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The Third Man: Robert Dunn's (1799-1877) contribution to aphasia research in mid 19th century England

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Dunn on aphasia

Abstract

Throughout his medical career, Robert Dunn (1799-1877) published a number of clinical cases with post-mortem reports involving acquired language disorders, the first noted in 1842. He developed a physiologically informed approach to psychological function during the 1850s along with a group of notable colleagues Benjamin Collins Brodie, Henry Holland, Thomas Laycock, John Daniel Morell, and Daniel Noble. He was also active in ethnographic research on human origins and racial diversity. As such, Dunn represents an interesting player in the developing fields of neurology, psychology, and anthropology in England in the latter part of the 19th century. These various strands converged at the meeting of the British Association of the Advancement of Science in 1868, where Dunn shared the program of lectures on the cutting edge topic of aphasia with Paul Broca (1824-1880) and John Hughlings Jackson (1835-1911). Dunn's ideas developed over a longer time-frame than his younger colleagues and as such represent a unique blending of concepts from the earlier work of Franz Josef Gall (1758-1828) and Jean-Baptiste Bouillaud (1798-1881) to the perspectives on language organization in the brain developed after 1861.

Keywords:

Robert Dunn, aphasia, localization of function, language faculty, John Hughlings Jackson, 19th century England, physiological psychology

Introduction

The identification of the disorder of aphasia through clinical pathological correlation is demarcated by the work of the noted French surgeon Paul Broca (1824-1880) and the rising star of English neurology John Hughlings Jackson (1835-1911) in the early 1860s. The nature and significance of this syndrome quickly became a hotly debated topic in medical circles. The British Association for the Advancement of Sciences organized a series of presentations on this cutting edge topic at the meeting held in 1868. Robert Dunn, FRCS was the third man invited to speak alongside Broca and Jackson (Lorch 2008). While the latter two are well known figures in aphasiology, whose legacy has been examined through extensive biographical and critical assessment of their work during the past 150 years, there is little secondary literature on Dunn, his work, and the significance of his contributions.

Several decades senior to both Broca and Jackson, Dunn held ideas that represent an interesting counterpoint to the theoretical and empirical approaches of these two key figures. Dunn stands as an active player in the nascent fields of neurology, psychology, and anthropology in London in the mid-19th century. He published two major books: *An Essay on Physiological Psychology* (1858) and *Medical Psychology* (1863), and was a regular contributor to the *Lancet* and *British Medical Journal* for over 40 years. Dunn was one of several early and mid-nineteenth-century medical figures to consider psychological issues in relation to physiology. Wozniak (1999) identified him as a member of the informal ‘school’ associated with William Benjamin Carpenter (1813-1885) who developed a physiological branch of psychology in England between 1850 and 1875, along with Benjamin Collins Brodie (1783–1862), Henry Holland (1788–1873), Thomas

Laycock (1812–1876) John Daniel Morell (1816–1891), and Daniel Noble (1810–1885).

Over the span of his long professional career, Dunn made the intellectual transition from being an advocate of Gall's organology in the first half of the century to a supporter of a more complex approach of clinico-pathological empiricism in his later years. This paper will consider Dunn's writings on language and mental organization, his clinical cases of aphasia, and his more general works on medical psychology and anthropology. It will explore the factors behind his presence on the program alongside Broca and Jackson at the BAAS meeting 1868 and the reception of his ideas on the organization of language in the brain.

Biographical Background

Robert Dunn was born in 1799 at East Brunton, Gosforth, Northumberland, England.¹ His father was of the Lairds of Matfen and his mother was a descendant of Bishop Nicholas Ridley (1500-1555). Through family connections, Dunn befriended the young Thomas Addison (1793-1860), who would later become a senior physician at Guy's Hospital and go on to identify the disease of the adrenal glands which bears his name. Dunn was educated at Atkinson's Primary School in Newcastle and subsequently apprenticed to W. Davison, an apothecary, in Alnwick from 1815-1821. Dunn later moved to London to study at Guy's and St Thomas's hospitals (1824-5) where Addison was on the staff. He was a licentiate (1825) of the Society of

¹ In the late 18th century, the Dunn family had many relations with the same first name in the same generation, many of whom pursued medical education. It is difficult to be entirely sure whether some details refer to the same individual of interest in the present paper. No private papers have been located to date. Biographical information is found in *Lives of the Fellows of the Royal College of Surgeons* Plarr, V. (1930). Robert Dunn, FRCS (1799-1877). *Lives of the Fellows of the Royal College of Surgeons of England*, 3: 233., the *Oxford Dictionary of National Biography* Richards, G. (2004). Dunn, Robert (1799–1877). *Oxford Dictionary of National Biography*. Oxford, Oxford University Press. Other biographical material is contained in the testimonial on his death given at the Obstetrical Society of London West, C. (1879). "Annual Address of Pres. Charles West, 2 Jan 1878. Annual General Meeting." *Transactions of the Obstetrical Society of London* 20: 22-25.

Apothecaries, and became a member (1828), and later a fellow (1852) of the Royal College of Surgeons of England.

