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THE RULE OF THE ROAD

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THE localization through war and barter of the cerebral centers of speech and writing (and hence of intellect) of 98 per cent. of the population in the left half-brain is the cause of right-handedness.[1] The increase of the necessary differentiation of bodily and mental function by the coordination of associated cerebral centers has resulted in a general right-handedness, right-eyedness, etc., the data by vision, audition, and for action of the right leg and foot for associated function, compelling a location of all these centers in the same left-brain and closely linked with the determining faculty of speech and writing. With the two per cent. of left-handed, the reverse of all this takes place. The mystery of the origin of right-handedness is thus cleared up. With this explanation manifest the other concurrent mystery of the rule of the road is of easy solution. Right-handedness, plus the variant circumstances of civilization, the reaction of the right-handed organism to the environment (in the language of evolution), explains all the puzzles of the rule of the road.

Primitive war, as Homer, chivalry, and present-day savage customs demonstrate, regardless of the number of combatants, was a matter of individual encounter, of hand-to-hand conflict. Even when archery, and throwing of spears, javelins, etc., came into use the essential individualism was not changed, and the shielding of the left side, and aggressive use of the right hand continued. All military tactics and drill of numbers was then established as right-handed, down to the most minute particular—and so continues, indeed, although the flung weapon weighs a thousand pounds instead of one or two pounds, and is thrown five miles instead of twenty or fifty feet. After the Trojan war, chariots fell more and more into disuse, and cavalry began to take their place, but this in no way changed the evolution of right-handed tactics. In Alexander's time the right flank of the phalanx was the post of honor, called the head, the left the tail, and marches and movements were made by the right. The commander had his station on the right. So strongly established was right-handedness as early as the half-legendary Amazonian times, that the Amazon had her right breast excised in order that she might hurl the javelin and shoot the arrow with greater freedom and accuracy.

[1] See Popular Science Monthly, August, 1904.

Thus not only right-handedness in the vast majority of people, but with it right-eyedness, etc., firmly fixed and differentiated, comes down to the beginnings of civilization. But this is far from implying that in meeting, either two or thousands of people invariably passed each other to the right. This is proved by the classical instance given by Dante in the eighteenth Canto of the Inferno in these words—translation of Longfellow:

> Even as the Romans, for the mighty host,
> The year of Jubilee, upon the bridge,
> Have chosen a mode to pass the people over;
> For all upon one side upon the Castle
> Their faces have, and go unto St. Peter's;
> On the other side they go unto the mountain.

Not only was the Papal order necessary to make the crowd keep to the right in coming and going, but a barrier was erected along the middle of the bridge so that the crowd could not interfere with one another. Further particulars are given in Longfellow's note to the passage, and by other commentators of Dante. In our own times the custom of foot-passengers is more firmly established, "As was well illustrated recently in the Paris Exhibition in the case of the two large wooden bridges erected opposite the Trocadero to convey foot-passengers over the roadway. Here, although for what reason was not apparent, the authorities commanded the people to pass over the bridges to the left, instead of, as in the case of other bridges in the same exhibition, to the right. After crossing the bridges the majority of the crowd would be seen bearing to the right, causing endless pushing in crowded days." But that many, especially women and children, are to-day reckless of the rule, is illustrated in the crowded side-walks of American cities.

Whenever, and that was generally, the custom and rule of orderly government was established by military usage, the ancient and persistent habit of passing to the right arose naturally from the necessity of keeping the enemy on the left side. This was the shielded side and gave combatants greater safety, as well as insured greater freedom and efficiency for the aggressive right arm and hand.

The crux of the difficulty in explaining divergent usage is encountered by the strange seeming anomaly of English practise. Wherever English usage obtains, the carriages and horsemen pass to the left, although foot-passengers pass to the right. That the foot-passengers keep to the right is natural, because it was derived from ages of military precedent. But another and overlooked fact doubtless contributed to prevent the English walkers from adopting the wagoner's rule of passing to the left. This was the growth of town and of city life. All urban life was conditioned by narrow streets, so narrow

