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Laura G. Smith ^a

^a Clark University , USA

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A BRIEF SURVEY OF RIGHT- AND LEFT-HANDEDNESS¹

By LAURA G. SMITH, Clark University

Every known language contains terms for right and left, by which it is clearly shown that in all times the idea of "rightness" or dexterity, has greatly outweighed that of "leftness," or awkwardness in value. It is needless to dwell here upon the various superstitions of former times regarding left-handedness. A detailed account of such ideas is set forth by Hertz in his treatise on Religious Polarity, dealing with the traditions of the Maori tribe of New Zealand. Our custom of wearing the engagement and wedding rings on the left hand is traced back to their belief in dispelling all evil influence and temptation connected with it, as the left side is profane, the right, sacred. Daniel Wilson in "The Right Hand: Left-Handedness" also presents many biblical examples of the usage of these two members, all of which are very interesting, though not of scientific value.

As to the origin and practice of right- and left-handedness many conflicting views have been set forth. I shall group these opinions according to the seven following theories:

I. THE HAND AND FOOT THEORY

This theory is upheld by Charles Bell who declares right- and left-handedness to be of the same order as right- and left-footedness. Workman has upset this view by the fact that a "spade foot" is as likely to be left as right in a right-handed person, and vice versa; and that a boy always hops on his "spade foot." I confess I cannot follow either line of argument. A boy is usually over his hopping period before he uses a spade to the extent of habitually guiding it with one foot more than the other. We find it convenient to use both feet whether we are right- or left-handed.

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II. THE HAND AND EYE THEORY

Gould considers that right-handedness originates in right-eyedness. Whichever eye first develops more than the other in strength, governs the hand on that side of the body, thus causing the preferred member. He considers ambidexterity nonsensical, and declares it to be the hobby of fanatics. It would mean playing on two pianos instead of one; fingering on the violin first with one hand, then the other; and would require separate road laws calling for passage to the left one day, and to the right, the next. He excuses the exception of the English road rules on the score of the once filthy streets and poor conditions generally; for as is said of the English custom:

“If you go to the left, you are sure to go right;
If you go to the right, you go wrong.”

He suggests that this extreme awkwardness of the English may account for the many accidents in the navy.

Gould offers as a proof of right-eyedness the right-hand position of the railway engineer. To be sure, the engineer's position is at the right, but does this mean that he makes use merely of his right eye, or that he is concerned with what passes to the right, only? From his seat he has a clear view of the entire track in front of him, and takes his signals from the left as well as from the right. All right-handed engineers are not right-eyed; and neither is the left-handed engineer at a disadvantage as regards his left eye, because he must sit at the right side of the cab.

The driver of a carriage or wagon usually sits on the right half of the seat, perhaps from habit, or more naturally, for convenience if he steps onto the vehicle from the sidewalk, as he does in most cases. If, however, he steps onto his delivery wagon from the left side, he is quite likely to take his position at that end of the seat, or in the centre. Few will take the trouble to pass over to the right, unless from strong force of habit.

The earliest models of the automobile would tend to bear out Gould's theory of right-eyedness as applied to the engineer, since the first drives were all right ones. Supposing such an argument to hold, it would prove that all early models were made exclusively for right-handed people, and that the improved models of to-day are constructed for their left-handed friends. Perhaps Gould would not include the right and left drives of the automobile in his arguments for right- and left-handedness, but it seems in consistency with the subject.

The manufacturers argue not on the basis of eyedness or handedness, but convenience. Road rules call for a right

facing of machines, hence, in order to enter the car from the sidewalk instead of walking around to the opposite side and entering from the oft-times muddy street, the drive must be a left one.

A different phase of this subject is brought to light by Stevens in his papers on Peculiarities of Peripheral Vision. His disc tests prove that an object in the right half of the field of vision appears larger than an exactly similar object occupying a symmetrical position in the left half of the field of vision. This result is, with some exceptions, universal for right-handed observers. He proves the tendency to relationship between right-handedness and the enlargement of the right disc, and left-handedness and the enlargement of the left disc.

