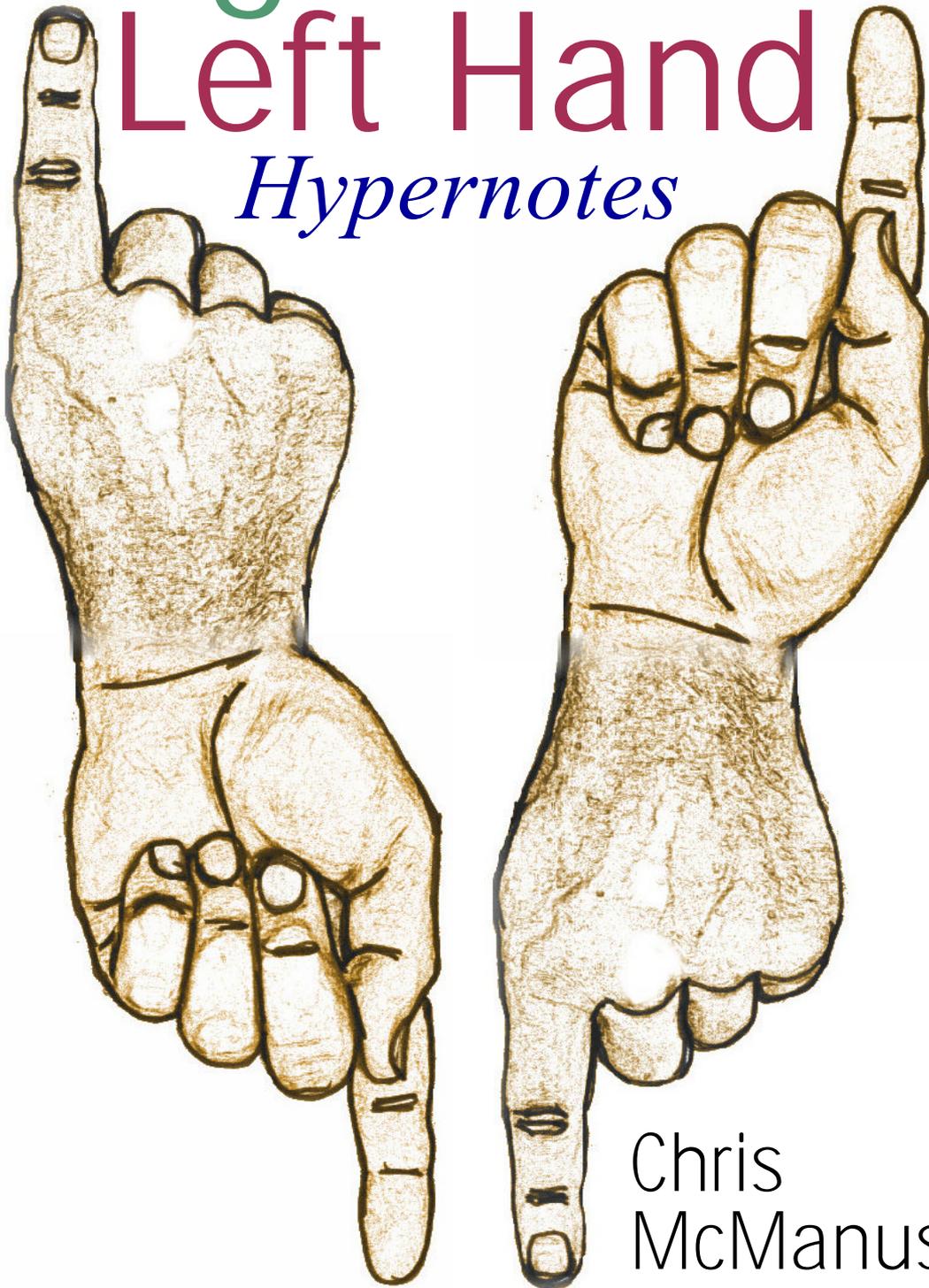


Right Hand

Left Hand

Hypernotes



Chris
McManus

Introduction

**"... permit me to disclose my name,
My calling, and the business I pursue.
I am a scholar, christen'd Lateral,
Truth-speaker, dweller on the open way.
Much have I read in books, and more in men,
Far have I wander'd, deeply have I weighed
The words and ways of pilgrims passing by".**

