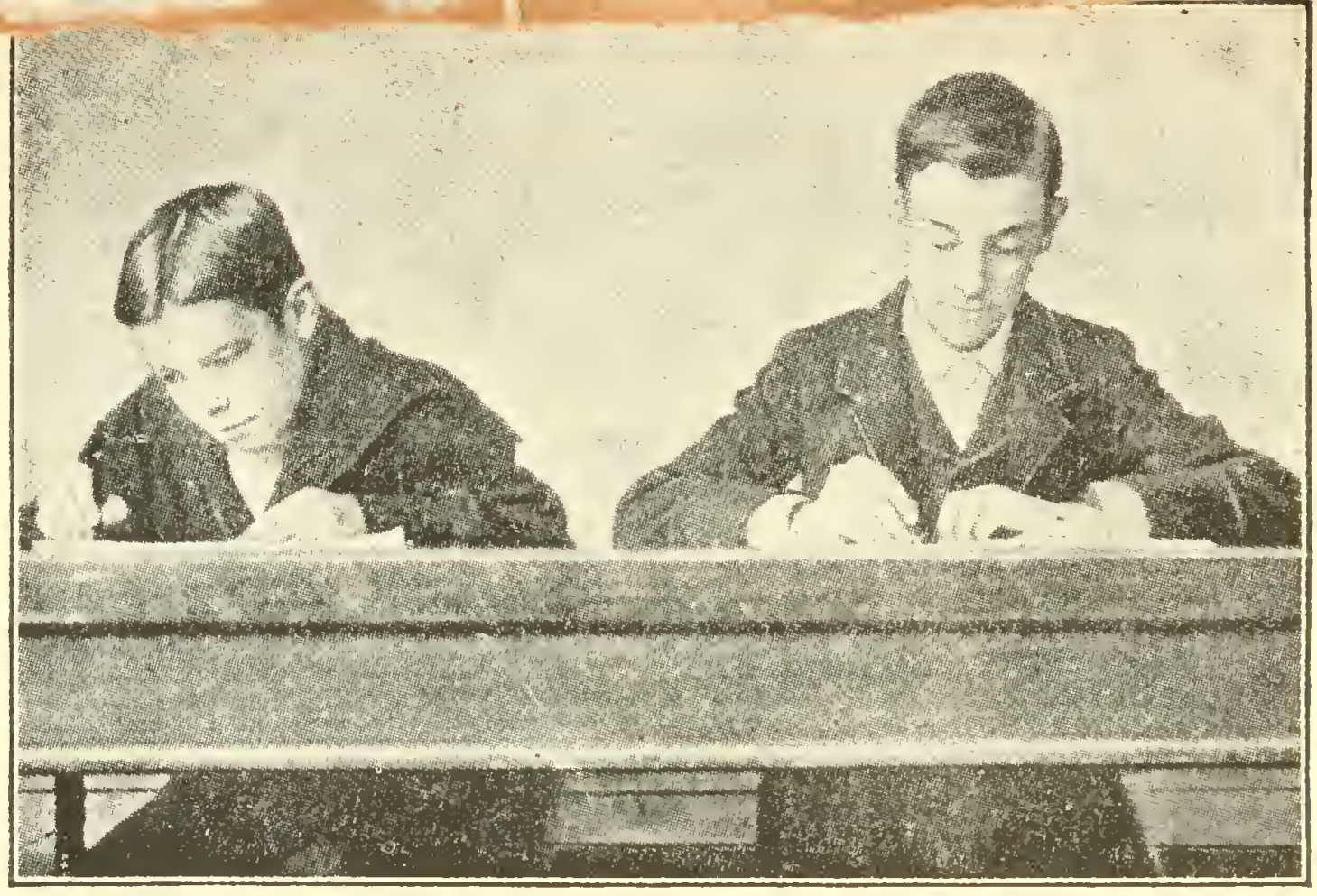

TWISTED POSITION REQUIRED AND TAUGHT IN SLOPING WRITING.

NATURAL POSITION REQUIRED AND TAUGHT IN VERTICAL WRITING.

Pocket Pedagogical Library, No. 2.

ESSAY

ON THE

PHYSIOLOGY OF WRITING

BY

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PREFACE.