Later, Stevens and C. J. Ducasse, in their report on The Retina and Righthandedness, give a summary of the results of their tests as follows:

I. In general it may be said that the right half of an extent in the field of vision is overestimated.

II. This overestimation holds true for both right and left eyes.

III. The extent which is overestimated forms its retinal image upon the left corresponding halves of the two retinas.

IV. The left corresponding halves of the two retinas are connected exclusively with the left hemisphere of the cerebrum.

V. By reason of the fact of a marked difference in the space sense of the two halves of the retina, those objects in the right half of the field of vision, by appearing larger attract the visual attention which in turn leads to grasping movements of the right hand. The hand thus formed by earliest experience acquires a special skill which causes it to be used in all manual acts requiring the greatest precision.

Max Meyer's view is a contradiction of the previous one. He says that left-sidedness of the infant is in every respect of the same nature as right-sidedness of the adult. By "infancy" he means the period preceding speech. If the left cerebral hemisphere, which serves such complex functions as speech, reaches maturity only during the second year, it is safe to say that during the first few months of life hand movements are predominantly controlled by the right brain which serves simpler functions and probably matures at an earlier period. If this is true the attempt of H. C. Stevens to explain right-handedness, fails. Meyer claims that the superiority of the sense of sight on the right half of the field of vision, which Mr. Stevens has proved, is not the cause but

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rather the effect of right-handedness, unless both are to be regarded as the effects of a common cause.

According to Meyer, children who in the first stage of life are left-handed, become right-handed when the speech centre becomes active, and vice versa. This implies that the great majority of children during the first year or so are distinctly left-handed, which we know is not the case. He fails to account for infants who are thoroughly left-handed and remain so throughout life.

With a view to discovering whether either right- or left-handedness is due to the predominance of one eye over the other, the following questionnaire was submitted to Perkins Institution and Massachusetts Institution for the Blind, and the New York State School for the Blind:

1. Name and age.
2. Do you write with your right or left hand?
3. Were you taught to use this hand?
4. Do you read with your right or left hand?
5. Were you taught to use this hand?
6. With what hand do you use the following: (a) hammer?
(b) scissors? (c) jackknife? (d) ball-throwing?
7. Were you taught to use this hand?
8. What left-handed relatives do you know about?
9. Were you born blind?
10. If not, at what age did you become so?
11. What was the cause?

* * * * *

Pupils with deformed or maimed hand or arm are excused from answering these questions.

If the name is withheld, please state sex.

The returns of two hundred pupils show that 10% of the boys and 11% of the girls are natively left-handed; while 5% of the boys and 16% of the girls are of the mixed type, a few being practically ambidextrous. 50% of these pupils were born blind, about 30% became so within the first six months, while those remaining lost their sight, partially or entirely, between six months and eighteen years.

Since many cases of right- and left-handedness are found among those born blind, it would seem that we cannot trace the preference of one hand over the other to any predominating influence of one eye, as Gould believes. The mixed type is found for the most part among those born blind, which shows what non-interference may do. The blind child, if let alone, will use whichever hand is the more natural or convenient in any case; in other words, prejudice of custom plays no part in his hand motion.

Many interesting cases are found in these schools. Two girls read braille with the right hand and line type with the left. One girl who is right-handed in everything else reads with her left hand and keeps place with her right. She was taught the opposite but finds this way more speedy. Another right-handed girl does likewise, not for speed, but because she has better touch in her left hand. A girl who became blind at two months uses her right hand for everything but hammering. She was not taught to use the hammer, which she holds in her left hand. As a hammer is usually held in the stronger hand, this example seems to show selection by nature as opposed to education or training. Two girls who were taught to use the easier hand, read with their left, though the right hand is employed in all other cases. A girl who became blind in early childhood is purely ambidextrous. She uses either hand well in any case. A similar case is found in a partially blind girl. Several of the right-handed boys read with their left hand, or either, immaterially. One throws a ball with his left hand. Five right-handed boys, who were born blind, throw a ball with the left hand. Two of these boys use the left hand in reading. A left-handed boy, who became blind at three years, is right-handed in ball throwing.

Fully one-third of these pupils write back-hand or have a strong back-hand tendency. Among this number are found all cases—left- and right-handed born blind, left- and right-handed becoming so, and the mixed and ambidextrous types.