Dunn maintained a private medical practice at his home, first at no. 15 and later at 31 Norfolk Street, the Strand, London. West states that he was “drawn to the locality of Norfolk Street by its nearness to the Carey Street Dispensary where Dr. Roots and Dr. Addison were Physicians...and where he spent for many years all the time that he could spare from a steadily increasing practice, in the endeavour to perfect his knowledge” (West 1879, p. 23). Dunn had at least two sons; one of whom was Robert William Dunn (d. 1888).² From 1863, Robert William joined his father in his practice while living at 13 Surrey St, which was close by.

In the Victorian era, the neighbourhood called the Strand where Dunn had his home and medical practice became a fashionable address. Many avant-garde writers and thinkers gathered here. Amongst Dunn’s neighbors were the writers Thomas Carlyle (1795-1881), Charles Dickens (1812-1870), William Makepeace Thackeray (1811-1863); the philosophers John Stuart Mill (1806-1873), Herbert Spencer (1820-1903); the scientist Thomas Henry Huxley (1825-1895); and the physician publisher and editor of the *Westminster Review* John Chapman (1821-1894).

Dunn never held a hospital or university position, but did serve on the staff of the Public Dispensary at Carey Street, Lincoln’s Inn (f. 1782). This was one of the oldest and largest of such institutions in the city, which offered medical education and examinations for apothecaries as well as outpatient treatment. Dunn’s friend Thomas Addison also served as physician at the Carey Street Dispensary, which was adjacent to the first King’s College Hospital (1839-1860). The *London Medical Directory* for

² Robert William Dunn was also a Fellow of the Royal College of Surgeons (1855) who notably carried out research on the use of mercury for the treatment of syphilis Dunn, R. W. On the mercurial and non-mercurial treatment of Syphilis, London, 1866. Robert William Dunn worked at the Farringdon Dispensary.

1853 also lists Dunn as Surgeon to the Law-writers' Providential Institution (Anonymous 1853). He continued to practice as a physician until a short time before his death at the age of 78. Robert Dunn died at home on 4 November 1877.

Dunn's professional network

Dunn was very active in a number of medical societies in London in the mid-19th century and held many positions of esteem in the highest ranks of the London medical community of the day. He was treasurer of the metropolitan branch of the British Medical Association for many years. He was a Fellow of the Royal Medical and Chirurgical Society (1833), elected a council member in 1846, later serving as Vice President. In 1859, he was a founding member and Fellow of the Obstetrical Society of London, held a seat on the Council in 1860, and served as Vice-President from 1861-2. He was also a Fellow of the Medical Society of London and a member of the Westminster Medical Society. Dunn was also treasurer to the London and Provincial Medical Protection Society whose aim was to secure more regular payments for doctors, to register assistants and pupils, and to administer a Benevolence Fund. Dunn was on the Council of the National Institute of Medicine Surgery and Midwifery and actively lobbied for general practitioners who were surgeons and midwives to serve on the council of the British Medical Association.

Dunn was also active in many significant intellectual and social institutions in the broader community beyond medicine. He was a Council Member for the Ethnological Society of London (from 1849) and served as Vice-President (1863-1869). He was later a Council Member when this society was amalgamated into the Anthropological Society of London (ASL f. 1863) in 1871, and remained an active member of the ASL until his death in 1877. Dunn attended the founding meeting of

the National Association for the Promotion of the Social Sciences on 29 July 1857 in his capacity as Vice President of the Anthropological Society. This organization was to be modelled on the lines of the British Association for the Advancement of Science to support improvements in moral and social science and was seen to actively support the suffragette movement (Goldman 2002). In the same year of 1857, the *Medical Times and Gazette* reported on a meeting of the still active the London Phrenological Society³ (f. 1823) where Dunn was still listed as a member along with many other medical men. This, coming at such a surprisingly late date, perhaps marks the resurgence of his active network of colleagues with a shared interest in physiological psychology at this time.

Dunn's Medicine

Notice of Dunn's medical practice appears in the earliest form of what is now the *British Medical Journal*. From 1840, records of presentations at the Westminster Medical Society in December 1841 were published in what was initially titled the *Provincial Medical and Surgical Journal*. Some indication of his early medical career can be drawn from the details included Dunn's 20 year retrospective of the obstetrical cases from his sizable working and middle class patient practice (Dunn 1859). From 1831-1850 he had recorded 4,049 cases seen in his practice resulting in only 27 maternal deaths over that period (Dunn 1859, Dunn 1860). This low mortality rate suggest the high degree of skill Dunn practiced⁴. The statistical analysis he published was still regarded as the primary data source for midwifery practice two

³ Cooter records that Dunn first became a member of the London Phrenological Society in 1826, but he documents the dwindling of the activity of the Society by the 1830s. Cooter, R. 1984. *The cultural meaning of popular science: Phrenology and the organization of consent in nineteenth-century Britain*. Cambridge University Press, Cambridge.

⁴ The annual death rate was 55 per 1000 total births from maternal mortality in England and Wales in 1850 as recorded in the Registrar General Reports. Chamberlain G. British maternal mortality in the 19th and early 20th centuries. *Journal of the Royal Society of Medicine* 2006; 99(11):559-563.

decades later by Barnes who referred to Dunn as a man “of the highest stamp” (Barnes 1879, p. 728).