THIS slight addition to the bibliography of Vertical Writing will give teachers information as to the movement in France, this being the authorized report of the Commissioners appointed to examine into the subject. John Jackson, in his "Theory and Practice of Hand-writing" (a history of the vertical writing movement), has given very clearly the history of the movement in Germany and England; this pamphlet completes the account, as these countries are the principal ones where the revival has become general. Dr. Javal seems to hold the theory that sloping writing is more rapid; this has been conclusively proven a fallacy, as notably rapid penmen, Thomas A. Edison and others, use the vertical because of economy in time and space.

ESSAY

ON THE

PHYSIOLOGY OF WRITING

VERTICAL WRITING AND SLOPING WRITING.

SUMMARY: INTRODUCTION—I. HISTORIC REVIEW—II. MODERN WRITING OF ADULTS—III. THE WRITING OF CHILDREN—IV. TRANSFORMATION OF VERTICAL WRITING INTO RUNNING HAND;—CONCLUSION.

INTRODUCTION.

A series of articles published in the *Revue Scientifique* * having come under his notice, the Minister of Public Instruction, by order of June 1, 1881, ap-

* Javal, Diseases of the eye and the use of glasses, Sept. 27, 1879; Public and private lighting, from the point of view of the hygiene of the eyes, Oct. 18, 1879; Books and myopia, Nov. 22, 1879; Mechanism of writing, May 21, 1881.

pointed a Commission, composed of M. Gariel, Gauthier-Villars, Gavarret, G. Hachette, Javal, G. Masson, de Montmahon, Panas and Perrin, "to examine into the causes of the increase of myopia among school children, and to point out the remedies for a condition which is daily growing worse."

The Commission set to work at once, and, after examining important documents, a large number of which were taken from the *Musée Pedagogique*, after consulting with competent authorities, and sending a sub-committee to examine into the mode of life in various schools, intrusted Dr. Gariel, engineer of the Ponts et Chaussées, Professor of Physics in the Faculty of Medicine of Paris, with preparation of a full report of its work.

The Commission, without neglecting the questions of lighting, school furniture, typography of school books, adopted the formula of George Sand that I had brought to light, and came to this conclusion: *that if the Administration adopt vertical writing for young children the principal cause of nearsightedness will have disappeared.*

The following is the text of the report:

"The Commission think that great progress will be made by exacting, according to Mme. G. Sand's formula, *vertical writing on straight paper, the body erect.*

"Thus both scoliosis* and myopia will be avoided together. It is not denied that the idea of insisting upon the substitution of vertical writing, in the place

* Curvature of the spinal column.

of sloping writing for children, will appear strange at the first glance; but search has been made in vain for sound objections which could be opposed to this proposal, which has the further advantage of rendering the characters more legible, a fact of which every one can make sure, as we ourselves have done. It must be mentioned also that when the child becomes an adult and wishes to use the running hand, which allows greater speed and straighter lines on unruled paper, he need only incline the paper to the left. But, in any case, the solution recommended of placing the body perfectly symmetrical, parallel to the edge of the table, the paper in front of the body, should avoid the lateral malformations which are now so frequent; making the normal position of

the head natural will prevent its coming continually nearer the paper. Consequently, it is thought that should the Administration adopt this conclusion, the principal cause of myopia will have disappeared.

"Doubtless a pupil may hold himself badly even while having the paper straight before him and writing without slope; but, at least, he can hold himself well, whereas with the present way of teaching, the perpetual admonitions of the most careful teachers break down in the face of physiological impossibilities."

These conclusions, published in 1882, have been adopted in several foreign countries.

In France, they remained a dead letter.

However, a Commission of forty mem-

bers, appointed by letter of January 24, 1882, was directed to study the hygienic conditions of the primary and infant schools.* It assigned to a sub-committee the examination of the subject of the hygiene of sight; this sub-committee adopted the conclusions of the special Commission of 1881, in full, and proposed the following resolution, which was passed in full session:

"*During the elementary course and the intermediate course, children shall be obliged to conform to the formula of Mme. Sand,* VERTICAL WRITING ON STRAIGHT PAPER, THE BODY ERECT."

Some impatient spirits may think, perhaps, that in ten years the Administration might have been able to con-

* *Hygiene of the primary schools.* General report by Dr. Javal. National Printing Establishment and Masson's bookshop, Paris, 1884.

form to the advice of the Commissions, and to make obligatory the teaching of vertical writing.

Such is not our opinion.

In a country so strongly centralized as France, the central power should only act with extreme moderation, and the Direction of Primary Instruction has done well to limit itself at first to authorizing vertical writing in the schools. It is for us to convert the teachers to our opinion.