In writing *Right hand, left hand* I encountered far more material than I could begin to include in the book or its endnotes. As an academic researcher into laterality I found them interesting, and I therefore felt it possible that others with my own particular enthusiasms might also find them useful. The internet is the perfect place for such ruminations and reflections since they are readily available to those who are interested but do not impose at all on those who find their detail of little matter. As an example of the things I found while preparing the book, and also as an epigraph to these details, I cite a curious piece of verse published in 1888 by Robert Buchanan (1841-1901), a Victorian poet who would now be almost entirely forgotten¹ were it not for the vitriol of his pseudonymous attack, as 'Thomas Matiland', on Rossetti and Swinburne, which made Ezra Pound subsequently refer to "foetid Buchanan"². Rossetti at the time wrote a twelve-page reply, which was never published but has subsequently been rediscovered (Freeman, 2001), and includes a particularly angry but undistinguished limerick which was to be on its title page³. In his epic poem, *The city of dream* (Buchanan, 1901), which is some 7000 lines long⁴, and is dedicated "To the sainted spirit of John Bunyan" there is a character by the curious name of Lateral, a scholar⁵, who presents to the pilgrim as a stranger. It is a strange piece of verse, moving in its way⁶, and it fits well for its present purpose.

¹ Buchanan must have been appreciated in his time or it would not have been thought worth publishing the two very lengthy volumes of his complete works (Buchanan, 1901). He does however seem to have slipped into the third division of nineteenth century poets. A critical appraisal of his work published in the year of his death (Stodert-Walker, 1901) says that, "Mr. Buchanan's significance lies then in the fact that he has used, as a subject for poetry, the great truths science has taught...". That may be so, but it hardly makes the generally turgid verse any the more readable, and seems only to be yet a further argument that science and poetry simply do not mix.

² In *Yeux glauques* of *Hugh Selwyn Mauberley* (1920).

³ "As a critic, the poet Buchanan
Thinks the Pseudo worth two of the Anon --
 Into Maitland he's slunk;
 Yet what gift of the skunk
Guides the shuddering nose to Buchanan?"

⁴ I confess to having read only a tiny fraction of the entire work, only discovering this section of the text through a computer database.

⁵ Buchanan thinks little of Lateral it must be said, linking together, "Literal and Lateral (the drones!) / [who] Interpret the dry letter of the book". Lateral is later described as "a Blind human mole / Dull burrower in the darkness".

⁶ At times I find sections of the poem are strangely evocative of aspects of T S Eliot, and in particular of parts of *Murder in the Cathedral*.

Chapter 1: Hypernotes

☞WWW☞ 1:1

Situs inversus refers to a complete mirror reversal of the organs of the body. Heterotaxy is now being used again in the scientific literature, referring to an anomalous positioning of the viscera relative to one another (Anderson, Webb, & Brown, 1998). In his classic paper, Layton (1976) showed that in mice with *situs inversus* there was also an increased tendency for the blood vessels of the abdomen to show atypical patterns of drainage, a heterotaxy. The confusion over the naming of the various abnormal syndromes has been referred to as 'nosologia ambiguus' (Casey & Hackett, 2000).

☞WWW☞ 1:2

Details of Watson's life are in his obituary (Anonymous, 1882) and his entry in *Munk's Roll* (Munk, 1878). Although *Munk's Roll* usually consists of obituaries, in the case of Watson the entry was published during his life-time. The description of Watson as Nestor was subsequently adopted in the *British Medical Journal* obituary, and in a brief notice a week earlier (Anonymous, 1882). The phrase eventually became a medical cliché, as for instance when Hughlings Jackson was called 'the Nestor of English neurology' (Critchley & Critchley, 1998 p.136). The description of Watson is clearly older though, being used in the *British Medical Journal's* review of the 5th edition of the textbook, in October 1871: "With the age of Nestor, Sir Thomas Watson has retained and even improved upon the silver-tongued eloquence in which he was alike wont to clothe his wise and careful judgements" (p.467).

