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Provenance and peer review:

Submitted and internally
reviewed.

Sir William Gowers (1845-1915): a centenary celebration, with an examination of his comments on cognitive dysfunction

2015 marks the 100th anniversary of the death of Sir William Gowers (Figure), one of the towering figures of clinical neurology in the late 19th and early 20th centuries, who has rightly entered the pantheon of neurological greats.^{1,2} A splendid recent biography has provided many insights into his life and career.³

Gowers' neurological contributions are manifold. Most, if not all, neurologists will be familiar with Gowers' sign or manoeuvre observed in patients with proximal lower limb and trunk weakness as they attempt to rise from the ground, a sign also known as "climbing up oneself" or, in North America, as the "butt-first manoeuvre", most typically seen in boys with Duchenne muscular dystrophy, a disorder which Gowers knew as pseudohypertrophic muscular paralysis and on which he wrote a monograph. Those familiar with the anatomy of the spinal cord will know of Gowers' tract (ventral or anterior spinocerebellar tract).

Gowers was a fecund and lucid writer, author of many publications, both papers (more than 300) and books (Box), which culminated in the *Manual of Diseases of the Nervous System*. This book has been variously described as "the greatest single-author comprehensive textbook of clinical neurology ever published" (Ref 3, p. 250) and as the "Bible of Neurology",⁴ and is perhaps Gowers' most enduring monument. Its two volumes first appeared in 1886 ("Diseases of the nerves and spinal cord") and 1888 ("Diseases of the brain and cranial nerves. General and functional diseases of the nervous system"), with a second edition in 1892 (Volume 1) and 1893 (Volume 2). A third edition of volume 1 appeared in 1899, co-authored with Dr James Taylor, but although preparations for a third edition of volume 2 were made this was never published. Parts of a manuscript marked with Gowers' proposed corrections survive in the Queen Square archives (Ref 3, p. 149), with new information particularly relating to nystagmus and myasthenia.⁴

Gowers' neurological interests were very broad, but perhaps particularly related to epilepsy,⁵ syphilis (especially tabes and locomotor ataxy), movement disorders, including "paralysis agitans" (Parkinson's disease) and "scrivener's palsy" (writer's cramp), and migraine. The student of cognitive neurology is disappointed to learn from his biographers that "from a survey of all Gowers' publications one gains the impression that he was not particularly interested in higher cerebral function" (Ref 3, p. 167), presumably because many of the conditions afflicting these faculties were at that time seen by "alienists" (psychiatrists) rather than neurologists. That said, he evidently took an interest in his own powers of recollection, which were said to be remarkable (Ref 3, p. 238), although perhaps not unexpectedly tailed off in his later years.⁶

Prompted by the biography suggestion of lack of

interest in cognitive neurology, I visited the Liverpool Medical Institution which holds copies of all the editions of the *Manual of Diseases of the Nervous System* (see www.lmi.org.uk and follow the link to Online Library Catalogue). I have examined these volumes, in particular the second edition of volume 2 of 1893, in order to try to gain some appreciation of Gowers' knowledge of and approach to what we might now define as cognitive disorders (unless otherwise stated, all subsequent page citations are to the 1893 edition of the *Manual*, volume 2, although I wish to emphasise that, since I have not read all the 1050 pages of text in the LMI copy, this does not purport to be a comprehensive account).

A brief perusal is initially discouraging: for example, there is no index entry for "dementia", although it is evident that this word was certainly part of Gowers' clinical vocabulary since he does use it on occasion (e.g. pp. 107, 648, 983). Much of what we call "dementia" is probably subsumed in his categories of "mental failure" and "insanity". It is clear that Gowers was familiar with many of the symptoms of cognitive dysfunction, and many of the disorders causing such problems.