The hope of succeeding in this was the cause of our thesis being presented to the Academy of Medicine, in 1892. After the state of the question had been set forth, the objection raised by routine against the adoption of vertical writing in the schools was once more refuted. The following is an extract from the

report of the session of January 26, 1892:

"The reason for opposing the adoption of vertical writing in France is the greater slowness of writing in this way. And yet, as far back as 1881,* I pointed out the simple means of teaching running hand quickly to children accustomed to writing without slope, and, a little later,† I published a physiological analysis of the movements of the hand and fingers in the act of writing.

"It follows from these studies that there are two kinds of writing: viz., *with the finger movement* and *with the arm* or *freehand*. The fingers alone are used in the former, whereas the wrist plays an important part in the latter.

* The mechanism of writing, *Revue Scientifique*, May 2, 1881, vol. XXVII., p. 647.

† Javal. On writing, *Société de Biologie*, Nov. 24, 1883.

The slope is useful only in freehand, whether round or angular. Hence, it is unreasonable to teach freehand to young children, since it is not possible to teach them to write from the wrist. They must be taught first to write with the fingers and only advance to the freehand when they begin to write on unruled paper. Then make them incline their paper to the left, and the slope will follow as a matter of course.

"Moreover, to be convinced that the natural tendency of children is to write vertically, it is enough to give specimens of writing to very young children to copy. If permitted, the majority of them will not imitate the slope of the copy; it is only necessary to say nothing to them to have them adopt vertical writing.

"It remains for me to apologize for having brought before the academy a subject of apparently very small importance. I will remark, however, that in case of war, especially in firing at long range, the condition of soldiers' sight is not without importance.

"Disraeli said to the English Parliament: *Power belongs to the most vigorous, the most numerous, and the best trained nation.*

"It is not the province of the academy to consider the subject of popular education; as for numbers, the recollection of the discussion on depopulation that I called forth, following the reading of a paper by M. Lagneau, is not yet forgotten. To-day, I wish to call attention to a question of physical fitness, which will certainly not be unappreciated by

our associates of the army and especially of the navy."

This communication to the Academy of Medicine made a certain stir, and gained a sufficient number of adherents to warrant the thought that the time has come to publish a statement of the mechanism of writing for the use of professors and directors of schools. Indeed, it is important that competent men be able to understand for themselves the reasons which have convinced the Commissions successively appointed by the Minister of Public Instruction.

HISTORIC REVIEW.*

We will now pass rapidly in review the material causes, which, independently of fluctuations of taste and systematic returns to antiquity, appear to have exercised a marked influence on changes in writing; these causes are variations in the price of paper, the transformation of the pen, the use of glasses, and the haste which characterizes the present time.

*
* *

The price of paper has played a very important part in changes of writing; so much so that we see, at the same era,

* Among the sources whence the elements of this review have been drawn, should be mentioned a manuscript of Poujade, from the Taupier collection, which is in our possession, and which contains the biographies of a number of penmen.

the running hand employed on the papyrus of the manuscripts, while on the parchment of the *codices* only closely written uncials, crowded together, so to speak, are used ; no tails, that the lines may be brought closer together, abbreviations of every kind, to save the precious skin ; nothing is neglected to make the most of the space.

The invention of rag paper dates only from the XIII century ; hence, with very rare exceptions, the habit of leaving wide spaces between words did not make its appearance until much later ; for the same reason, long tails are relatively recent ; no person being rich enough to allow himself to imitate the luxury of the long letters which characterize the writing of the Pontifical Court.

The price of paper has been reduced

more than that of any other article. The result is that now, writing no longer takes account of the space used. But, while in the XIX century the waste of paper does not affect the writer, it is far otherwise with the publisher ; this waste increases with the size of the edition, and this circumstance suffices to explain why, since the invention of printing, while writing has become constantly larger, type has decreased gradually in size, so that any sort of identity between written and printed characters lasted very few years after the invention of Gutenberg.

***

The pen has influenced notably the appearance of writing. We see the goose-quill make its appearance towards the middle of the VII century ; this in-

novation scarcely changes the character at all. In fact, in imitation of the *calamus*, the quill was cut very broad, like those that are still used for gothic or round hand; its elasticity served sometimes to accentuate more strongly the top of the strokes, as may be remarked in certain English manuscripts of the VII century, sometimes to swell the middle of the stroke and to give to the letters a similar appearance to that of the Roman capitals; but, in the main, the general appearance remained the same as in the manuscripts written with the reed of the ancients.