that our modern city alleys are in comparison wide.[2] At first, indeed, there were no sidewalks, and there was room at the sides, when a cart or carriage occupied the center, for only one person to walk between the wagon and the houses. Hence plazas, open spaces and squares, were the meeting places of the citizens. Quarrels and fighting were always taking place in the "streets," garbage and refuse (*gare à l'eau!*) were thrown from the windows into the center of the streets—which thus became open sewers, and the mud, etc., of passing vehicles had to be avoided with great dexterity by the foot-passers. And literally with great "dexterity." The left or shielded side, although shields might not be used, would naturally be that presented to the center of the street. The right side was thus chosen to keep the right hand or armed side of the body free for action, to avoid the mud, to escape the refuse flung from above, etc. And if one protected a lady, she was, as to-day, given the side next the house-walls. When wider streets and sidewalks came into existence the right-passing custom was already established; and the still-remaining narrow ones in old cities insured its maintenance.

But why did the English early adopt the habit of passing their vehicles to the left? The contradictory rules have tormented visitors, evolutionists, the correspondents of *Notes and Queries,* and many periodicals of the last one hundred years, and have been epitomized in many forms, the most common being this:

> The rule of the road is a paradox quite
> In riding or driving along;
> If you keep to the left you are sure to be right;
> If you keep to your right you'll be wrong.
> But in walking, a different custom applies,
> And just the reverse is the rule;
> If you keep to the right, you'll be right, safe, and wise;
> If you keep to the left, you're a fool.

[2] St. Evremond makes his visitor say that in the Paris of his time the streets were muddy whether it rained or not, because everybody threw rubbish of all kinds into the middle of the streets. Ladies had to be carried across the central gutter on the backs of their servants. Men wore top-boots, like those of postilions. Blocks of vehicles constantly occurred, and then there was no respect of persons; ladies whose carriages happened to be entangled in them had to listen to the most frightful oaths and language. There were often duels with whips. Victory did not remain always with the most foul-mouthed. The most dilapidated fiacre would have remained where it was until nightfall sooner than have made way for a court-carriage. Blind people and blind mendicants, criminals and pickpockets thronged everywhere. To the clashing of bells were added the shouts and cries of the perambulating dealers in vegetables, milk, fruit, rags, sand, brooms, fish, and water. The water-carriers numbered some 20,000, each of whom distributed from 30 to 40 pails a day. The tumult of cries kept up night as well as day.

The English rule of the road as to vehicles obtains on the continent only in some Swiss cantons next to Italy, and in Italy. Nowhere, apparently, do foot-passengers, in meeting, ever pass to the left. The method of passing when overtaking another wagon or carriage is also a result of that adopted in meeting. If wagons pass to the right they overtake to the left, and *vice versa*. The rule of all nations at sea, including the English, is uniform—Port your helm!—*i. e.*, pass to the right! This international rule was settled in 1862, yet Harper's "Book of Facts" says that near Great Britain alone there were in the six years ending 1895, some 13,000 collisions at sea.

The English rule of the road was of course socially recognized long in advance of any formal laws or decisions on the subject. So far as I can learn, the first Act of Parliament was enacted in 1835, and reads as follows:

> Any person driving any carriage whatsoever, or riding any horse or other animal, who meeting any other carriage or horse or other animal, shall not keep his carriage or horse or other animal on the left or near side of the road or street, or, if passing any other carriage or horse or other animal going in the same direction shall not in all cases where it is practicable go and pass to the right or off side of such other carriage or horse or other animal, shall be liable to a fine not exceeding 10 shillings.
>
> Any person riding any horse, and leading any other horse, who shall not keep such led horse on the side farthest away from any carriage or person passing him on any public road or in any street of a town shall be liable to a fine not exceeding 10 shillings. (In 14 and 15 Vict. Cap. 92, Sec. XIII.)

The led horse, and especially if the man is himself mounted, requires the man's right hand in leading on the halter of the led horse. Another evident reason why the led horse should be at the right edge of the road is to avoid dangers, both to the led horse and to the approaching person, if the led horse were to pass in the center of the road, and thus graze the passing vehicle, man, or animals.

The universal ancient custom, derived from military drill and right-handed habit, of passing to the right, was therefore unexceptionally continued by all nations except two—England and Italy—and in these two it was continued as to sea-going vessels, as to led horses, and as to foot-passengers. But by these two nations the strange exception is found that vehicles pass to the left. Why?