III. CIRCULATION THEORY

Wilson in summing up the various views of right- and left-handedness, states in brief the following: 1. The general vigor, and immunity from disease appear to be transferred to the left side of left-handed people; and this has naturally suggested the theory of a transposition of the viscera, and the consequent increase of circulation thereby transferred from one side to the other. "This is an untenable theory as the relative position of the heart is easily determined in the living subject."

2. A greater flow of blood to the left side is traced to the reverse development of the greater arteries of the upper limbs. This idea is more generally favored.

Barclay's contention as stated by Buchanan reads: "The veins of the left side of the trunk and of the left inferior extremity cross the aorta to arrive at the vena carva; and some obstruction to the flow of blood must be produced by the pulsation of that artery. All motions produce obstruction of the circulation, and obstruction from this cause must be more

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frequently produced in the right side than the left, owing to its being more frequently used. But the venous circulation on the left side is retarded by the pulsation of the aorta, and therefore the more frequent motions of the right side were intended to render the circulation of the two sides uniform."

Wilson considers this a curious idea as it traces right-handedness to the excess of a compensating force for an assumed inferior circulation pertaining naturally to the right side.

Hyrtl thinks that ordinarily the blood is sent into the right subclavian under a greater pressure than into the left on account of the relative position of these vessels; that in consequence of the greater supply of blood, the muscles are better nourished and are stronger; hence the right extremity is more used. In cases of reversed condition, left-handedness is occasioned.

IV. THE WEIGHT AND EQUILIBRIUM THEORY

Buchanan's early theory is based on the preponderance of the liver and lungs on the right side; that the right lung is the larger, having three lobes, whereas the left has only two; that the liver, the heaviest organ of the body, is on the same side; and that the common centre of gravity of the body shifts more or less toward the right. He fails to account for the normal deviation from the natural action of the body.

His modified opinion is a Theory of Equilibrium by which he claims the following variations: (1) The centre of gravity above the transverse axis, with its accompanying right-handedness.

(2) The centre of gravity corresponding with the transverse axis, which he assigns to the ambidextrous.

(3) The centre of gravity below the transverse axis, causing left-handedness.

Struthers contends that the centre of gravity depends upon the weight of the viscera. The deviation from this centre is the cause of right- and left-handedness.

V. THE HAND AND BRAIN THEORY

In 1861, Broca definitely assigned the posterior part of the third frontal convolution of the left hemisphere as the seat of articulate speech in right-handed people, the opposite holding for the left-handed.

Gratiolet attributes right-handedness to the early stages of foetal development in which the anterior and middle lobes of the brain on the left are in a more advanced condition than those on the right side. Hence, the right side of the body is

better supplied with nervous force than the left; and therefore the movements of the right arm precede those of the left.

Wilson's answer to this is given in the proof furnished by a patient of the Provincial Asylum at Toronto. This man was so inveterately left-handed that he was placed on the extreme left of his company in the army and allowed the exceptional usage of firing from the left shoulder. At death his brain was removed and weighed, showing the preponderant weight of the right cerebral hemisphere. Hence, left-handedness is an exceptional development of the right hemisphere of the brain.

That some people consider right- and left-handedness to be controlled by the position in which a child is carried, is expounded by Baldwin and at once refuted. This would prove, he says, that a right-handed mother or nurse would cause the child to become left-handed; and, of course, such is not the case. His child showed no discernible preference for either hand from the fifth to the ninth month, so long as the objects were within easy reaching distance; but when violent muscular exertion was required it was always made by the right hand. When deviating to the left the right hand was used. Up to this time the child had not learned to stand or creep; hence, the development of one hand over the other is not due to a difference in weight between the two longitudinal halves of the body. Neither had the child learned to speak or to utter articulate sound with much distinctness; and so, right- and left-handedness may develop while the motor speech centre is not yet functioning. The use of the right hand carried over to the left side shows that habit in reaching does not determine its use. Baldwin believes that right-handedness is due to the difference in the two half brains, reached at an early stage in life; that the promise of it is inherited; and that the influences of infancy have little effect upon it. However, disuse or the cultivation of the other hand may diminish or destroy the disparity between the two. This inherent brain-onesidedness accounts for the association of right-handedness, speech and music faculty.