The breadth of the nib of the *calamus* and of the quill exerted a determining action upon the division of the heavy and fine strokes in the *uncials*, and this action is reflected in the Roman

capital. In fact, in order to obtain greater speed, the *librarius* of antiquity and the monk of the middle ages endeavored to write the characters with a single stroke. Again, to avoid the ungraceful slope of the running hand, the elbow must be held well out; in this position, if an *M* be written, it will be noticed that the fine strokes are made in ascending and the heavy in descending; if an *O* be written, making the first heavy stroke lower and the second higher than they should be, for symmetry, cannot be avoided. Nothing is easier than to multiply these examples.

It was the square form of the nib of the quill which gave birth to gothic writing; for proof, it is only necessary to try to make gothic letters with a brush, a pencil, or an ordinary pen; in spite of

all the efforts of the writer, the result will be very inferior to that easily obtained by means of a broad-nibbed pen.

The use of the broad-nibbed pen, cut obliquely, marked an advance which is shown by the appearance of the free-hand and *la bâtarde*.

In round hand, the heavy strokes are exactly vertical; according to the penman, by taking for the unit the width of the nib of the pen, the letter *u* would be inscribed in a square, of which the side measures five nibs, in such manner that the space between the two uprights measures three nibs. The difference between the letters *u* and *n* is almost insignificant; the uprights equally square on top are a little more rounded at the base for *u* than for *n*.

The flowing hand only differs from

the round by the inclination or slope which, in the most beautiful models, is that where the stroke forms the diagonal of a rectangle, of which the breadth is three nibs, and the height four nibs; whence it follows that the length of the uprights is $\sqrt{3^2 + 4^2} = \sqrt{25} = 5$. Hence it is seen that the length of the uprights of a flowing hand, written between lines four millimetres apart, is equal to that of the uprights of a round hand between lines five millimetres apart.

La bâtarde differs principally from the flowing hand in the position of the rounded parts, which, instead of being entirely at the base of the uprights, is distributed as in small italics or modern English.

Finally, the pointed cutting of the quill gave birth to the English or angu-

lar hand so universally used in our day; it is distinguished by the length of the looped letters, and by the total absence of heavy ascendants, which cannot be made with our sharp steel pens; the spread of the English hand is the consequence of the invasion of the steel pen.

Since the beginning of the century the use of the pencil and more recently that of the American stylograph, which gives neither coarse nor fine strokes, has caused us to prefer a handwriting having all strokes of the same size. It is the writing of the future. It results partly from the present nature of the steel pen, of which the slit serves only to facilitate the running of the ink. Inversely, this simple type of writing leads manufacturers to furnish us with pens which

allow of writing, without any pressure, pens midway between the broad-nibbed pen of the round hand, and the elastic and pointed pen of the quartermaster sergeant.

* *

The invention of spectacles, or convex lenses, which dates from the end of the XIII century, has contributed powerfully to the decrease of the size of writing, for, before this invention, it was necessary to write large under the penalty of being illegible to old people. The great spread of myopia, particularly among educated people, must have acted necessarily in the same direction, so that the nearsightedness of some, by allowing them to write smaller than they should, could promote nearsightedness among those forced to read their writing.

It is possible that this double action f myopia and convex glasses has early reached its maximum, for the use f convex glasses has become an essential art of everyday life, and myopes begin o use for writing concave glasses, hich will remove the influence of their yopia.

* * *

Finally, haste, which is one of the haracteristics of the XIX century, has ad the effect of bringing the form of he letters to the greatest simplicity, by oing away with flourishes; people who rite fast and well do not waste their ime in forming irreproachable heavy nd fine strokes, by means of changes of ressure on the pen, and they write loping for the reason that will be given resently.

* * *

This very incomplete sketch* was necessary to show through what evolution we have passed to reach the rapid and sloping writing so generally used in our day.

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The history of the return to vertical writing for children is much shorter; it begins with Guillaume and Fahrner, in 1863. Notwithstanding the efforts of Gross, Ellinger and many others, the campaign in favor of this writing came to nothing, less from the opposition of routine, than because its promoters exceeded moderation, and favored the adoption of vertical writing without any restriction. They missed the physiological explanation of the advantages of

* For further details, see our articles on the physiology of reading, in the *Annales d'oculistique*, 1880.

oping writing, for adults, who are under
ıe necessity of writing very fast, and
.ey were not wise enough to limit their
ɛmands to the adoption of vertical
riting, for children. Nor did they know
ɔw to explain the manner in which the
ıange from the one to the other can be
ısily made.