The suggestion has been made that in England and Italy the diligences, and post-coaches, had to be protected from highwaymen and brigands and this was done by armed postilions; these sat, of course, on the near or left-hand horses, because they were right-handed men (and thus mounted from the left side of the horse), and also because in driving the left hand held the rein while the right hand was kept free to handle the firearms. The theory is that they passed to the left in order the better to fight the highwaymen, who were thus kept on the

right side. This explanation is scarcely explanatory. Were highwaymen not as common in other countries as in Italy and England? Could they not and would they not as footmen attack from the left side of the road as well as from the right? Usage so widespread must have a far more generally acting and ancient habit behind it than this of robbery. All such habits as the rule of the road must have sprung from many and more primitive and humble origins, from the necessities or customs of the common people, in fact, whence as here the few later diligences and post-coaches derived their habits. The conscious legal enactment is merely the late acceptance of centuries of unconscious custom. If suddenly springing into existence, a general change must be the response to a new circumstance of powerful and general application.

Contributing customs or necessities may have cooperated to effect the change in Italy and England from the natural passage of vehicles to the right, making them pass to the left, while foot-passengers, vessels, etc., continued to pass to the right. But it has been overlooked that before vehicles had come into use horseback-riding must have set the fashion in passing because the riding of horses, asses, mules, etc., must have long preceded the existence of the wheeled vehicle of any kind. For perhaps a thousand years (as now in a large part of the earth's surface) it must have been impossible for transportation of goods or men to be effected by wagons, and only by horses, pack-mules, etc. During this time the rule of the road must have been fixed pretty rigidly, especially as the narrow "trail" or path would not everywhere allow meeting riders to pass, but only in certain wider or more open spaces. In all civilized countries, except the two mentioned, the fact that subsequent customs demand the passage to the right shows that, during the preceding centuries, the ridden horses and pack-animals must have passed to the right. One can scarcely doubt that the ridden horses of England and Italy did the same. This seems only to deepen the mystery of their contrary practise to-day.

The mystery, I suspect, is resolved by the forgotten fact of the tremendous, fashion-setting, and centuries-long influence of chivalry with its tourneys, joustings, and knightly battles on horseback, with ax, sword, spear, tilting lance or pole. Those who have studied and realize the vast domination of chivalry can easily comprehend the rôle it played as its vogue after centuries melted into plebeian tilling the soil, commercialism, and roads covered with wagons, coaches, etc. The horseback fights and mock-battles of the troubadours, minnie signers, knights, and aristocrats of these centuries were possible only by the contestants meeting and passing to the left. It is needless to illustrate the fact from histories of chivalry, from medieval legends, tales, adventures, etc., whether of the Arthurian cycle, or Ariosto, or a hundred

aftercomers. The club, spear, sword or pole must be held in the right hand and the reins in the left; the horses and riders passed necessarily to the left. There could have been no game or reality of battle if the passing were to the right. The holding the spear, lance, ax or pole was dictated by right-handedness, and to fight each other they had to pass to the left. Thus right-handedness begot left-passing, owing to the peculiar conditions of the battling or jousting.

The conclusion draws itself: this must have settled the fashion of horses (and riders) passing to the left wherever chivalry was merged into wagoning by an evolutionary process. I judge it was thus transformed in Italy and England, and that on the continent the wagon and post-chaise were not slowly derived from the fashion of chivalry. We have a capital proof of the fact, as regards England, where antiquarian research demonstrates that the postilion phase of development was not long-continued or generally practised. For the postilion period (dominative and even tyrannical in France, as her literature shows) must evolutionally be considered as the intermediate between horseback-riding, and driving from the wagon-seat or box. In England the driver, as it were, jumped directly upon the wagon-seat from the ground, or on the back of the horse without a vehicle, while on the continent, for hundreds of years, the horse of the rider hauled a vehicle behind him, and the representative of the former knight and rider became a postilion. Lack of information compels me to confess that the actual and detailed steps of the evolution in Italy are not clear to me. But in England the postilion's office was short or non-existent, and in early times the drivers of wagons, carts, etc., walked, of course, on the left or near side of the horse or team. Probably the walking was because a single horse, instead of two or four, was the rule, as the costermonger's cart and the Irish car to-day illustrate. On the continent the teams were of two, or four, or more horses, and the postilion rode one of the "near" horses; this may be seen in pictures of Paul Lacroix, "The Eighteenth Century," especially that of the "Carabas," on page 448. By the seventeenth century, as is shown on pages 6, 44, etc., the driver had mounted on the box, but the postilion was continued on the wheel-horse or, in case of three or four pairs of horses, on the near leader of the team. There can be no doubt that those who have explained the rule of the road for vehicles, as due to the position of the driver or postilion on the box or seat, took *post hoc* for *propter hoc*; the custom had already been long established before either variant arose. The extreme of the *post hoc* argument is seen in the frequently adduced statement that to have the whip-hand free, the driver sits on the right side of the seat, and *hence* passes to the left in order that he may better see that the wheels of the two vehicles do not collide. A similar illusory explanation credits the English left-