Questions 1, 2, 3, 6, 7 and 8 of the questionnaire already given were sent out to determine whether left-handedness is common among people of impaired speech, to the Lewis, Lamb and Northwestern Schools for Stammerers.

The returns from these schools show that of 36 girls, 3 are natively left-handed; of 80 boys, 5 are natively left-handed. Most of these subjects are now partly right-handed; and it is highly probable that the others have also had their hand motion tampered with. This high per cent of left-handedness among

stammerers seems to prove the hand and brain theory: if hand motion is interfered with before speech is established the result is quite likely to be stammering or impaired speech.

In addition to the questions sent out to stammerers the following were submitted to the Ohio State School for the Deaf:

Do you talk with your right or left hand? Were you taught to use this hand?

Were you born deaf?

If not, at what age did you become so?

What was the cause?

Out of 500 returns, 78% of the girls, and 68% of the boys are right-handed; 3% and 4% respectively are left-handed; and the remaining 19% of the girls, and 28% of the boys are ambidextrous in talking and at least one other action.

Of these pupils 70% were born deaf or became so before three years.

We have no way of detecting in sign language whether interference with natural hand motion affects the speech centre while it is functioning, or not; but the great ambidextrous tendency seems to point to a freer hand motion in the absence of speech. More freedom of motion is granted in the sign language than in penmanship. Several left-handed pupils according to instruction write with the right hand, but talk with the left.

VI. THE BILATERAL ASYMMETRY OF FUNCTION

The bilateral asymmetry of function, according to Hall and Hartwell, is shown in every organ, the most familiar asymmetry in both form and function being that of the hands and arms. Dual function is well represented by the right and left brains: one of which is nearly always superior to, and controls, the other. One brain may be insane and be counter-balanced by the other brain.

The result of accurate measurement of the bilateral asymmetry of function, so far as applied to the arms and hands shows that the preferred hand makes the greatest excursion. The test of the hearing power shows the reaction by the stronger or preferred side to be greater than that made by the nonpreferred. Dynamometer tests show that the pre-eminence of the preferred hand is not in skill alone, but in exerted force as well. A maximal clenching movement by one hand is weak if at the same time a like maximal movement is made by the other hand. The failure of an attempt to repeat the standard submaximal clenching movement with both

simultaneously, instead of with one, indicates summation in repeated submaximal movements. The attention, so far as controlled by fixing the eye on one hand, has power to intensify the maximal energy of the clenching effort of the hand to which it is then directed. Attention seems to have more power over the right hand than over the left; but, if fixed on the left, commonly causes its maximal power to develop slightly in excess of the right.

Van Biervliet also favors the theory of asymmetry, even to the extent of expounding Hassen's proof of the asymmetry existing in the Venus of Milo. He asserts that in the right-handed person the right hand is the stronger, as are also the right eye and ear, and that the skin covering the right side of the body is more sensitive than that covering the left. The opposite holds in left-handed people. His experiments on two hundred subjects show that the optic, acoustic, tactile, olfactory, and gustatory motor nerves are all keener on the right side in right-handed people. He further states that in the right-handed the right nostril is the larger.

Van Biervliet says that right- or left-handedness is due to a mechanical cause coming from the beginning of embryonic life, and is not directly hereditary. He does not believe in ambidexterity, arguing that one member is always more developed in force than the other.

In direct opposition to the above theory is the one furnished by Toulouse, stating that in the great majority of cases subjects have olfaction as well as feeling and perception more developed to the left. Olfactory asymmetry means proficiency of the left nostril since this organ is in relation with the left hemisphere which commands sensorial superiority. Right-asymmetry or right-brain is left-handedness or ambidexterity.

VII. THE ULNA THEORY

W. Franklin Jones has just devised an instrument to ascertain whether a child should use his right or left hand. It is a form of brachimeter and may be used even with new-born infants. A child should be taught to use the arm having the longer ulna. He claims that in 96 cases out of 100 the ulna is longer in right arms. Out of 10,000 brachimeter tests he has discovered that 417 children were born left-handed, while 9,853 were born right-handed. 4% of the race are left-handed, while 96% are right-handed. 1% of all left-handed are shifted by deliberate interference. The many cases of feeble-mindedness and stuttering that he has met make him fear the transfer from one hand to the other. It is easy to return an individual to his birthright so far as the arms are concerned, he says.