Watson has been described as a "forerunner of Semmelweiss", who was to show the role of hospital-acquired cross-infection in puerperal fever (Györgyei, 1976). The specific comment on surgical gloves reads, "In these days of ready invention, a glove, I think, might be devised which should be impervious to fluids, and yet so thin and pliant as not to interfere materially with the delicate sense of touch required in these manipulations."

When made a baronet, Watson adopted the beautifully elegant motto, **Παθηματα, Μαθηματα**, (Pathemata, Mathemata) *Sufferings are lessons*; it would be an excellent motto for medicine in general.

T H Huxley made his comments about Watson in a Presidential Address to the Royal Society on 30th Nov 1883.

Richmond, who painted Watson's portrait, and earlier in his career had painted Charles Darwin and his wife Emma at the time of their marriage, provides an interesting link with Osbert Sitwell's *Left hand, right hand*, since it was Richmond's son who painted a portrait of Sitwell's mother. Clearly artistic talent did not in this case run in the family, since, as Sitwell puts it, "Sir William Blake Richmond ... was the second son of George Richmond, the charming portraitist, whose profession, but not whose gifts, he seems to have inherited" (Sitwell, 1945).

As well as Richmond's painted portrait of Watson, there is also a drawing and several photographs of Watson in the collection of the Wellcome Museum in London.

☞ WWW ☞ 1:3

Although nowadays referred to as the Royal College of Physicians, the origins of the 'Royal' are obscure, not being used in the original charter of 1518, and first used in a letter from Charles II only in 1674. It was not used consistently until the 1850s (Payne, 1960), and was referred to simply as the College of Physicians in the article discussed here.

Watson would have presented the heart of John Reid at a meeting in what was then the relatively new College of Physicians building in Pall Mall East, the college having moved there from the City of London in 1825⁷. A photograph of the building can be found in Cook (1992).

I had hoped that the specimen of John Reid's heart might still exist, but enquiries at King's and several other London medical museums have not succeeded in identifying it. I am however particularly grateful to Mr Jim MacIntyre for his help in trying to trace the specimen.

Sir Astley Paston Cooper was born in 1768, was made a Fellow of the Royal Society in 1802, and died in 1841. In 1830 he published his superbly illustrated account of *Diseases of the Testis*, and a few years later in 1840 followed the equally exquisite monograph *On the Anatomy of the Breast*.

It should be noted that the evidence that "Dr Watson", the author of the paper in the *London Medical Gazette*, is the same as Sir Thomas Watson is circumstantial but overwhelmingly compelling. *Munk's Role* (Munk, 1878), the biographical record of Fellows of the Royal College of Physicians has no other appropriately qualified Dr Watson living at the right time, Sir Thomas was associated with both the Middlesex Hospital and King's College, he was clearly active in the College, and later in life would rapidly include references to Broca's discoveries into his textbook of medicine. It is also the case that the pages of the *London Medical Gazette* in the 1830s and 1840s are full of papers by Watson, including the lectures that would later form the *Lectures on the principles and practice of physic*. The presumption that Dr Watson and Sir Thomas Watson are one and the same seem inescapable.

☞ WWW ☞ 1:4

Watson made his comment about stethoscopes in the fourth edition of his textbook of medicine, published in 1857, 20 years after John Reid had died; see East (1957 p.38). The stethoscope had actually caught on remarkably quickly. Laennec published his *Traité de l'auscultation médiate* in 1819, and within five years the newly published *Lancet* had an article nearly thirty pages in length, ostensibly a review of Forbes' book on the stethoscope (Forbes, 1824), but in reality a 'how to do it' manual (Anonymous, 1834). It must also be said that in the 1843 edition of his textbook, Watson does devote several pages to the use of the stethoscope.

⁷ The College moved to its present site in Regent's Park in 1964

Although it is clear even from the first edition of Watson's vast encyclopaedic textbook of medicine that he was an excellent physician, particularly one who put great emphasis upon the history and pathological examination, he is less obviously a *scientist* in the way he describes his material. That is not meant to be critical of him. Medicine and science are, at their extremes, very different modes of cognition and discourse, and Watson is clearly mainly at the medical end. I think I am entitled to say this having backgrounds in both medicine and science.