passing to the fact that the early drivers *walked* on the left of the horses, and consequently they passed to the left to avoid being ground between the two sets of wheels. King Arthur and Tristram and their fellows had settled that, one judges, a thousand years previously.

Why did the American colonists from England reverse the rule of the mother country as to vehicles passing to the left? That is the remaining riddle which has perplexed every writer upon the subject. There seems to be no exception, the Virginia colonists, who were so largely horseback-riders, developed the rule of passing to the right as spontaneously as the New Englanders. In Canada there appears to have been a noteworthy indecision in earlier days; in some places, as Toronto and St. John, New Brunswick, the English custom prevailed. My reports are that to-day the American custom, if we may so name it (passing to the right) is being increasingly adopted.

The change of the colonists to the American practise has been credited to the necessity of keeping to the right in snow-drifted roadways—surely an invalid argument from evident reasons. The use of ox-teams is also said to have brought the change about. This was perhaps a minor contributory cause, but, like the preceding, will not explain the spontaneity and universality of the American habit. Another explanation that has been offered for our passing to the right is that in early days of narrow and depressed roads the driver could the better judge of the danger from the bank or "lift" of the roadway on the right. Lastly, it has been suggested that lurking savages in the woods at the sides (both sides) of the road made the change of practise. But just how either cause compelled the colonial wagoners to pass to the right, or how they bettered their condition by doing so, one vainly tries to discover.

The real explanation of the change comes to light in a more careful observation and history of the actual facts and conditions of the colonial immigrants. In the first place, they were not in the beginning even preponderatingly English. We appear prone to forget that the first Puritan settlers were mostly Dutch, to which France quickly added her complement, both of continental or right-passing people. Then it must be remembered that the long first period of settlement was not only wagonless, but even horseless, and even English folk when afoot had never ceased to be right-passers. The ox-team, the ridden horse and the led horse were the first means of transportation, and all these methods would insure the beginnings of the customs of right-passing and soon establish it as the rule. It must have been a long and fashion-fixing period before the wheeled vehicle could have come into any general use to meddle with the already established custom of right passing. Most powerful too must have been the dominating

factor of the long interregnum-disuse of the English custom, whereby men's minds were freed from the influence of the special force which had made the old English custom differ from that of the continent. In the old countries war and jealousy, quarrels and crime, made men watchful of each other, kept old customs in vigor, etc., while with our colonists the common enemy banded our ancestors together in friendship and mutual trust. The habits of the continental immigrant also came into action, so that with the factors of disuse, of walkers, of horse-riders, of ox-teams, etc., all uniting, the more natural and universal law came to be customary. Two other necessities cooperated to win the easy establishment of the change: When wagons came into use they were hauled by two, by three, often by four or even by six horses or mules. The driver, of course, being a right-handed man, sat upon the near wheel-horse, and guided the leaders by the "jerk-line," held again, of course, in the left hand. The "prairie schooner" was an illustration of this universal American custom, and the six-mule team of all our armies in the war of the sixties was and remains a distinctive proof of conditions which gave it birth during the earlier history of the country. When the driver left his near wheel-horse and jerk-line, and mounted the seat in the "schooner," wagon, carriage, etc., handling the pair of reins for each pair of horses, there was the best reason in the world, wholly overlooked by writers, that he should sit on the *right* of the seat as did and does the driver in England, although he did not, as do they, pass to the left. This reason is that he might operate the brake with his right hand or right foot. In a hilly country and with ungraded roads, the braking was fully as necessary as the driving. The combined force of all these factors is fully sufficient to account for the change in our country's custom from that of England.