A little practice will be sufficient to develop skill in the arm which nature intended to be used; and what nature intends in the case of left- or right-handedness should be followed to the letter.

In making the test Jones relies to a great extent upon his measurement of the 'ulna plus,' that is, the length of the ulna plus the length of the hand to the middle of the knuckle. This measure is used because it is more easily determined than the length of the ulna alone.

His returns seem to me to confirm the Hand and Brain Theory with the additional discovery of the 'ulna plus.'

Is the brachimeter test of practical value? Supposing the solution a true one, just how is it to benefit mankind? Nature will surely assert herself if allowed to do so; and, if interfered with, the brachimeter will be of no assistance unless laws are enforced forbidding interference in hand motion. It is not that people are ignorant as to whether a child prefers his right or left hand, but that they are bound he shall use his right one irrespective of his choice in the matter.

OBSERVATIONS OF HAND MOTION

Mrs. Woolley's observations of her baby's hand motions are rather significant. The first week of the seventh month the left hand was preferred, but after that the right predominated steadily, though at times either hand was used. In the eighth month the child learned to wave "Bye Bye" in connection with starting for a ride. The nurse in taking her out of the cab always carried her on the left arm, leaving the baby's left hand free; and as a result the child learned to wave her left hand. Later, either hand was used for this purpose, and finally the right hand entirely. In other pursuits the child used the right hand almost as exclusively as the adult. During the ninth month right-handedness began to be apparent. Mrs. Woolley declares the theory of the speech centre and right-handedness proved in this case, as the use of the right hand predominated when the child began to babble syllables.

Major's child at times preferred the right hand, then again had no preference for either, until in the twelfth month when a slight preference for the left hand began to appear, increasing rapidly until the child was clearly left-handed. The left movement was broken up at this time, so either as a result of training or natural tendency, the right hand was used more and more until in the second year the boy was decidedly right-handed.

Major questions what would have resulted if the child had been allowed to continue without interference or training. He

wonders whether children are natively either right- or left-handed which no amount of training can change; whether it is a matter of training; or if some children are ambidextrous but will develop right- or left-handedness under training.

Dearborn's little girl furnishes an interesting and varied program of hand motions only a few of which I shall state here. The fifth day of her life she used the right hand as much as the left though before this she had shown signs of left-handedness.

168th day she was very left-handed; 303rd day she was right-handed; 358th day ambidexterity played an important rôle; 595th day on, the right hand predominated.

Dearborn concludes that "the left side of the body seems both more reflex and somewhat more precocious than the right side. It seems to be more distinctly the mechanical implement of the organism's will while the right side is still largely reflex."

AMBIDEXTERITY

The late Sir Daniel Wilson was an artist of considerable ability. He was natively left-handed but through education cultivated the use of his right hand thus becoming ambidextrous. Much of his artistic work, however, was done by the preferred hand. As one enjoying both sides of the situation, he makes in his book a hearty plea for ambidexterity.

Henry Jones Macnaughton says: "As in the instance of polarized light, molecular arrangement in the brain may account for the freedom of the right hand over the left." He maintains that there is nothing discernible of an organic nature in the cortex of either hemisphere of the brain to explain any functional difference or superiority of one over the other. Man was originally endowed with a dual psycho-motor co-operating capacity of brain and hand—simultaneous or alternating. The brain is a dual organ and each hemisphere is capable of independent action. That a great coördination exists between speech and writing is clearly shown in pathological cases such as aphasia, in which the understanding is clear, but the patient is unable to convey his ideas in speech; amnesia, when there is confusion in recalling words and in applying the correct ones; and in agraphia, when the person may be able to express himself in language and yet be unable to write the words he wishes to use. Such cases of pathology are found but seldom in left-handed or ambidextrous people, who, by education or custom, are strongly influenced to use the right hand largely, hence working the left as well as the right hemisphere. These diseases are often successfully treated by compelling the patient to use his non-preferred hand and

thus bring the latent force of the accompanying brain into play. Aphasia, according to one estimate, is, in fourteen out of fifteen cases, a disease of the left brain. This is decidedly an argument for the cultivation of both hands.