The idea of the physician as scientist, and particularly as scientist collecting data from patients to test a diagnostic or therapeutic hypothesis, is a nineteenth century invention. Before that even examination of the patient was rare. In a footnote to his edition of *Middlemarch* (Eliot, 1965), W. J. Harvey specifically notes how advanced Lydgate was in 1830 to be using a stethoscope, and quotes from Newman's *The evolution of medical education in the Nineteenth Century*: "it is little short of astonishing to notice how completely physical examination was disregarded. The old physicians took most careful histories, and paid the greatest attention to what the patient told them about the structural abnormalities they were experiencing. They looked at the facies and the tongue, observed the appearance of shed blood, of urine, and of faeces, in that order of interest, but they hardly ever examined the patient at all."

That the location of the heart could be determined in life had actually been demonstrated twelve years before Watson described the case of John Reid. Bryan (1824) described the case of Agnes Cavanagh, for whom although in life "no suspicion was entertained that there was anything peculiar in her conformation", but was subsequently shown at post mortem to have *situs inversus*. As a result, the chest of her still living father was examined, and his heart was clearly in the normal place, "the pulsations of the heart being sensible at the left side of the thorax". Bryan also noted that his patient was right-handed: "The *placement extraordinaire* of her viscera did not lead to any unusual symptom, not even to a preference for using the left hand"

☞ WWW ☞ 1:6

I first became aware of the HG Wells' *The Plattner Story* through Richard Gregory's *Mirrors in Mind* (1998). Subsequently I found it referred to in Cook (1914). It is dated as 1896 and printed in *Thirty strange stories* of 1897. It can be found on the internet at www.mtroyal.ab.ca/programs/arts/english/gaslight/plattner.htm.

Torgersen (1950) does note that only 25/715 (3.5%) of the brothers and sisters of the patients with *situs inversus* were left-handed, and in their 320 parents, 17 (5.3%) were left-handed. It is therefore possible that there is a slightly raised incidence of left-handedness in individuals with *situs inversus*; however as Torgersen himself notes, the handedness of siblings and parents was not ascertained directly, but only from the patients themselves, and it is possible that they were not always accurate. Nevertheless what is clear is that the incidence of left-handedness is very much lower than the 90-95% which would be predicted if the brain were also mirror-imaged. The results are also compatible with other studies (Cockayne, 1938; Gordon, 1998). A modern study is however definitely needed.

☞WWW☞ 1:7

The point about the cross-cultural studies had also been made three years earlier by Sir Charles Bell (1834)

Corballis and Beale (1983 pp.94-5) give only two examples of populations where it is reputedly claimed that there is an excess of left-handers over right: the claim in the Eclogues of Stobaeus, of about 600 AD, that "those on the south-west ... for the most part fight with the left hand" (cited by Wilson, 1891); and John H Tooke's *Diversions of Purley, 1786-1805*, which claimed "I remember to have read in a voyage of Da Gama's to Kalekut ... that the people of Melinda ... were all left handed..." (cited by Wile, 1934).

☞WWW☞ 1:8

Although 'racemic' is now used to mean a mixture of equal proportions of right and left forms, its original uses refers to the acid coming from grapes, the Latin *racemus* meaning a bunch of grapes (Nicolle, 1962 p.25).

Pasteur did have one lucky break in carrying out this study – the conditions were cool enough. Isaac Asimov, himself once a lecturer in biochemistry to medical students, describes how below 28°C racemic acid crystallises, as Pasteur found, into two different types of crystal, but above that temperature a more complex single type of crystal is formed containing both (+) and (-) molecules (Asimov, 1976 p.57).

In the later experiments, Pasteur actually showed that non-optically active racemic acid became optically active if a mould was allowed to grow on it. The mould, probably *Penicillium glaucum*, consumed the (+) tartaric acid, leaving behind the (-) tartaric acid, which then was optically active (Mason, 1989 p.184).