But the most interesting and by all odds the most financially important part of the story still remains—that concerning the railways. The history of double-tracking in the United States is not yet written. An illustration of what took place on one trunk line, the Union Pacific, is not very different from that on others. This company in constructing its line across Idaho put in sidings one and one half miles long, every three miles, and located these all upon the same side of the track, the object being to utilize these as parts of a second continuous track at a later day. The English rule was of course to pass to the left, as with carriages in the common highways and streets, a rule naturally adopted in Europe, India, etc. In our country there was said to have been sufficiently active political feeling to think that "what was English was bad," and from the first this made some of the double-track railways right-hand passers. I very much doubt this; the right passing of our common wagons even in revolutionary times had

become the invariable rule, and so, despite the influence of England, her engineers, etc., the right-hand rule in our own railway orders, was in the last century usually adopted. We still have three double-track railways which, owing to English habit, having started as left-passers, still continue the practise—the Lake Shore, the Chicago and Northwestern, and the Great Northern. All others have been right-hand roads from the beginning of double tracking. It is most astonishing to find that any railway in double-tracking should have adopted left-passing, because the engineer sits (or stands) always on the right side of his engine or cab, and uses his left hand on the throttle, observing the signals at his right. In left-hand roads it is plain that he is at a disadvantage in seeing the signals because of intervening trains or cars upon the track at his right. A great element of danger is thus introduced. This may possibly help to account for the existence of two exceptions to the rule in England—one between Charing Cross and Cannon Street in London, and another, one of the first suburban lines run out of London, that formerly known as the Greenwich Railway, from London Bridge to Greenwich. Various explanations have been suggested to explain these exceptions to the rule.

The danger in left-hand roads of obscured signals by intervening trains must at least complicate and make more expensive the working, and it will never be learned how many accidents and wrecks may have been caused by the unnatural method. Even on right-hand roads the signal systems alone are now costing more than the entire construction a little while ago. Some 50 miles of modern signal systems are being put in by the New York Central Railway at a cost of $60,000 a mile, or $3,000,000 in all. There are all-controlling reasons why, once established, a modern left-hand railway can not change to a right-hand one, although the disadvantages of left-hand roads grow amazingly every year. The switches into factories, mills, yards, etc., once established must be kept up, and hundreds of millions of dollars' worth of property and vested rights are concerned. A train should enter a switch "head-on," and established switches are so designed.

Incidentally the history of signals is of interest. At first watchmen or policemen were stationed along the line as signalmen using white and red flags in the daytime, and at night lanterns of the same colors. The signalmen at first stood upon the track, then to one side. The mechanical signals are at present often overhead. When the man was displaced by a mechanical device it was at first the figure of a man, with body, head, etc., and with two arms rising and falling as did the living man's arms. Then, the signal was vertically cut in two leaving the man's half-body, half-head and one arm. That one arm is now in lineal descent represented by the dropping and rising arm

of the semaphore signal. A writer in *Pall Mall,* 1902, thus describes the extension of the signal system:

> However, as traffic increased, fixed signals, first of the disc and then of the now universal semaphore pattern, were introduced, and worked by hand—that is, by means of a handle at the foot of the post. The idea of manipulating a cluster of these signals, together with track switches, was suggested by the inventive genius of a lazy Irish porter. The latter had two signals, some distance apart, to attend to; and in order to save himself the walk, he counterweighted the handle of one, and tied to it a length of clothes-line. Thus while standing at the one he was able to operate the other. An inspector chanced to see the rude though efficient mechanical device, and ordered some experiments on the same principle to be carried out in Camden goods yard—for the incident occurred on the North Western Line—with the result that the system of actuating signals from cabins or boxes by means of levers and wires was introduced. The first arrangement of concentrated levers equipped with an interlocking apparatus was invented in 1843.