Macnaughton heartily favors the acquisition of simultaneous, two-handed writing, drawing and technical work, arguing that ambidexterity requires will power and control, concentration of mental effort, and contributes to the formation of character and intellectual growth. Man's intelligence cannot be bisected.

The nascent or developing period of the hand centre probably extends from the end of the first year to the end of adolescence, but the most active period is from four to fifteen years, after which time the centre becomes comparatively fixed and stubborn. During this period of development any forceful change from left to right, or vice versa, may result disastrously, causing, for instance, neurotic disorder, impaired speech such as stammering or stuttering, or indeed, complete imbecility. Neurasthenia and *neuro-mimesis* he claims to be caused by work taxing to the utmost one side of the brain and body. Simultaneous writing and ambidextrous motion in general would guard against all such diseases.

Schuyten also advocates the symmetric education of the different parts of the body, thus doing away with atrophy.

Lueddeckens affirms that at the beginning of embryonic life the symmetry of the organs is complete: even the vascular system is absolutely symmetrical from the heart to the veins and capillaries. The unequal development of the vascular system comes with the inequality of blood pressure which is stronger on one side of the head. Right-handedness is the result of the high blood pressure in the left head—where cerebral hemorrhage is most often found.

Another strong advocate of ambidexterity is Varia Kipiani. She says that the child at the beginning of life is ambidextrous; but this natural tendency is destroyed by educators who insist upon unilateral growth. Many types of tic, St. Vitus Dance, professional cramp and neurosis are the result of occupations in which unilateral muscular motion is in play. She considers that excess of unilateral cerebral, asymmetric work frequently disequalizes the nervous system of the school child from ten years of age to puberty; and is thus responsible for neurasthenia, chorea, St. Vitus Dance and the many cases of tic met with in school life.

As an argument for ambidexterity many writers cite instances of left-handed or ambidextrous nations. According to Pliny, the Gauls in their religious rites, contrary to the Roman custom, turned to the left. The Scythians, noted for strength

and valor of conduct, were ambidextrous. The Ancient Egyptians show in their works an inherited evidence of a prevailing ambidextrous faculty. A large proportion of the Persian workmen of to-day are ambidextrous; and among them the left hand is commonly used for signing letters or documents. By far the most striking example of ambidexterity among modern nations is that of Japan. There ambidexterity is taught in the schools and practiced in all the arts. The trait dates back to the remotest history of the race, and the gift is equally possessed by both sexes. Japan of all modern nations exhibits the most wonderful craftsmanship and manipulative skill, as is shown by originality in design; delicate carving in ivory; marvelous lacquer and gold ornamentation; beautiful inlaying of woodwork as also of gold and silver; unsurpassed embroidery and lace-work; tortoiseshell and silver enamel; and copper casting.

The ambidextrous and left-handed are proud to claim in their ranks these well-known men of talent: Michael Angelo, Leonardo da Vinci, Holbein, Landseer, Mozzo of Antwerp, Amico Aspertino, Ludivico Congrago, Sir Daniel Wilson, and Sir Baden Powell.

It is quite generally agreed that the percentage of left-handed people is two in one hundred. Jackson's investigation proved that 3% are incurably biased to left-handedness; 17% to right-handedness; while the remaining 80% are normally ambidextrous.

My own investigation of three public schools however showed that of the entire 2,055, 4½% of the girls, and 5½% of the boys are left-handed in practice. No doubt if the natively left-handed were to be added the percentage would greatly increase.

Is left-handedness increasing or decreasing?

This question is duly considered by Romalev who terms the left-handed person a Mendelian recessive. In a family containing a left-handed child perhaps neither parent is left-handed, nor has any ancestor for a number of generations been so affected. Such a condition probably exists in about one-sixth of the population. Left-handedness among parents is greatly underreported as the number of left-handed children is twice that of left-handed parents. He concludes thus: "Recessive mutants, unless of inherent weakness in some respect, must tend to increase in number at the expense of the originally dominant right types."

