HUMAN FALLIBILITY AND ITS RELATION TO ACCIDENTS BY RAILWAY AND ON SEA¹

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WHAT factors contribute to the creation of this human fallibility which so largely enters into the causation of all kinds of accidents? No matter what zenith human ingenuity and high engineering skill may attain in the perfection of scientific instruments and mechanical appliances, in the utilisation of which may be enforced the most strict discipline, the severe routine of stern duty, and every possible precaution devised by experience and foresight, yet this wretched item, *human fallibility*, continually crops up, and with invariable precision contributes its average numerical quota of misfortune. For the navigation of sea-going vessels there are constructed the most perfect forms of sextants, chronometers, compasses, and deep-sea sounding appliances. In the control of railways there are an all but infallible brake, a thoughtfully arranged block system, automatic signals, interlocking gear, fog alarms, and electrical indicators. All these are so elaborated that theoretically no accident should take place except by Divine permission. Yet fallible man must step in, and by his own action, or absence of action, produce periodical sacrifices, catastrophes, and sanguinary horrors to travellers by rail and by sea.

In this inquiry I purpose dealing with the general principles involved, and, in some instances, may have to make special reference to recent calamities occurring within these colonies or the waters surrounding them. It may be necessary to define the term "accident" briefly as "an event which is not expected, casualty, contingency"; also to explain that the term "observation" is the act of seeing or noticing, perception, the act of noting or remarking, performance of what is due or prescribed. A careful consideration concerning human fallibility as the causation of accident develops the idea that the foundation of it is the result of many factors, all of which contribute to faulty observation and inaccurate determination of facts.

Some of these factors may be classed as follows: (1) automatic action—automatism; (2) imperative idea; (3) the condition and capacity of the faculty of observation possessed by the observer; and (4) the mental condition of the observer and his capacity at the time for the correct interpretation of what should be observed.

1. *Automatic action*.—Sir B. W. Richardson in *Diseases of Modern Life* gives a very concise description of certain automatic phenomena of the body, which, exaggerated in character, pass into the phenomena of disease. These, in very minor forms, may be aptly illustrated. At the close of the present year (1896) numbers of persons will for several days in 1897 continue to write automatically 1896 instead of 1897. Married ladies, especially if married late in life, continue for some time to automatically write their maiden names. We all know some persons who continually interlard their conversation automatically with some special phrase, such as "You know," "I say," &c. Persons who for a few months enter a room of a house with the handle presenting to the right hand perform the act of seizing the handle at last with automatic regularity, and if a change is made into a room with the handle presenting to the left hand they for some time are guilty of a mistake whenever they approach the new door. This automatic action or movement exhibits itself in various ways, and may affect the writings, use of expressions, and various acts of individuals. A well-marked exaggeration of it once contributed to a very disastrous railway accident in England some years ago. On a certain single line two trains, travelling in opposite directions, used to meet, according to circumstances, either at A or B station at a given hour each day, B being only distant two miles from A. It was the duty of the station-master at A daily to telegraph to B to know if the train had left, and, if not, to say to the guard, "Line clear—right away." One day, in answer to his

inquiry, he was told the train had just left B. Automatically he went out to the guard and said the fatal words, "Line clear—right away!" The train was no sooner beyond recall when he realised the terrible deed that he had done. He heard the smash of the meeting trains, was tried for manslaughter, but terminated his days in a lunatic asylum. It was only in Sydney within a recent period that a certain driver, about to start from Redfern Station, challenged the outgoing signal by the usual whistle. A signal—not his signal—fell. Automatically he started his train, and the city was horrified by the details of one of the most heart-rending accidents that ever occurred in the Australian colonies. This accident may be said to have been caused by faulty observation and automatic action.

2. *Imperative idea*.—Sir B. W. Richardson, writing in 1876, confounded "automatism" with "imperative idea," which is a curious over-mastering desire developed by some persons to do certain acts, without any cause, rhyme, or reason. Thus Napoleon the Great could not resist counting the windows in every street through which he passed. The great Dr. Johnson must needs count his footsteps or touch with his hand certain stone pillars which protected from vehicular traffic a flagged pathway through which he walked, and should he find himself to have by inadvertence passed one without touching it he was impelled to retrace his steps to do so. Another very intellectual gentleman would, in defiance to all reason, walk daily to a wayside pillar or post and touch it three times with his walking-cane or umbrella. It was hopeless to argue with him, for he could not argue with himself. Let it, therefore, be understood that an automatic act is simply an habitual voluntary one, performed inattentively and unconsciously, while the so-called automatic acts of the sufferer from imperative ideas are carried out in opposition to his volition and frequently associated with intense and painful consciousness. Possibly with justice such acts may be called reflex, seeing that they are often fatal and unchosen responses to some unknown stimulation. Given a railway employé or navigating officer with some such imperative idea, recurring at well-marked periods, and no sense of duty would be permitted to interfere with this particular fad.