☞WWW☞ 1:10

After serving in a regiment of Hussars, Dax studied first in Toulouse and then entered the medical school at Montpellier on the 19th day of Pluviôse in the year III (7th Feb 1795), and on the 10th day of Thermidor, year VII (28th July 1799), "le citoyen Dax" presented his thesis for the degree of doctor of medicine, having spent many of the worst years of the French Revolution as a student (Mouret, 1959 p.48; Ravoire, 1933 pp.8-9). Dax died on 3rd June 1837. In Sommières there is a small commemorative plaque on the wall of the building where the Doctors Dax lived and held their surgeries (see Critchley (1979 pp.72-82) for a photograph and brief history). Nowhere have I ever come across photographs of either Dax *père* or *filis*. Since Professor Lauren Harris is also unaware of any portraits, it seems likely that they do not exist.

Dax's paper was published in 1865 (Dax, 1865a; for a translation see Joynt and Benton 1964). Dax's 1836 paper is usually said to have been read (Finger & Roe, 1999). There are though some sources which suggest it was never even actually read at the Congress (Critchley, 1979; Joynt and Benton, 1964; see Finger, 1994, p.391). Although Dax *filis* did not have his own copy of the paper, a hand-written copy did turn up in the papers of a former Dean of the medical school at Montpellier, and Gustave published it. That the manuscript copy was genuine seems to be supported by the eventual emergence of a manuscript in the

hand-writing of Marc Dax, a fact described in a paper in 1879. The only slight confusion seems to be whether the manuscript was found by “a friend of Gustav Dax among the papers of his own deceased father” (Schiller, 1979) or by Caizergues “dans les papiers de son grand-père, ancien doyen de la Faculté” (Hécaen & Dubois, 1969), who died in 1850 (Ravoire, 1933 p.21).

Dax claimed to have seen 40 patients, all with damage to the left side. In addition his son Gustave collected a total of 87 aphasic patients, 16 of his own and the rest from the literature, all of whom had left hemisphere damage (Dax, 1865b). If we take Broca's estimate that nineteen out of twenty aphasic patients have a left-sided lesion (Broca, 1865 p.111), then the probability of after seeing 40 patients that at least one of them will have a right-sided lesion is about 87%; with 87 patients the probability rises to 98.8%; and with the grand total of 127 patients to 99.85%. The suspicion must therefore be that there has been some selection of cases.

☞ WWW ☞ 1:11

Although originally in the Musée Dupuytren, the brains were removed in 1940 after the walls of the museum collapsed (Signoret et al., 1984). Although long thought lost, Schiller (1979) in his monograph on Broca, describes in 1962 finding the brains of Leborgne and Lelong in the basement of the École de Médecine in Paris: “with the help of friendly attendants and a flashlight I have been allowed to take a specimen ... up into the light of day from its dusty shelf in the basement ... where it had rested since 1940”. Although then again thought lost, in 1979 Signoret *et al* again searched the basement, once again found the brains, and this time removed the brain of Leborgne from its glass pot for the first time, photographed, and also looked at it with computerised tomography (CT) (Castaigne et al., 1980; Signoret et al, 1984). The scans confirm that the damage was entirely restricted to Broca's area, and that Wernicke's area was unaffected. Photographs of the brain of Lelong were also published by Quercy (1943). For a partial translation of Broca (1861) see Eling (1994).

Leborgne's name is an intriguing one: **borgne** in French is an adjective meaning one-eyed, and **le borgne** is a modern slang term for the penis (presumably in much the same way as Australian slang, at least as popularised by Barry McKenzie, uses 'one-eyed trouser snake'). Of greater interest in the context of laterality is that Dumézil (1974), in a hypothesis that is still controversial, noted the mythic overlap in Indo-European between a one-eyed hero and a one-armed hero (who needless to say had lost the right arm), and in his title he refers to ‘Le Borgne’ and ‘Le Manchot’ (the one-armed, one-handed, presumably from **manche** for an empty sleeve). There is no mention of Broca or Leborgne in his essay

☞ WWW ☞ 1:12

The quote is from Schiller (1979 p.192). For a full translation of Broca (1865), reprinted in Hécaen and Dubois (1969), see Berker *et al* (1986).