The entire question of working a double-track road and its signals, and especially of a left-hand road, depends upon general right-handedness, etc., particularly upon right-eyedness, and more than all else upon the fact that the driver or locomotive engineer sits or stands upon the right-hand side of his boiler or cab. The factor that has been utterly overlooked, by writers, by railway managers, by everybody connected with or interested in the problem, is that the engineer stands or sits where he does simply and solely because he is a right-eyed man. It is all as easily demonstrated as the existence of right-eyedness by the experiment with a pencil: Hold up a card or blotting sheet so that the left eye is covered by it and the right views the scene or landscape; then suddenly move the card so that the right eye is covered by it and the left eye is the used one. At once the whole scene "jumps," intermediate objects are in an entirely different relation to those more distant, there is doubt and uncertainty of localization, there is discomfort, and a clear desire and attempt to get the right eye into use. Look at moving objects and the troubles are increased; ride in the engineer's cab and they are doubled again; when sitting on the left side and looking out of the left-side window, it is necessary to put the whole head, that is, the right-eye, out, in order to be sure about the approaching objects, signals and their relations. Sit on the right side and at once it is recognized that it is only the right eye that need be put outside the window in order to see correctly and to satisfy the mind. It is most curious and of absorbing interest to see how this fact was slowly, unconsciously, blindly recognized, but without ever being uttered or brought to consciousness in the history of locomotive-engine building and early railroading. If you ask any railway official or chief engineer of a modern railway why the engineer sits on the right-hand side of his cab, disusing his skilled and strong right hand

and using the left on the lever of the throttle valve, that lever on which all force and safety depends, and you will be answered by a blank stare of wonder at such a question, or there will be something said about the wagon-driver sitting on the right of the seat, about the use of the strong right hand ready for the application of brakes, for whistling, for the reversing lever, for bell-ringing, etc. All of which is most wide of the mark.

In the beginning of engine building, there was no "cab" and even in England to-day there is none; and also no seat for the engineer to sit upon. He simply looks out in the face of the wind and storm along the right hand side of his boiler, at the track in front of him. The very earliest machines, *The Newton,* 1680; *The Cugnot,* 1769; *The Murdoch,* 1784; *The Symington,* 1786; were directed by the engineer or driver in front of the boiler, and by both hands. But as early as 1790, with *The Read,* the engineer had learned that he must stand behind his boiler, although the older method of operating from the front of the boiler reappeared as late as 1803, *The Trevicks,* in 1821; *The Griffith,* and even in 1824, *The James,* etc. In some cases, as in *The Killingworth,* 1825, the location of the engineer is doubtful. It is interesting and instructive to watch the struggle from 1790 onward between the conflicting unconscious tendencies and demands of the right-handed and right-eyed engineers (an occasional left-eyed engineer may have obscured and lengthened the progress) and the engine-makers who were still more oblivious of right-eyedness. In *The Read,* of 1790, both hands were used on the throttle and there is no intimation as to right-eyedness or the side of the engine whence the outlook was made. In 1801 in the *First Trevicks* engine, and in 1803 the *Second Trevicks,* the throttle lever was held in the right hand, and the engineer looked along the left side of the boiler. In the 1808 *Trevicks* this was also the rule. In the 1805 *Trevicks* both hands seem to have been used, and so if, as appears from the picture, the right eye looking past the right side of the boiler was the custom. The dominant influence of the right hand is steadily shown in *The Blankincop,* 1812; *Stevens' America,* 1829; *Puffing Billy,* 1813; *Blucher,* 1814; *Locomotice,* 1825; *Seguin,* 1827; *Royal George,* 1827; *Stephenson's Twin Sisters,* 1827; *Hackworch's Globe,* 1830; *Bury,* 1830. In all these, probably or surely, the driver stood upon the left side of the boiler and watched the track in front from his side. He naturally wanted to use the right hand as the throttle-hand, and had not yet discovered the ocular problem. From 1829, with *The Rocket, The Costello,* 1831; *The Lafayette,* 1837; *The Hector,* 1839; *Hinkley's Lion; Gooch's Great Western,* and all subsequent machines, the necessity of looking with the right eye along the right hand side of the boiler at the track and signals, became dominant, and dictated the placing and direction of the throttle-valve

handle. With the late construction of the "cab" of the driver, the needs of the right eye were accentuated because the engineer in looking out of the window at his right hand is compelled to put no more than his right eye out of the cab-window. If he put the left eye out of the left-side window he would have to put the entire head out in order to see with the right eye. Thus right-eyedness has unconsciously compelled the driver to disuse the right hand for the naturally expert work with the throttle-valve, in order that the greater danger may be avoided that would follow both to the engineer and to his train, from putting the whole head out of the left window of the cab.