3. *The condition and capacity of the faculty of observation possessed by the observers*.—With this must be also considered the condition of the special senses of hearing and seeing, as well as the more complex subjects of "personal equation" and "nerve reflex." Now, eliminating faulty condition and capacity for observation due to mental alienation, or the toxic action of drugs or liquors, there may be enumerated various causes of errors in observation, such as inefficient training, some defect in the special senses necessary for observation, any of which may be permanent or temporary. In some services at sea and on land there are various examinations periodically made with the view of testing the reliability of these senses, especially hearing and vision. Yet, though hearing and vision may be perfect, implicit reliance on any one special sense alone may involve the individual in fatal fallacy. I regret that without a practical demonstration upon normal subjects it is impossible to illustrate this proposition, but I have frequently proved in public the total unreliability of each special sense under certain conditions which are not incompatible with their healthy condition. It is much to be regretted that no compulsory periodical examinations to detect faulty conditions of hearing and seeing in captains, officers, and lookout men in our mercantile marine are legally enforced in these colonies. I say this advisedly, as on more than one occasion I have been instrumental in drawing the attention of the Government of this colony to this most remarkable blank space in our colonial legislation. Regarding "personal equation," this is a term used by astronomical observers to denote the amount of error liable to be committed by each individual observer in determining at what instant a planet passes a certain fixed point, usually a fine spider-web fibre traversing the object-glass of the telescope. This personal equation of an astronomical observer is no myth—it is a quantity that can be measured to the thousandth of a second—and it has been found that certain conditions of health and mind produce errors appreciable to measurement. The so-called nerve reflex is another expression to indicate a similar quality. Its sum total is that to see a certain act taking place at a particular instant and to record that act by pressing upon a button an appreciable period of time takes place between seeing the act and recording it. That is, when one sees the act which

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makes its impress on the sensorium it takes a small space of time to telegraph from the sensorium to the periphery (i.e., the finger) which presses the button. The duration of this interval is estimated by a very ingenious instrument. In no single instance have I heard of any attempt being made to estimate the personal equation of navigating officers in the Mercantile Marine. The error induced thereby may amount from one-tenth to one-fifth of a second, which means several miles in an observation by a sextant, and may be a great factor in the production of shipwrecks, especially in these days of cutting corners and close navigation to the coast. Mr. Russell, Government Astronomer of the colony of New South Wales, has courteously informed me that the error "may be easily estimated and corrected during health, is a fixed quantity, but that in ill-health and depressed conditions it may be varied or intensified."

4. *The mental condition of the observers and their capacity at the time for the correct interpretation of what is to be observed.*—Under this heading may be classed and considered those various conditions varying from the deleterious results of long hours, overwork, and anxiety, as well as the depressed conditions due to incipient or chronic disease, or impaired mental condition caused by the open or secret indulgence in alcohol or sedatives to a condition of unsuspected, though permanent, ill-health. How frequently of late has it been found upon inquiry into the cause of a disastrous shipwreck that the officer in charge, whose life is generally sacrificed—often voluntarily—had been suffering from ill-health and had not been "quite himself" before starting on the fatal voyage. To such a cause have been attributed the naval disaster involving the loss of H.M.S. *Victoria* in the Mediterranean Sea and the more recent wrecks of the *Wairarapa* and the *Catterthun* in the Pacific waters. These factors are so self-evident and possible that it is needless to expand this paper by dwelling upon them. Beyond all doubt they have been the primary causes of most of the accidents by rail and by sea.