Finger and Roe (1999) have emphasised that it is commonly suggested that Broca discovered cerebral dominance in 1861, when he published the cases of Tan and Leborgne, although Broca himself was “inclined to attribute to coincidence” that the first two cases were on the left. It was not until 1863 that Broca first tentatively proposed that the left hemisphere was dominant, at a meeting on April 2nd, 1863. Since Gustave Dax had submitted both his

father's manuscript and a lengthy manuscript of his own to the *Académie de Médecine*, where they were received on March 23rd, 1863, just nine days before Broca's presentation, it was almost inevitable that controversy over the question of priority would continue. Whether priority should go to Dax for his finding, whether Broca and Dax were co-discoverers independently, or even whether Broca may have published in a hurry because he had had some prior, privileged (and, by implication, improper) sight of Dax *filis'* manuscript still is not clear. In the absence of any new information it is unlikely ever to go away entirely. What is clear is that it was Broca who realised the philosophical and neurophysiological importance of this finding, and that without Broca, Dax would probably have remained well nigh unknown in perpetuity, yet another “flower born to blush unseen / And waste its sweetness on the desert air” (Thomas Gray).

☞ WWW ☞ 1:13

The quality of Watson's textbook is a commonplace in the medical literature of the time. Harvey Cushing, the biographer of Sir William Osler, described how “Watson's justly celebrated 'Practice' ... had successfully held the field against all rivals, and there were many” (Cushing, 1925 I: p.339). A contemporary reviewing the fifth edition of 1871, although critical of the scientific content, could still praise, “its fluency and beauty of language [which] make it as delightful to read as a standard novel” (Anonymous., 1872), and Watson as a result had been called 'The Cicero of English medicine' (Smithers, 1979 p.94). The young Osler, whose own *Principles and practice of medicine*, was to play the same role for the next two generations of students, wrote an obituary of Watson whom he described as “wearing the white flower of a blameless life” (Osler, 1883). Later he included Watson's book as one of several English textbooks which “furnished Anglican pap to the sucklings, as well as strong meat to the full grown” (Osler, 1939).

The pre-eminence of Watson's textbook has often made me wonder if it is a coincidence that Sherlock Holmes' faithful assistant was Dr Watson. There is little doubt that Holmes himself was modelled by Sir Arthur Conan Doyle on Dr Joseph Bell, a charismatic teacher of Doyle's at the Edinburgh Medical School. Hesketh Pearson suggested that Watson was based on Conan Doyle himself (Pearson, 1943), and Stashower (2000 p.76) raises the possibility that Dr James Watson of Portsmouth or Dr Patrick Heron Watson of Edinburgh were models, at least for the name. Doyle thought long and hard about Holmes' name (trying Sherringford Holmes and Sherrington Hope before arriving at Sherlock Holmes), and also considered Ormond Sacker before settling on Dr John Watson: Holmes “must have a commonplace comrade as a foil. ... A drab quiet name for this unostentatious man, Watson would do” it has been suggested (Michael Coren, 1995 pp.49-50). That may be, but the name of Watson may still not have been chosen at random. Given that Watson is the perfect foil for Holmes, is his mirror-image in every respect, it would make sense to name him after a textbook, a book no doubt just referred to as ‘Watson’ by Victorian medical students – and seeming to be the opposite of everything represented by the charismatic Dr Joseph Bell. Watson entered the Edinburgh medical school in 1876 just five years after Watson had published the fifth edition of his textbook, a time when the book was already seen as rather dated and old-fashioned (Anonymous., 1872)– rather like Holmes' Watson in fact. And writing textbooks is, like dictionary-making, and also perhaps writing short stories, is merely a task for “harmless drudges”.