MODERN WRITING OF ADULTS.

When children are taught to write, it should not be forgotten that they are destined to grow up; but at the same time this teaching should not be directed as if all the scholars were intended to become copying clerks. The writing that is taught them should be legible when they shall have left the primary school, and it is advisable that, in addition, it should become, without too great trouble, rapid and elegant for those who are to adopt the liberal professions. Writing should not be taught in the same way in the primary schools and in the high schools.

Although departing somewhat from our object, which is the teaching of

riting in the primary schools, we are oing to explain with some detail the echanism of writing among adults. We ave followed in this study the method hich should guide all those who ish to formulate rules to be followed n the proper execution of the bodily xercises. This method consists in observing the mode of working of the most ifted persons, who, either by natural ptitude or by tradition, possess exceptional skill.

Let us then examine the movements f a skilled writer; for example, those of recording secretary of the Chamber of Deputies, who, while looking constantly bout him, writes out on the spot the nalysis of the proceedings in a fine, oping regular hand, sufficiently legible o be perfectly clear to the printers.

First of all a continual oscillation of the entire hand will be noticed; it is the wrist joint which makes a movement of extension for each up stroke, and a movement of flexion for each down stroke; furthermore, the three fingers which hold the pen, make at the same time movements of extension when the wrist extends, and of flexion when it draws back; these movements of the fingers have the effect of diminishing slightly the slope of the up strokes and more that of the down strokes. The fingers make still other little movements to complete the form of certain letters and to raise the pen. The most rapid and most regular writing is that which reduces to a minimum the movements of the fingers and relies to the utmost upon the wrist motions, which by their

sochronism and identity are a measure of celerity; these motions of the wrist orm a kind of vibration, of absolutely egular quivering, which is produced vithout fatigue and, it might be said, nvoluntarily. It is, so to speak, the oundation of rapid writing; but on this novement must be grafted various other novements whose use is to shape the ifferent letters. The movement in uestion gives speed and regularity; the ther movements give legibility.

But the motions of the wrist and fingers, assisted, with some people, by a notion of the arm lengthwise to form ne long letter, would only allow of writng in one spot; there must still be a novement of conveyance of the whole and along the line. How is this conveyance effected? This is a point

on which special stress must be laid. The skilled writer, if he have forgotten the precepts of his writing master, leans his elbow on the edge of the table; so that as long as he writes on a narrow sheet, the elbow rests absolutely immovable, and the line of the writing is not a straight line, but an arc of a circle having for its radius the length of the forearm, increased by that of the hand and the part of the pen which extends beyond the fingers. To prove this, after being comfortably placed for writing, put the point of the pen on the beginning of a line and move the forearm round the elbow, taken as a centre ; the pen will trace on the paper an arc of a circle of so great a radius as to coincide with a straight line parallel to the upper edge of the sheet. This immobility of

ne elbow is favorable to rapidity of
riting, for the rotation of the forearm
s made gradually without requiring the
east time, while a stop is caused nec-
ssarily when the arm is wholly dis-
laced to move the pen along the line.
Another advantage of this system is
hat the straightness of the line is pre-
erved automatically, so to speak; with
ne elbow well supported, nothing is
asier than to write perfectly straight
ith the eyes closed.

The use of the elbow as a pivot brings
bout other consequences. The first is
ne oblique position of the paper adopted
y all rapid writers, the diagonal which
ins the upper right to the lower left
rner of the paper being almost perpen-
cular to the edge of the table. The
cond is the slope of the writing; when-

ever the line that is being written is perpendicular to the forearm, the movement of the wrist produces necessarily a slope which should be greater than 45°, if the motions of the fingers and the movements of conveyance of the hand have not reduced it considerably, particularly on the down strokes.

The graphic method enables us to analyze the motions of writing; put on the wrist and little finger of the writer a bracelet and a ring, to each of which a pencil is attached. While the pen traces the writing which is the resultant, these pencils trace on the same paper the movements of the forearm and hand which are the components.