Among the many ocular problems of railway employees those relating to deficient color-perception are of great importance, but equally great are those regarding presbyopia or the failure of visual acuteness after 40 or 45 years of age, and especially should the diagnosis of right-eyedness or left-eyedness be held of prime necessity. The left hand may be allowed, somewhat against nature, to manage the throttle-lever, but the right eye must be the absolute judge of signals, etc. Undoubtedly there are a few hundred, at least, of left-eyed engineers, signalmen, etc., on our roads, and their disability for their peculiar calling is greatly endangering lives and property. Nor should it be forgotten that there are generally proportionally more left-eyed than left-handed men. As trolley-car "gripmen" or engineers, chauffeurs of automobiles, etc., the left-eyed are at only a slight disadvantage, because nothing is in front of their eyes to impede the dominant function of the right eye. Despite this fact the automobile chauffeur sits on the right-hand seat, not only because of inherited custom, but again that his right eye may have the slight advantage of position and that his right hand may be free to use in almost every instant's emergency. In our trolley cars and electric locomotives the all-important brake is operated with the right hand.

To epitomize, the resolution of the mysteries as to the origin of right-handedness and the rule of the road may be made only by grasping the phenomena as a whole, *i. e.*, by massing the facts of the entire history from prehistoric savage battle and barter to the expert locomotive-engineer of to-day running a "limited" train at the rate of a mile or more a minute on a two-track or four-track railway. Even the cave men show that right-handedness was the rule in their time, and spear-hand, shield-hand, gesture-language, digital-counting, and the tally-stick, the world over, fixed the speech and writing and right-hand brain-centers in the left half-brain—and, of course, those of the left-hand and fingers in the right half-brain. War made up the life and set all the fashions of beginning civilization, and war together with narrow streets established the custom of right-hand passing, for walkers, riders of horses, asses, mules, etc., and for drivers of all

vehicles, and for vessels. For walkers and vessels no people ever changed the custom, but especially the English, while preserving right-hand passing in foot-passengers and on the sea, anomalously developed left-hand passing for vehicles, and the same, of course, for double-track railroads. What everybody has failed to see is that right-handedness is necessarily bound up with right-footedness, and right-eyedness, because all closely united functions of the body must be correlated and their centers of motion located in contiguity and upon one side of the brain, in order to make effectual and rapid all responses of the organism to circumstance or environment. This works toward a necessary and desirable differentiation of function that makes the aims of the "ambidexterity" sillies more than resultless and foolish. Because whenever a center or congress of centers is developed in one half-brain, disuse and transfer to the other half is, according to age, either impossible, faulty, handicapping, or disease-producing. Coordinated functions of the body require coordinated and contiguous nerve-centers upon the same side of the brain, at least so far as is possible. If one or two dextral factors are in opposite cerebral hemispheres, responsive and quickly-acting coordinated functions will be slower and more inaccurate than if on a single side. The English left-hand passing of vehicles is probably due to the influence of the single-hand fights on foot, tourneyings and joustings of horseback riders, in which meeting and passing to the left was inevitable. The custom grew and continued directly into that of the wagon-drivers. In the United States there was a reversion to the right-hand passing of vehicles, because of the abeyance of left-hand passing of vehicles, and of vehicles themselves, for so long, with growth of the natural right-hand passing by walkers, horseback-riders, ox-teams, and wagons with drivers on the near-wheel horse, such as is found in the later prairie-schooner, and six-mule army-wagon. Three double-track railways in the United States still pass their trains to the left, an absurd and bad custom, expensive and productive of wrecks. But despite this the enginer sits upon the right of his cab, because he can in this place better observe the track and signals in front and to his right, and with the dominant right eye only outside of the cab-window, whereas, if sitting on the left, he would be compelled to put the entire head out in order to see with the right eye, and, even then, because of the boiler, not so well. Only right-eyedness will explain the long, doubtful, and varying custom in engine-building as to the position of the engineer in the beginning of history of railway construction and signaling.