To determine the relation of left-handedness to general intelligence and character questions were sent out which brought me most deplorable returns.

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500 reports from the Trenton State School for Girls, the Hallowell State School for Girls, the Shirley Industrial School for Boys, show that 11% of the boys and 6½% of the girls are left-handed. This seems to agree with the old idea of wickedness accompanying left-handedness. Notice, however, that it strongly disagrees with the former belief that this wickedness prevailed in the feminine gender. It is almost 2:1 against the boys.

200 returns from the Rhode Island and Maine Institutions for the Feeble-Minded show that 11% of the girls, and 8½% of the boys are left-handed. 4% of the girls, and 5% of the boys, are ambidextrous but prefer the right hand.

Does this not prove that there are many more cases of feeble-mindedness than we usually credit? Here, education has probably had no part, hence the native motion has prevailed.

The ambidextrous tendency seems to be a thoroughly native one.

Yet we find left-handedness well represented in all walks of life; the highest scholarship and honor lists include left-handed people. Then, too, many a brilliant so-called right-handed person must cast his die with the natively left-handed if real facts be known. He has been so well educated in the use of his right hand as to make it appear a natural one. Hence, data on the left-handedness of adults are quite likely to be faulty.

Left-handedness is viewed by many as little short of an affliction; and many of the so-afflicted must be often humiliated and at times seriously injured by the coercive methods used in breaking up this natural motion. We do find extreme awkwardness in connection with left-handedness, but is right-handedness entirely free from this condition? I think if we fairly examine the case we find that for every ungraceful left-hand motion may be found a proportional number of awkward right-hand acts. Sinistrality may be dextrality at the same time, and vice versa. Yet, any natively left-handed person I feel, greatly appreciates a right-hand training. He is thereby enabled to comply with the rigid rules of polite society, and still use his stronger or preferred hand for exceptional cases.

The destruction of native left-handedness must sometimes result in the loss to the world of a talent concealed in that paralyzed member.

Fine penmanship is found among left-handed subjects who are properly trained and have adequate practice, which, indeed, is necessary for good right-hand script. Are instructors

of penmanship, especially in the grammar grades, wise in compelling the use of the right hand even in the most stubborn cases of left-handedness? May they not be largely responsible for the many nervous disorders found in their little victims?

Many every-day acts call properly for ambidexterity or left-handedness. The manipulation of most musical instruments is a two-handed one; and the piano player calls for left- more than right-hand motion. According to the position of door knobs the hand used on entering is not that which should be used at the exit. Rowing often requires a two-hand motion as does sculling, also. Many accidents occur on the railroad and street railway which might be avoided if people would only learn to use their left hand instead of their right, when stepping off the car. The right hand grasps the handle of the seat or car, and hence the body is turned toward the right in such a way that the person steps off backwards. If the car is in motion he is thrown upon the back of his head. When the proper hand is employed the body swings out from the left hand, and the person faces the direction of the car. Then if he steps off while the car is in motion he may either run forward until his equilibrium is maintained, or simply be cast forward, in which case his head will not be in immediate contact with the pavement. Men's coats button to the right hence calling for a right motion; while women's coats have an opposite buttoning system calling for left-handedness. It is interesting to notice the conflicting movements involved in this matter-of-fact performance. You will see an apparently right-handed man deliberately decline the convenience made for him, by using his left hand. Then, again, a left-handed woman will button her coat with the right hand. Many people use the two hands in buttoning; but the majority, whether right- or left-handed, follow the law set for them—the men, right; the women, left.

In conclusion, the following data which do not entirely agree with commonly accepted statements as to left-handedness, may be once more stated for emphasis: As against the usual statement that 2% of the population are left-handed, my returns from 2,055 school children show that 4½% of the girls and 5½% of the boys are left handed; out of 500 delinquent children, 6% of the girls and 11% of the boys; out of 200 feeble-minded, 11% of the girls and 8½% of the boys; out of 500 deaf, 3% of the girls and 4% of the boys; and out of 200 blind, 11% of the girls and 10% of the boys.

The high percentages of the blind, feeble-minded and delinquent are especially striking and call for further study and explanation.

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