With the position of the arm and of the paper just described, the down strokes take naturally a position nearly perpen-

dicular to the edge of the table. Hence it follows that, in order to write without slope, the skilled writer who holds himself as indicated, has only to place the sheet straight before him; at once the movements of the wrist of which we have spoken will cease to produce the slope, and without any practice he will write vertically with sufficient speed and quite involuntarily; the only difficulty is that for each word, and even several times in a somewhat long word, it becomes necessary to move the forearm and, in consequence, the arm toward the right; otherwise his lines will rise as do those of very many people who persist in holding their paper straight before them as they were taught in their childhood.

In observing the method of skilled writers—it is not that of the penmen—

we arrive at this conclusion, that it is necessary to incline the paper toward the left at an angle almost equal to the slope of the writing, and that the writing must slant. It is for greater clearness that we have supposed the elbow to be supported on the table; a part only of the forearm can be used without inconvenience; although having no point of support, the elbow can serve perfectly as a fixed pivot for the movements of the forearm.

It must be admitted at once, with regard to the attitude of the body, that the position that we adopt is not entirely without its disadvantages; although it permits of writing with closed eyes, one looks willingly at one's work, and it is even necessary to do so to place the dots and the accents. Now, for very com-

plex physiological reasons, the eyes are so constructed that it is disagreeable to them to look along oblique lines ; consequently, persons who write as we advise, are irresistibly led to lean the head to the left, in order to put the two eyes and the line of the writing as nearly as possible on the same plane; this is a slight inconvenience for adults, with whom deformations of the body are no longer to be feared.

A very widespread fault in writing, arises from the use of dots on the *i*'*s* and of accents. Most persons do not wait for the word to be finished to put the dots, the accents, and the crosses to the *t*'*s*. A series of inconveniences come from this. First, an interruption of the stroke, which should unite in one group without stopping, all the letters of the

same word. Again, a very considerable delay, for it takes more time to stop, dot an *i*, and take up again the regular motion of the pen, than to make two or three down strokes. Finally, many persons, especially in Germany, do not raise the pen to dot the *i*, cross the *t*, or make certain accents, whence come strokes that connect the accents to the letters, and interfere greatly with legibility.

Others working rapidly, scatter dots and accents hap-hazard, while with the system we advocate, these signs are always put in their proper places.

The penmen advise not putting the accents and dotting the *i*'*s* until the word to which they belong is finished; this is a difficult habit to inculcate in children and one which they do not

often keep up. It would be better to forbid entirely the use of dots and accents while writing and insist that they be not placed until subsequently, in reading over—whereas the punctuation should be done with great care in the first place. By this system one can write very rapidly and regularly. If writing for one's self or for the printers, it is entirely useless to add dots and accents, which are only to render writing legible, in spite of its faults, and to people having little education. By suppressing dots and accents it is easy to take notes of a lecture *currente calamo*, to write out the entire proceedings of the most animated discussion, and all these signs can be added on reading over leisurely, or they can be put in by a secretary. This system presents also the very great

advantage that a glance will show whether a page of writing has been re-read or not; it is written evenly and quickly, and its legibility is increased afterwards, without loss of time, on re-reading, by adding the dots and accents, of which good manners forbid the omission, except in writing reserved exclusively for one's own personal use.

Speed exacts next that the heavy strokes be produced by a very slight expenditure of strength, and rather by the breadth of the pen than by pressure. Pens with fine and extra fine points should be rejected, and those of medium nibs adopted.

Rapidity excludes unnecessarily long tails; this is no evil, for the caprice of fashion alone hinders them from being considered as ungraceful as they are in

reality; in beautiful flowing hands the long strokes have a total dimension which hardly exceeds twice the size of the body of the letter.

Finally, in order to write rapidly, it is important never to need to raise the pen, which causes considerable loss of time. Now, if it be desired to write in a continuous stroke, it will be noticed that seven letters necessitate the lifting of the pen; it must leave the paper before the letters *a*, *c*, *d*, *g*, *o*, *q*, in the middle of the letters *a*, *g* and *q*, and after *q* and *s*.

A great number of faults of writing spring from connections which are adopted to avoid these breaks in continuity; let these connections be introduced wherever possible, by forming the round part of the letter *a* by means of a very open sort of *e*, and let the same

system be applied to *g* and *q*, and here are four letters which will be made by a single stroke of the pen (*Jackson System*). As for *s* let the connection be authorized and it will take a form analagous to an *c* reversed, easy to write rapidly and not to be confused with any other letter.