In addition to his obstetrical patients, Dunn published cases of “monstrosity” (Dunn 1844), hare-lip, cleft palate, and spina bifida in the babies he delivered. He mentions referring some cases to “his friend” William Bowman (1816-1892) the noted Surgeon at King’s College Hospital. His medical reports to the various London societies include a large range of varied medical interests beyond obstetrics. It is also clear that he saw a more general range of patients with various medical complaints. Herbert Spencer, who was Dunn’s neighbour, records that he called upon Dunn for treatment in 1854 while Spencer was writing his *Principles of Psychology* (Spencer 2005 [1904], p 453-4).

Dunn’s Neurology

At the outset, Dunn’s own practice was primarily concerned with antenatal and postnatal patients, but he saw a broad range of cases in general medicine in his work at the Public Dispensary at Carey Street. However, he soon began to develop a special interest in neurological patients. In addition to his particular interest in language disorders (discussed below) examination of his published case reports indicates that Dunn was also interested in hallucinations, disturbances of sleep, and the mental effects of alcohol amongst other neurological themes. From citations in notable textbooks and lectures of the day, it is clear that Dunn was a highly regarded colleague of several hospital based practitioner’s and university professors who collaborated with him and were consulted by him including: William Benjamin Carpenter, Robert Bentley Todd (1809-1860) and Eduard Brown-Séguard (1817-1894) .

As mentioned above, Dunn was a colleague of Bowman but also of Robert Bentley Todd, founder of the King's College Hospital (f. 1839). This hospital was first established in the vacant St. Clement Danes workhouse at the corner of Portugal Street adjacent to The Public Dispensary at Carey Street where Dunn also attended. In his Royal College of Physicians Lumleian Lecture of 1850, Todd's discussion on the treatment of delirium and coma cites "an admirable account of this case has been given in the *Lancet* for 1845 by my friend Mr Robert Dunn⁵, to whose kindness I am indebted for the opportunity for seeing it" (Todd 1850, p. 834). Todd notes that Dunn provided the correct treatment, which led to complete recovery in this girl who had been rescued from drowning.

In his *Lectures* (1868), Brown-Séquard mentions a patient with a dislocation of the shoulder joint due to muscular contraction which was seen with me "by a very able physiologist and medical practitioner, Mr. Robert Dunn, of London" (p. 62). This case had been published by Dunn in the *British Medical Journal* in 1862. Brown-Séquard reported on the use of chloroform in epilepsy and hysteria in the *Lancet*, and remarked that he was attended by Dunn on one of these cases (Brown-Séquard 1866).

Another of Dunn's colleagues, William Benjamin Carpenter was based at University College London (Smith 2004). In his *Principles of Human Physiology* (1864), Carpenter cites two cases by Dunn that had been published in the *Medical Chirurgical Society Transactions* with chronic disease of the Cerebellum and unsteady gait but no paralysis. Carpenter states that "these [cases of Dunn's] afford a strong confirmation of the doctrine based on the experimental researches..." (Carpenter 1864, p. 567). At another point, Carpenter suggests that his view of the

⁵ It is a British convention to address surgeons by the title Mr. but physicians as Dr.

physiological basis of the muscular sense “has been recently supported in the able papers of...Mr. Robert Dunn in his *Essay on Physiological Psychology...*” (Carpenter 1864, p. 567). These points detailed above evidence both Dunn’s rigorous clinical and scientific approach and the widespread recognition of his talents by senior colleagues.

Dunn’s psychology

Dunn’s first major contribution to ideas on the relation between mind and brain was his 1858 *Essay on Physiological Psychology* which initially appeared as a series of papers in the *Journal of Psychological Medicine and Mental Pathology* edited by Forbes Winslow (1810-1874), and subsequently brought out in book form (Dunn 1858). In the preface, Dunn confesses that it was “written at intervals amid distractions of medical practice...”

Dunn’s book appears to have been widely discussed in medical circles and reviewed favourably alongside Daniel Noble’s *The Human Mind in its Relations with the Brain and Nervous System* (1858) which appeared in the same year. In his Hunterian Oration to the Royal College of Surgeons in 1859, John Bishop cites Robert Dunn as a key figure in the newly developing field of physiological psychology, alongside Benjamin Brodie and Daniel Noble. In A.T. H. Water’s (1826-1912) ‘Address on Physiology’ to the British Medical Association annual meeting in Liverpool in 1859 he asserted that:

The right path to the development of a scientific psychology is already entered on, and we may hope that the researches of the physiologist will pave the way for the formation of a true science of mind. Abandoning the vain speculations which characterized a former epoch, the spirit of the Baconian system has

been infused into the inquiries of psychologists. To these results, the labours of some of those who are still amongst us—of Carpenter, of Noble, of Brodie, and of Dunn have contributed; and, as a greater accumulation of facts takes place, let us hope that some subtle genius may arise, who shall unite together the scattered links of the chain of this vast inquiry, and establish the great doctrines of mind on a sound and immutable basis. (Waters 1859, p. 715)

Dunn's second book on the topic *Medical Psychology* (1863) was first published in serialized form in the *British Medical Journal* and later reprinted in book form. Its main proposition was that consideration of the psychological aspects of disease might illuminate the physical bases of mental disorders and enhance diagnosis. With regard to Dunn's ideas about the relation between mind and brain Richards states:

While holding that in this life mental phenomena manifested themselves through the nervous apparatus (especially the brain) Dunn remained a mind–body dualist. He identified three successively developed levels of conscious functioning: sensory, perceptive, and intellectual, each served by a 'distinct nervous organic instrumentality'. His position is transitional between those of Benjamin Brodie and Henry Holland, for example, and the stance to come in the impending wave of evolutionism. (Richards 2004)

Dunn's anthropology

Dunn was also deeply interested in the field that in the first half of the 19th century was called Ethnology and later became referred to as Anthropology. Dunn asserted a connection between his research on physiological psychology and anthropology:

“The argument for the unity of the human species...evidence furnished by physiology and psychology...is equally conclusive” (Dunn 1859, p. 186).⁶ In 1861, Dunn made his position on the inconsequential nature of superficial racial characteristics very clear: “To conclude, does not the survey which we have taken force upon our own minds the conviction, that the colour of the skin and the character of the hair, are absolutely valueless as distinctive characteristics of race?” (Dunn 1861, p. 70). He adopted the position that “all men are derived and descended from a single stock” (Dunn 1861, p. 71). In his paper ‘Some observations on the psychological differences which exist among the typical races of mankind’ Dunn states “psychological differences among races do not differ in kind but only degree” (Dunn 1865, p. 10). In a review that appeared in the *British Medical Journal*, it was stated that:

Mr. Dunn has a definite object in view in his paper; viz., to indicate to physiological ethnologists a field of investigation and inquiry, which (he thinks), if thoroughly explored, cannot fail of throwing light upon the causes of the psychical differences which exist among the typical races of man. Among the different races (he observes), there has often been noticed a marked superiority on the part of the savage over the civilised, in the force of their instincts and in the acuteness of the organs of sense; but that it is in their intellectual manifestations that the widest and most striking differences are seen....Such being the case--to every physiological ethnologist, how important must be the inquiry, and incumbent the duty, to examine, compare, and contrast their cerebral organisation; seeing that it is upon nervous

⁶ In the same paper, Dunn complained that “although presidents of the Ethnological Society have been medical doctors ...[we have] not received from the medical profession of this great metropolis that general and cordial support which might have been expected.” Dunn, R. (1859). "On physiological and psychological evidence in support of the unity of the human species." Transactions of the Ethnological Society **i**: 18-202. p. 186.

instrumentality-the vesicular matter of the encephalic ganglia as its substratum-that the mind is dependent for manifestation of all its activities, and among all the races of man....The subject is treated in a manner worthy of the author of the papers on Medical Psychology which have appeared in our pages, and will be read with pleasure and profit. (Anonymous 1865, p. 514)

Dunn's paper on civilization and cerebral development (Dunn 1864) was noted in the *Annual of Scientific Discovery* for 1864: "Mr. Robert Dunn maintained that the genus *homo* was distinctly defined, on the grounds that in man's moral and religious attributes the inferior animals do not participate, and it was this that constituted the difference between him and them. The barrier was thus he considered impassable between man and chimpanzee..." (Wells, Cross et al. 1865, p. 287). This refers to the debate that was current, arising from the ideas expressed in Charles Darwin's (1809-1882) *On the Origin of Species* (1859).

The *British Medical Journal* also reviewed Dunn's article on Civilization and Cerebral Development saying:

...we cannot help thinking that those of our readers who were interested in the abstract which appeared in our pages at the time when the paper was read before the Society, will now be glad of the opportunity of studying this paper *in extenso*. The influence of civilisation upon the development of the brain in the different races of man, is a most interesting and important inquiry; and it is one, judging from what has been contributed by him to our own pages, that is well suited to the author's habits of thought and inquiry. (Anonymous 1866, p. 413)

Richards comments on Dunn's particular stance within this debate: "While affirming that the genus *Homo* was one, Dunn believed that differences in cerebral organization between the races underlay their psychological differences, and he urged more research into this. Although side-stepping evolution, he accepted a progressive hierarchy from 'negro', via 'Malay', 'American Indian', and 'Mongolian', to 'Caucasian'." (Richards 2004)

These texts exhibit the ethnocentricism and racial stereotyping of contemporaneously accepted notions of 'scientific racism', but in Dunn's writing there is also a strong affirmation of a 'common humanity'. During the American Civil War, Dunn's membership of the Ethnological Society of London identified him with the anti-slavery camp, as contrasted with the newly formed pro-Confederate Anthropological Society of London (f. 1863).⁷ As a reflection perhaps of these socio-political tensions, Dunn's book *Medical Psychology* was given a less than positive review (anonymously) in the first volume of the new journal *Anthropological Review* (163-6). Indeed, Dunn cited innate 'African' docility as evidence against fears regarding the consequences of abolition. Rather than reflecting personal racism, Dunn's position stemmed from his acceptance of physiological accounts of race differences in skull shape, brain size and brain form that were in turn reinforced by his belief in the broad truth of phrenology.⁸

⁷ Jackson is recorded in the minutes as having attended the founding meeting of the Anthropological Society of London on 20 August 1863. He is listed as Council Member for 1863, at the time when the society's membership numbered 200. Jackson is also recorded in the minutes as serving on the Publication Committee; and recorded as a Member for 1864 and 1865. However, his name does not appear on the membership list for 1866 when the membership had grown to 600, or in subsequent years.