Conclusion.—It being acknowledged by all competent authorities that "human fallibility" is an extensive factor in contributing to a large percentage of accidents by land and by sea, it behoves us to consider by what means this percentage may be decreased. Can any means be adopted to lessen the frequency of accidents arising from this cause? I think so. Careful observation and an intelligent appreciation of the various idiosyncrasies of the different officials having control over the different departments of passenger transit by sea and by land may become an active element in eliminating causes contributing to human fallibility. It is, therefore, essential that there should be careful and periodical examinations of those upon whom is dependent the safe transit of passengers by land and by sea. This examination should be entrusted to competent, skilled, and scientific experts. Special stress should be attached to the competency of the examining officers, from the very fact that they, in the discharge of their duties, may be liable to some of the fallacies, foibles, or disabilities of those individuals whom it may be their duty to examine and pronounce competent. A very apt illustration may be culled from an occurrence which took place in one of the British possessions. A member of a Board of Examiners rejected a candidate for promotion for deafness from eustachian catarrh—a disease producing deafness, which becomes intensified in damp or foggy weather. This candidate managed to get himself subsequently passed by another member of the same board residing in a distant city, but foolishly boasted of this exploit to the first examiner, who then insisted upon a re-examination of the candidate by himself, the second examiner, and another member of the board. But imagine his consternation, when consulting with his colleagues, so as to determine a standard basis of acuteness of hearing, to find that both of them were much deafer than the candidate about to be examined. This examination for colour-blindness, acuteness of vision, and hearing is too often delegated to unscientific, untrained, and often incompetent hands, as well as persons who may give way to outside pressure and undue influence. When performing my duties on the Medical Board of the Government Railways of this colony I had occasion to cause the dismissal of an epileptic engine-cleaner and reject several candidates for employment for errors in vision and hearing, and in every instance the influence of members of Parliament and persons of importance was utilised in attempting to make me alter my decision and "give the poor fellow a chance."

During my attempts, in association with other members of

the profession, to induce the Government of the colony of New South Wales to make compulsory the examination of officers in charge of sea-going vessels and lookout men for vision and hearing I have excited the active hostility of many officials, who have not hesitated in accusing my colleagues and myself of "finding a job for ourselves," and they have pleaded the hardship of deposing anybody who had passed his examinations in navigation for some physical defect in hearing and vision. It certainly is hard for such persons, but it would be much harder for the travelling public, to whom such defects prove a factor in producing risk and fatality during transit. And the time will come when travellers will only patronise the vessels of such owners as will insist upon proper precautions for ensuring the safety of all travellers. I, however, insist that strict attention to the senses of hearing and vision alone is not sufficient to ensure safety to travellers by rail and by ocean. The habits of life, idiosyncrasies, and general intellectual powers, in addition to the state of health, of all concerned in the safe transit of all classes of passengers should be carefully and periodically noted, and every care and precaution taken to guard against long hours, over-work, excessive worry, and incidental sickness. As age increases more exacting scrutiny as to the "nerve reflex" and general capacity should be studiously exercised.

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CYSTS IN THE ANTERIOR CHAMBER.

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FREE cysts in the anterior chamber are among the rarest ophthalmological affections, and the two following cases which came under my care at St. Bartholomew's Hospital, Chatham, seem worthy of record.

A woman aged thirty-two years attended in August, 1896, suffering from catarrhal conjunctivitis. The left eye at once attracted attention. In the anterior chamber was to be seen a small cyst-like formation, with dark-coloured walls about the size of a large shot; it was quite unattached and moved to the lower part of the anterior chamber in whatever position the head was placed. The iris acted well. Vision in each eye = $\frac{6}{6}$ and Jaeger's test-types No. 1. The fundus was normal. The patient had never had any accident to the eye, and remarked that it had always been the same; she volunteered the statement that she had a son aged ten years whose left eye was exactly the same as her own, the defect being observed soon after his birth. At my request she brought him on her next visit. The boy, who was a healthy-looking lad, presented in the left eye the same condition as his mother, only the cyst was slightly larger and a shade darker in colour. The globular body moved quite freely in the anterior chamber, there were some remains of a pupillary membrane in this eye, but in other respects his eyes were normal. In May, 1890, I showed a similar case at the Ophthalmological Society, and the record is to be found in the tenth volume of the Transactions of that society. These are the only cases with which I am acquainted.

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LITERARY INTELLIGENCE.—*Sunday Hours for Boys and Girls* is the title of a new weekly illustrated magazine which will shortly be issued by the Religious Tract Society. As a weekly paper for boys and girls it will fill a sphere somewhat different to that already occupied by other religious periodicals. It will try to show the possibilities of interest and delight which the Day of Rest brings to the young as well as to the old. An attractive programme has been prepared, amongst the writers of stories being Miss Alcock, Evelyn Everett Green, Frederick Langbridge, Lily Watson, and Emma Leslie, while amongst the writers of papers we notice such well-known names as those of the Earl and Countess of Meath, the President of Queen's College, Belfast, Mrs. E. Rentoul Esler, Professor A. Macalister, F.R.S., of Cambridge, Dr. Hugh Macmillan, Rev. P. B. Power, Rev. Prebendary Jones, Dr. William Wright, Dr. Munro Gibson, Dr. Thain Davidson, Dr. S. G. Green, Rev. R. Lovett, Rev. George Everard, Dr. McCheyne Edgar, and Dr. James Stalker.