To sum up, if it be wished that a man of the liberal professions have a good handwriting when he shall have left the benches of the lyceum, he must be taught, at a given period, such a handwriting as will not be distorted too disagreeably by rapidity. If very great celerity is sought, this writing will be sloping, written on inclined paper, and its mechanism will rest on a regular tremulous movement of the wrist.

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All the preceding applies to freehand writing, in which the motions of the wrist play a preponderating part, writing of which the principles have been perfectly laid down by Taupier and by Grimal. If the methods of these penmen be fallen into an unmerited oblivion, it is because they were wrong in wishing to apply to the teaching of children principles with which they had succeeded in rectifying the writing of adults destined to become copying clerks. They forgot that the immense majority of the people have no need to write at great speed. Let the people as a whole write quietly and legibly, and let the methods of Taupier and Grimal be reserved for the *virtuosi* of the pen.

* * *

The principles of writing with the fin-

ger movements are very different. Methods are not lacking in which directions can be found for holding the pen so as to write round hand, flowing and *bâtarde*. We only say in passing that, among these styles of writing formed by means of pens with broad, straight nibs, there is one unnamed, which appears to us preferable to all; it is a round hand in which the *n* differs from the *u* as in the *bâtarde* and in which the *l's*, *b's*, etc., will be looped. This writing done with a pen of medium nib, should become the *national handwriting*.

* * *

After having frankly made known the reasons which lead some people to prefer sloping writing, we are going to demonstrate that. for children, the teaching of vertical writing is preferable in every respect.

THE WRITING OF CHILDREN.

It cannot enter the mind of a reasonable person to wish to teach to a child six years old, who does not yet know the form of the letters, the very complicated mechanism of which some grown-up people make use in order to write rapidly. Moreover, should this be desired, his organization is not adapted to it, for his forearm being very much shorter than that of the adult, the rotation round the elbow would cause the pen to trace an arc of a circle differing widely from a straight line, and his writing is much too hesitating to be able to make use of the tremor of the wrist. These movements then must be given up, the child allowed to move his entire forearm at

almost every letter, and to make use almost solely of his fingers in moving the pen : he must be left to himself in this respect.

On the other hand, ruled paper is always given to children, no reason exists for the inclined position of the copy-book: the straightness of the lines is assured by the ruling, and is not to be obtained by the rotation of the forearm round the elbow. The copy-book is placed, then, straight before the child.

It has been said already that, even for the adult accustomed to sloping writing, vertical writing is a consequence of having the writing book straight. To prove that it is the same with the child, make him copy some sloping writing : if left to himself, his copy-book being straight, he will write vertically in spite of the

slope of the model. Why counteract his natural tendency? Give him models of vertical writing, he will copy them more easily, which is no evil, *and in writing vertically, he will the more willingly hold himself straight*, which ends to avoid curvature of the spinal column, or *scoliosis*, and above all myopia, which is often recognized as the result of a bad position while writing.

If, disregarding the instinctive tendency of the child, which is good, it be desired to teach him sloping writing, two solutions present themselves: copy-book inclined to the left or copy-book straight.

When the inclined position of the copy-book is directed, the oblique position of the lines induces the inclined position of the hand, which reacts by

degrees on the attitude of the whole body. The copy-book turned obliquely to the left has the effect of bending the head toward the left and the rest of the body follows the movement to avoid a too great bending of the neck, and to throw the centre of gravity to the right, so much so that the copy-book held obliquely brings about *scoliosis* with left concavity, as noticed thirty years ago.

When, on the contrary, a sloping hand written on a copy-book placed straight is exacted, teachers demand what is contrary to nature; it is not enough to place the elbow against the body; it must be put *into* the body, and the unhappy scholar is forced to hollow his right side to give room for his elbow, which leads him to drop his right shoulder and to bear all the weight of the body on the

eft buttock, which causes a *scoliosis* vith a right concavity. An eminent vriting teacher praised this attitude to is in the presence of the Commission ppointed by the Minister of Public nstruction. Our reply was topical: But turn around, if you please, and you vill have your reply!" The celebrated penman had himself a fine curvature of he spine which, seen from the back, ssumed the form of the letter C; the ight shoulder was much lower than the eft.

But *scoliosis* is a relatively insignifi- ant evil; what is more serious is that oth the foregoing attitudes press the ead forward, after a few minutes, and his by a mechanism of which the de- cription would take up too much space ere, and against which the exhortations

of the most attentive teacher would be necessarily of no avail.