⁸ Dunn's interest in such anthropological topics finds parallels in the work of Broca although they did not hold identical positions on particular issues (See Schiller, F. (1979). Paul Broca : founder of French anthropology, explorer of the brain. Berkeley ; London, University of California Press.)

Dunn's work on language and the brain

Although there had been a steady stream of papers on the relation between damage to the anterior lobes and loss of speech in the European medical literature, the theoretical principles of phrenology were hotly debated throughout the first half of the 19th century. Many cases of “loss of speech” (as it was referred to before Trousseau offered the term ‘aphasia’ in 1864) were recorded in the British literature in the 1830s, 1840s, and 1850s.⁹

Many of Dunn's early medical case reports were on other aspects of general practice or midwifery, as discussed above, but in 1845 he reported his first case which focused on psychological and neurological issues: a case of “Suspension of the mental faculties, of the powers of speech, & special senses ... occurring in a young woman” which was a case of loss of expressive behaviour after drowning (Dunn 1845).

Five years later, Dunn read before the Royal Medical and Chirurgical Society of London, June 25, 1850 “A case of Hemiplegia, with cerebral softening, and in which loss of speech was a prominent symptom.” This paper was not accepted for publication in the *Transactions of the Medical and Chirurgical Society* and the slight was cause for comment by the editor of the *Review* (Anonymous 1851). In the anonymous discussion of Dunn's presentation, it is described as “a case, which helps to solve one of the most intricate questions in human cerebral pathology” (p. 391). It is implied that the paper might have been rejected because of its subject, or possibly

⁹ The attention attracted by one case published in 1854 in a Belgian journal *Archives de Médecine Militaire* gives some indication of the interest on the topic both on the Continent and in Britain at this time. It was reprinted in the French journal *Gazette hebdomadaire de Médecine*, as well as meriting citation in the *Half Yearly Abstracts of Medical Science* in England. It was a short report by a Dr M. Dechange who documented a case of a man who hit the back of his head on a ladder and died a week later. At autopsy damage was significant in the anterior frontal lobes on bilaterally (i.e., *contre coup*). “This case derives its interest from the contradiction which it affords to a well-known phrenological dogma” (Ranking and Radcliffe, 1854). The crucial point for the writer and the editors of the journals was that the man suffered no loss of speech although his brain was damaged in the anterior frontal lobes thought since the earliest teachings of Gall to be the location for the faculty of language.

because the author did not have a hospital appointment or that Dunn's position was dissenting to the view put forward by a distinguished physician and former President of the Society (possibly referring to Marshall Hall). They insist that it is "a paper drawn with great care, by one of the ablest clinical observers in the country..." Having been rejected for publication in society's transactions, Dunn succeeded in having this case published in the *Lancet* instead. This may be seen as an indication of his strong reputation and high standing in the medical community.

In Dunn's paper, he describes a patient with loss of speech and right hemiplegia. At autopsy, it was found that the upper two thirds of the anterior lobe of the left hemisphere had been destroyed but the middle and posterior lobes were sound and healthy. The upper half of the corpus striatum on the left was also destroyed, as well as the thalamus, corpus callosum, anterior commissure, and fornix.

Dunn begins this report by asserting the importance of individual cases. He cites Richard Bright's (1789-1858) valuable research into the pathology of the brain and more specifically on language pathology. Dunn insists that it is of great value: "... the attempt to trace the connection between structural diseases of particular portions of the encephalon, and of deranged, impaired, or obliterated manifestations of the mind, is clearly one which comes legitimately within the province of the medical observer..." (Dunn 1850, p. 474).

Dunn describes a patient whom he had followed over a period of five years until her death at the age of 66 years. She had had an apoplectic seizure resulting in a right hemiplegia of both arm and leg, which recovered fully over a period of months, but "One peculiarity, however, remained—the habit of using one word for another, and of not applying appropriate names to the things signified. She never afterwards called even her own daughters by their right names" (Dunn 1850, p. 474). A second

attack occurred two and a half years later. This time there was little recovery, the right hemiplegia and speechlessness were permanent.¹⁰ In describing her loss of speech, Dunn states: “In reply to a simple question she could not say yes or no, and never could get beyond the utterance of the monosyllable dat-dat, while the conscious failure of the effort found expression in a hopeless shake of the head, and often in the exhibition of emotional feeling and a gush of tears” (Dunn 1850, p. 474). She had a final seizure two and a half years later and died 18 days afterwards. A post-mortem was done with the assistance of Todd: “I was struck by the want of symmetry between the hemispheres of the brain. The left on its anterior and upper surface were much depressed and shrunken... The upper two-thirds of the anterior lobe was a pulpy mass, in a state of complete destruction... while the middle and posterior lobes were sound...” (Dunn 1850). They found that on the left side, the corpus callosum and the corpus striatum were also damaged, while the right hemisphere was healthy down to the corpus callosum, but the right corpus striatum was also destroyed and a small recent clot was found in the right lateral ventricle.