The quotations by Watson are from his textbook (Watson, 1871 vol 1, p.494). The first edition of his textbook has examples of cases of language loss after left hemisphere damage. The still bear reprinting, mainly because the detail in these old case histories, with its insights into the daily life of the 1830s, has such a remarkable charm compared with the dry, tedious, scientific accounts in the modern medical literature, which are packed with pounds of biochemistry and not an ounce of humanity. In the first case the patient, despite being treated by trephination, died on 10th February 1834 and Watson clearly describes the post-mortem findings of what would now be called a chronic sub-dural haematoma.:

“In the year 1833, during Christmas time, the coachman of a lady living in my neighbourhood fell, being intoxicated, into a cellar or area, struck in his fall one side of his head, and tore up the scalp over a considerable space. ... In the early part of February, 1834, he had a shivering fit, which was followed by convulsions of the right side of the body, and subsequently by paralysis of the right arm and leg, and by stupor from which he could easily be roused. he would put out his tongue when desired to do so; but to every question he answered ‘yes’.” (Watson, 1843 vol 1, p.364).

In the second case, reported at more length, there is also a post mortem with clear signs of an intracerebral abscess, perhaps secondary to an infected embolism:

“I received, on the 3rd of September, a note, written in a remarkably clear and neat hand, desiring that I would call upon the writer, as he had had a severe attack of apoplexy a day or two before. I found a stout, active gentleman, apparently in perfect health, and declaring that he felt so. He showed me, however, a paper written by a surgeon ... [saying that on the 30th of August the patient had been unconscious from an apoplectic attack, and had been bled]. My patient spoke of going down to his country-house, where he had, he said, ‘a good deal of shooting to do’. I dissuaded him from this, and enjoined perfect quiet for at least a fortnight to come. The next day, after a long and imprudent conversation with a friend, he suddenly lost the thread of his discourse, and could not recover it. Then he became confused, and misapplied words. I asked him how he felt. He answered, ‘No quite right’, and this he repeated very many times, abbreviating it first into ‘not right’ and at length in ‘n’ight’. Wishing to mention ‘camphor’, he called it ‘pamphlet’.... On the 5th it was evident that his right arm and leg were weak in comparison with the others... By slow degrees the weakness degenerated into complete palsy, and the right side of the face became motionless. ... and so, on the morning of the 15th of September, he died. We examined his head the next day. [There were] two ounces of pus, which was situated in the upper part of the left hemisphere of the cerebrum. In the centre of this cavity was a small, fibrous, tough mass of a dull red colour; the coagulum, doubtless, of blood effused on the 30th of August. In front of the abscess the brain *seemed* natural, but its consistence was that of liquid custard.” Watson, T. *Lectures on the principles and practice of Physic*, 1 edn, London: Jon W Parker, 1843 vol 1, p.499 Watson, 1843 vol 1, p.499.

Hughlings Jackson (1874), who wrote extensively on neurology, also said, “To locate the damage which destroys speech and to locate speech are two different things”, a principle that has long been recognised and as often ignored in neurology and neuropsychology.

☞ WWW ☞ 1:15

Watson's argument was already an old one when he put it forward, Sir Charles Bell (1834) having criticised a similar argument, that the blood supply to the arms and hands is asymmetric, as “a cause altogether unequal to the effect”. Bell goes on to demolish the argument further by pointing out the most people are right-footed also but there is no difference in blood supply to the legs. It is more than possible that Bell and Watson had discussed the matter since Watson was brought in by Bell to be the Professor of Medicine at the Middlesex Hospital (Gordon-Taylor & Walls, 1958).

Although Watson restricts his argument to handedness, it should also be the case that people with *situs inversus* should also be right hemisphere language dominant. Regrettably even nowadays there have been only a few very limited studies of language dominance in

situs inversus, and they are barely sufficient to base a judgement (Kennedy et al., 1999; Tanaka et al., 1999; Woods, 1986). Overall the presumption is that language, like handedness, is the same in *situs inversus* as in the normal *situs solitus*.

There are other problems still with Watson's anatomical theory, ones which came from facts which Broca and most other workers in the second half of the nineteenth century had not yet appreciated. Everyone assumed initially that even though there was a gross asymmetry of language in the brain, that some vestiges of symmetry could be restored (at least in a mathematical sense), if *left* handers tended to have language in the *right* cerebral hemisphere. It took a good half century or it to be generally accepted, but the majority of left-handers, like the majority of right-handers, actually have language in the left hemisphere. And that is something that Watson's anatomical theory also would not be able to explain.

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