The physiological mechanism by which sloping writing is a cause of *scoliosis* and of myopia has been shown elsewhere * in detail; reference can be made to it and the numerous authors who have written on this subject, above all in Germany, can be studied. It is enough to reproduce here photographs showing the positions acquired in either class of work. Herman Kohn, on the hygiene of the eye, (Vienna, 1892, Urban and Schwartzenberg, publishers. See frontispiece).

According to Kohn, Schubert took two groups of ten pupils in two classes in the same school in Nuremberg; the

* Javal. Vicious attitudes of scholars. Revue d'hygiene, 1881, pp. 500 and 570.

scholars in the first group wrote sloping; those of the second group had practiced vertical writing for a year. We are assured that the experiment was faithfully made. We believe it, but even if it should have been a little exaggerated for the needs of a subject of which M. Schubert is one of the most ardent and intelligent champions, it is none the less certain, from our own personal observations, that the attitudes are in all countries much better among children practicing vertical writing.

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* *

As far back as the year VIII François de Neufchateau, Minister of the Interior (at that time there was no Minister of Public Instruction), did not consider it beneath his dignity to publish a method of teaching reading by writing, and he

recommended that a good handwriting should not be insisted upon at first. We think with him that the *first stage* of the teaching of writing should consist in making the pupil trace legible letters, and in leaving him free provisionally from rules for holding the pen. But as, in this respect, he should not be allowed to contract bad habits, it is best to make him write with chalk on a blackboard, which is also to be preferred for the preservation of the sight.

The *second stage*, in our opinion, should be writing with a pencil, less because this process avoids ink blots than for the reason that the pencil writes in any position: it is one difficulty less, and nothing compels the pencil to be held in the inclined position, which is necessary for the proper use of the steel pen. Only

those pupils should be allowed to write with ink who shall have made sufficient progress to justify this step, which will be given them as a reward.

As a *third stage* we should be tempted to recommend a kind of modern round hand, written with a pen having a straight broad nib, held quite vertically; we should even be willing advocates of exercises written with a double pen, as a means of forming the habit of bearing equally on both nibs of the pen.

TRANSFORMATION OF VERTICAL WRITING INTO RUNNING HAND.

At what age and to what extent should sloping writing be adopted? It is hard to say precisely. However, it will be said that the use of ruled paper is almost a necessity when writing without slope; hence whenever the writing ought to become very rapid, and the use of ruled paper is given up, it seems well to abandon vertical writing. Experience alone can indicate the most opportune moment, which for the great majority of scholars will never come. For those whose profession will consist principally of writing, the change will often come of itself: prevent its use among very

small children, and *scoliosis* will have been suppressed entirely, and the number of myopes notably diminished.

As for the means of effecting the change, they will vary a little with the age at which it is desired to be made. In fact, a good many adults who write passably fast make no use of the wrist motions, although writing sloping, and on the other hand it is possible to write vertically while making use of these motions. There is no absolute correlation between these two terms, sloping writing and the use of the wrist motions. The question of knowing at what moment it is important, first, to teach the motions of the wrist, and second to give the slope to the writing, remains an open one. It is not even known if the two changes of system should be made

at the same time. This question presents little interest for the pupils in rural schools who can, without inconvenience, keep to vertical writing and finger movements. It is entirely different for scholars whose education should be pushed much farther, for if the teaching of the freehand to these be too long delayed, there is danger that the principle can no longer be inculcated in them, and that then, continuing indefinitely to use the finger movements, they will retain all their lives one of those handwritings in which irregularity is not redeemed by rapidity of execution. For such, it seems wisest to teach successively vertical writing with finger movements, then vertical writing with arm movements on ruled paper, as a preparation for sloping writing.

CONCLUSION.

There is no doubt:

That the very rapid writing of adults should be sloping, the paper being inclined.

That the writing of children should be vertical, the copy-book being held straight.

That the adoption of vertical writing at the beginning presents no obstacle to the ulterior use of sloping writing.

Those who know our efforts to have vertical writing adopted in primary schools will experience some surprise at seeing us accept sloping writing for adults in the liberal professions. Our answer is that nothing is attained when

too much is demanded. To those who write rapidly, with slope, and who derive benefit from it, it will be difficult to prove that they are wrong, when they are right. To wish to force all to write vertically would be as absurd as to make young children write with a slope. Our hope of bringing about the adoption of vertical writing in the primary schools rests exactly on the distinction, subtle in appearance, but founded on physiology, that we have shown between the mechanism of a child's writing and that of the freehand writing of adults.

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