In his discussion, Dunn states that this case sheds light on the causes of the loss of speech with respect to the cerebral origin of this faculty. Dunn reviews the history and evidence supporting the idea that the cerebral seat of the faculty of speech is the anterior lobes. He refers to the writings of Gall, and then cites two more recent memoirs that were read before the Académie Nationale de Médecine de Paris in 1848 by Belhomme and Bouillaud that reiterated this relation between language and the frontal lobes. Dunn states:

¹⁰ Dunn explains that the case was seen by “my friend” Dr Robert Bentley Todd and together they carried out testing of the muscular irritability of the paralysed limbs using a Cruikshank’s battery of fifty plates and then a magneto-electric rotation machine. This stimulation did elicit contractions. These experiments were subsequently written up by Todd and published in “On the contractility or irritability of the muscles of paralysed limbs, and their excitability by the galvanic current, in comparison with the corresponding muscles of healthy limbs” in *Medico-chirurgical Society Transactions* 1847, vol. 30, 215-6.

...it is quite evident that with the disorganization of the left anterior lobe its functional power was entirely abolished; and though the right hemisphere was healthy, and there is every evidence from the history of this case, that it maintained and exercised its functional power as a centre of intellectual action, still the volitional agency was wanting to give utterance to the passing thought, for the corpus striatum was not in its integrity. (Dunn 1850, p. 500)

The anterior lobes and corpus striatum were viewed by Dunn as the “centres of volition and intellect.” Dunn asserts:

It is never to be forgotten, that perfect speech—that is the power of giving utterance to our thought in suitable and appropriate language—depends upon the due relation between the centres of volition and of intellectual action, and that, thus considered, the apparently conflicting evidence which has been adduced, as to the seat of the faculty of speech, admits, in his [Dunn is speaking in 3rd person] opinion, of a satisfactory explication. The thought is framed and moulded for expression in the centre of intellectual action, but the due agency of volitional power, and consequently, the integrity of its seat of action, is needed to give it utterance. And while it is universally admitted that the cerebra are the great centres of intellectual action, he [Dunn] believes with Gall, --and of which the present case affords corroborative proof, --that the anterior lobes are the seat of the faculty of speech; and he [Dunn] asks, Is it not equally true that the corpora striata are the great centres of volition? And therefore, does it not necessarily follow that loss of speech may alike result from diseases of the anterior lobes, or of such portions of the corpora striata as are in direct relation with them? He [Dunn] concludes by saying (in the case

narrated,) it is manifestly obvious, that with the disorganization of the left anterior lobe its functional power was entirely abolished; and that although the right hemisphere was healthy, --and there is every reason to believe, from the history of the case, that it maintained and exercised its function as a centre of intellectual action, --still the volitional power was wanting, to give utterance to the passing thought for the corpus striatum was not in its integrity. (Dunn, 1850, p. 25)

Dunn then goes on to compare these cases with his own from 1846 of a girl saved from drowning whose speech was affected by mental derangement (described above). Later on where he again discusses this case, Dunn says: “There is not, I believe, a single instance on record in which the power of utterance was retained *intact*, however sound and healthy the great hemispherical ganglia may have been found, where the corpora striata were both diseased” (Dunn 1858, p. 72).

In his review of the history of the corpus striatum, Kinnier Wilson (1878-1937) explains the perspective that prevailed at this time. He points out that before the work of David Ferrier in the 1870s, the assumption was that the pyramidal path issued directly from the corpus striatum. This assumption was tacitly made in all the writings of this period (i.e., 1840s-1870s) and occurs repeatedly in the records of hemiplegic and other cases (Wilson 1914, p. 434).

Thus, in his paper of 1858, Dunn is clear in his identification of the cortical lesion as unilateral and that the effect indicates some privileged role. In addition, he stresses the significance of the corpus striatum, which was damaged bilaterally. Dunn is identifying the outflow route from the left anterior cortex through the subcortical

structures of the basal ganglia¹¹. The significance of Dunn's description of an outflow pathway for verbal expression and the role of this network in aphasic disorders were subsequently lost sight of in the efforts to assign functions to areas of the cortex and to diagram them on the lateral surface of the brain.¹² On the other hand, Dunn does not use this clinico-pathological evidence to make the claims that Broca would 15 years later regarding the left frontal lobe and language function (Benton 1984).

Dunn further explored the psychological aspects of language in his first book *Essay on Physiological Psychology* (1858). Chapter 4 includes a section with the key points highlighted in the contents as “articulate speech, the exclusive prerogative of man; language is common to all the races of man; cerebral seat of the organ of speech is in the anterior lobes of the brain; language is the instrument of thought and reasoning”. Many of these considerations on language, as those on human race discussed above, reflect Dunn's engagement with issues indirectly raised by the ideas presented in Darwin's *On the Origin of Species*. However, Darwin himself only directly discussed the nature of human language in his much later writings (Lorch and Hellal 2010).

Dunn continued to write about the dual aspects of expression and intellect in producing speech, emphasizing the role of the corpus striatum in the motoric expression of articulation and the anterior lobes of the cortex for language. In his paper “On the psychological phenomena or symptoms of disease” in “perfect speech—that is, the power of expressing our thoughts in suitable language—depends

¹¹ This is similar to the views of Jackson a decade later.

¹² This prevailed from the 1870s with the efforts of Wernicke through to the final quarter of the 20th century when the significance of subcortical structures in language processes again came to the fore Crosson, B. (1985). "Subcortical functions in language: a working model." *Brain and Language* **25**(2): 257-292..

upon the due relation between the centres of volition and of intellectual action”

(Dunn 1862, p. 571).

Dunn was apparently then unaware of Broca's two cases of loss of speech in 1861.¹³ However, he does cite the work of Louis Pierre Gratiolet (1815-1865) who was involved in those discussions with Broca about brain function at the Société d'Anthropologie in 1861 (Lorch 2011). This appears in his book *Medical Psychology* (1863), which was drawn from articles that were published in the *British Medical Journal* from 1861-2. In the long section on “Loss of Speech or the Power of Utterance”, Gratiolet’s theories regarding the function of fibre tracts are used by Dunn as a physiological mechanism for the association of ideas. He considers how the cortex is connected and relates this to the complicated web of our conscious existence, ideas, and their associations. With regard to the relations between ideas and speech, Laycock¹⁴ is referred to for his work on the alternate layers of grey and white matter of convolutions having different functions and offices, and distinct groups or layers of cells, which are probably regulative or ideagonic or kinetic (Dunn 1863, p. 34).

The influence of Dunn on Jackson’s aphasiology

One of Jackson’s earliest papers to discuss loss of speech was published in the *London Hospital Reports* in 1864 contains a lengthy quote from Robert Dunn’s book. Jackson subscribes to many of the other ideas detailed in Dunn’s writings, specifically with respect to the important role of the corpus striatum. Jackson and Dunn also

¹³ There is no reference to Broca in any of Dunn’s writings in the early 1860s nor is there any evidence that Jackson was aware of Broca’s work on aphasia until 1864. Greenblatt, S. H. (1970). "Hughlings Jackson's first encounter with the work of Paul Broca : the physiological and philosophical background." *Bulletin of the History of Medicine* **44**: 555-570. Lorch, M. P. (2008). "The merest Logomachy: The 1868 Norwich discussion of aphasia by Hughlings Jackson and Broca." *Brain* **131**(Pt 6): 1658-1670.

¹⁴ Laycock was also Jackson’s teacher at York Medical School from 1852-5 and influenced his neurological ideas.

shared bibliographic references, both using the work of Todd and Laycock as foundations.

In an Editorial on aphasia which appeared in the issue after Jackson's paper (1866) in the *British Medical Journal*, there is the statement which acknowledges Dunn's priority:

The patient, this writer seems to think, cannot talk, or talks badly, because the injury is at the critical point where a great part of the brain is connected by fibres with motor centres and motor organs, and not because the peculiar seat of one distinct faculty is more or less broken up. This is essentially the view long ago put forward by Mr. Dunn. (Anonymous 1866, p. 259)

In another article which Jackson published later that year he states:

I must here say that I believe less in some of the views propounded by Broca than I did, although I think the scientific world is under vast obligation to him for giving precision to an important inquiry.... I think, then, that the so-called 'faculty' of language has no existence, and that disease near the corpus striatum produces defect of expression (by words, writing, signs, etc.), to a great extent, because this is the way out from the hemisphere to organs which the will can set in motion. (Jackson 1866, p. 659)

This view is consistent with Dunn's position and other British physiological psychologists working a decade earlier.

Dunn and Jackson both attended the meeting of the British Medical Association in Oxford 1868 before they met again three weeks later in Norwich for the discussion on the novel topic of aphasia that the British Association for the Advancement of Science. Jackson gave his paper to the Biology Section on Anatomy

and Physiology on Monday 24th August entitled “On the Physiology of Language, founded on Facts supplied by Cases of Diseases of the Brain”. The presentation by Broca “On the Seat of the Faculty of Articulate Language” was given the next day, Tuesday 25th August. A discussion, which included Jackson’s paper, followed Broca’s presentation. Finally, Robert Dunn presented his paper entitled “On the Power of Utterance in respect to its Cerebral Bearings and Causes.”

In Jackson’s presentation, he gave significant priority to Dunn’s ideas as documented in the published abstract of his paper:

Destruction of parts of the hemisphere at a distance from the motor tract need produce no obvious mental symptoms of any kind. An equivalent quantity of destruction of parts near the [left] corpus striatum will, however, cause defects of intellectual expression. He thinks that the quantity of defect depends generally on the (1) quantity of destruction of tissue, and (2) on its nearness to the highest part of the motor tract, (the corpus striatum,) “the point of emission of the orders of the ‘will’ to the muscles.” (The Author here quotes Mr. Dunn, who has long held essentially similar opinions).¹⁵

While neither Jackson nor Broca had their abstracts printed in *the Transactions of the British Association*, Dunn’s did appear:

“On the Power of Utterance in respect to its Cerebral Bearings and Causes.”

By R. Dunn

Viewing the faculty of speech as an instrument of thought and language, as the minister and interpreter of the thoughts, feelings, and emotions of the mind,

¹⁵ The text of this unpublished version of Jackson’s abstract is reprinted in Lorch, M. P. (2008). "The merest Logomachy: The 1868 Norwich discussion of aphasia by Hughlings Jackson and Broca." *Brain* **131**(Pt 6): 1658-1670.

the author maintained that, in all cases of loss of speech which are of *cerebral origin*, there is involved either structural change or functional derangement in the nervous apparatus of the intellectual consciousness. The author briefly narrated two illustrative cases out of a number which had come under his observation, one of structural change, and the other of functional derangement, both of striking significance. But the point which he wished especially to impress upon every physiological psychologist was this, viz. that the power of giving utterance to our thoughts and ideas in appropriate language depends upon the due relation being maintained in its integrity between the centres of intellectual action and the encephalic motor centres through which the volitional power is exercised in articulate speech—in other words, between the cerebral hemispheres and the corpora striata. For thoughts and ideas might be moulded for expression in the seat of intellectual action, but the agency of the will or volitional power to give them utterance requires the integrity of the motor centres, through which the volitional impulses operate on speech. The author said a special cerebral organ had been assigned to the faculty of speech, and that the illustrious Gall was the first to locate it in the anterior lobes of the brain. Since his time the subject had undergone much discussion in France, and conflicting evidence had been adduced. He adverted to the hypothesis of Dr. Dax, that the left hemisphere of the brain was *its exclusive seat*, but to which he could not subscribe. The brain is a double organ; the functions of both hemispheres are identical, in harmonious accord with the doubleness of the organs of sense, as double inlets to knowledge. Professor Broca, who claimed the honour of being the first to discover that the third convolution was the seat of the faculty of articulate speech, was constrained to admit that the

function was not *exclusively* exercised on the left side of the brain, although disease there, with hemiplegia of the right side, was almost universally characterized by aphasia. The author, in proof that the right hemisphere exercised the same function in regard to articulate speech as the left, adduced a case in which there was extensive disease in the left hemisphere, on the very site of Broca's organ, and yet during life the faculty of speech was not impaired. (Dunn 1868, p. 114)

The discussion that followed Dunn's paper was also reported in *the Medical Times and Gazette* 1868:

In reply to remarks made on his paper, Mr Dunn wished to correct Dr. Hughes Bennett. The will, as an attribute of mind, had its seat in the cerebral hemispheres, and not in the corpora striata. The latter were the encephalic motor centres, through which the impulses of the will were propagated, the *connecting links of thought with articulate speech*. In reply to Dr. Humphry's opinion as to unity of action of the brain and uniformity of structure in all the convolutions, he believed that the vast sheet of vesicular matter which crowns the convolutions, subserved different mental actions, and begged to remind him that the microscopic examination of its ultimate structure demonstrate that the anterior was more complicated than either the middle or posterior lobes. (Anonymous 1868, p. 267-8)

The *British Medical Journal* carried a long report on the presentations by Jackson, Broca, and Dunn at the Norwich meeting. The subtle differences of focus in the positions of these three can be clearly traced here. The summary of Jackson's

paper remarked on his stress on the role of the corpus striatum for intellectual expression and his disagreement with Moxon on the education of the right hand as the cause of the left hemisphere as the leading one. Broca was said to have argued for the corpus striatum “as merely the medium of connexion.” Dunn argued for the dependence of utterance upon the corpus striatum, “the point of emission of the orders of the ‘will’ to the muscles” (Anonymous 1868, p. 260).

Conclusions

The evidence presented here documents the significant impact of Dunn’s neurological and psychological work amongst his colleagues. He was notable for publishing a number of insightful clinical descriptions of acquired language disorders in the 1850s, a decade before the advent of modern aphasiology. Writings on the pre-history of Neurolinguistics have included few British contributors during this period and there has been very little in the way of secondary research on Dunn’s work previously. This led Richards (2004) to be dismissive in his entry in the *Oxford National Dictionary of Biography*: “Dunn's influence is difficult to gauge; his publications were few and his psychological work was soon overshadowed by that of more eminent contemporaries such as Alexander Bain; moreover, his views on racial brain-differences have long been discredited.” This seems harsh and inaccurate in equal measures in light of the material presented here.

Dunn published dozens of significant case reports, as well as a statistical review of a large series of obstetrics cases that served as reference material for generations. There is substantial evidence that his books on physiological psychology were highly regarded by his contemporaries. Moreover, in this paper I have documented his significant contribution to the development of ideas regarding the

physiology of language from 1850 to 1869. These served in part as an early foundation for Jackson's more well recognized views of aphasia. Dunn was interested in determining the physiological distinction between articulation and linguistically based thoughts. The formulation of motor expression he ascribed to the corpus callosum, while the anterior lobes of the cortex were the source of language. He held that there was duality in the hemispheres and that the right side of the brain did play a role in language function. The ideas expressed in the writings of Jackson by 1868 shared many of these ideas.

However, in the ensuing decades subsequent focus on the localization of function of the cortex relegated the corpus striatum to a less defined role in the following decades. The attractiveness of the histological organization of the cortex, and the possibility of localizing higher mental functions drew many neurologists of 19th century to cortical research. Amongst those that continued studying the corpus striatum, there was a sudden realization that many of the functions originally assigned to it were in fact properties of neighbouring corticospinal paths. As Wilson describes, the corpus striatum "seemed to fall from its high estate and depreciate in physiological significance." (Wilson 1914, p. 428) At the same time, the force of Broca's statements regarding lateralization of language to the left hemisphere also took hold in the 1870s, although many in Britain continued to contest it (Hellal and Lorch 2007).

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