Cognitive symptoms

Amnesia

In describing "Mental symptoms" (98), Gowers noted that "mental functions of the brain are frequently disturbed in organic disease", and that "Simple mental failure is indicated first and chiefly by *defect of memory*, 'amnesia' in the widest sense of the word" (Gowers' italics; 107). Hence, "The diseases of the brain that affect memory are extremely numerous", including "various degenerative processes, which are for the most part classed as forms of insanity, e.g. senile dementia and general paralysis of the insane" (107). Under the heading of "Mental failure", the index includes references to epilepsy, chorea, and tumour, amongst others (1060).

Aphasia

It has been acknowledged that the *Manual* contains a very good account of aphasia (Ref 3, p. 167). Gowers noted of cerebral defects of speech that "The subject abounds in difficulty" (111). Amongst the most important writings on the subject, Gowers cited Broca (111n), Wernicke (109n), and Hughlings Jackson (109n, "in many places, but especially in 'Brain' vols. i and ii").

Gowers drew a clear distinction between motor aphasia (116-119) in which the "patient is able to understand whatever is said to him" despite impaired speech output, and sensory aphasia (119-122) in which "heard words are not understood". He seems to have used the term "word deafness" interchangeably with "sensory aphasia". The defects of writing (agraphia) and reading (alexia) accompanying these two forms of aphasia are also described.

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As regards causation of aphasia, "The region of the cortex in which the speech-centres are situated is supplied by the middle cerebral artery..., and obstruction of this is the most frequent cause of aphasia" (124). Transient aphasia in the context of right-sided convulsions and of migraine is also noted (124).

"Agnosia"

As far as I can see, Gowers does not use the word "agnosia", coined by Freud in 1891, but he was clearly aware of what we would now regard as agnosic phenomena, which 19th century neurologists had called "imperception" or "asymbolia".

He described "word-blindness" as an isolated loss of the power of comprehending visual word-symbols, after Kussmaul, with an inability to read even simple words (122). He noted that such patients could write spontaneously or from dictation but could not copy (123) and that there may be an associated hemianopia (124). Hence this corresponds with what we might now call pure alexia, alexia without agraphia, or pure word blindness. Gowers thought this resulted from a lesion in the lower and hinder part of the left parietal lobe including the angular gyrus. He also characterised word-blindness as a partial form of "mind-blindness", after Munk, that being impaired power to recognise the nature of seen objects, including words, although they could be "recognised at once when some other sense is employed" (23). Gowers' possible role in defining the pathological substrate of one of Hughlings Jackson's patients with agnosia has been described (Ref 3, p. 167).

Cognitive disorders

Senile amnesia, Senile dementia

Gowers reported, in a section headed "Senile atrophy" (581-582), that "In old age the brain wastes, like many other organs ... The amount of fluid in the ventricles and on the surface is increased in proportion to the lessened bulk of the brain ... this wasting of the brain is commonly attended by no symptoms. Senile mental failure is often ascribed to it, but ... caution should be observed in attributing to it any mental change that may co-exist". He recognised "senile dementia" as a condition, and a temporal gradient in "senile amnesia", in which "... the events of early life may be vividly remembered, and those of later years be lost" (107).

Paralysis agitans

In his descriptions of what we would now call Parkinson's disease, Gowers noted that the "intellect may be unaffected throughout", as per James Parkinson's original 1817 description of the disease, but noted that "in the later stages of the disease ... mental weakness and loss of memory" are occasionally present and that these might also occur early in the disease course (648). "If tremor is inconspicuous, they add considerably to the misleading aspect of the case. Very rarely they are accompanied by a tendency to delusions, and occasionally



they amount to actual dementia" (648). One wonders in retrospect if Gowers is describing what we might call dementia with Lewy bodies here.

Hereditary chorea, Huntington's chorea

Gowers noted that George Huntington's original 1872 description of this disorder mentioned "mental failure" as one aspect of the disease (624). Gowers' own focus was principally on the chorea, but he did note that "Mental changes are generally associated, especially mental weakness, and hence many of the cases have been reported from asylums" (625).

Epilepsy

In the section on "Mental disturbance in Epileptics" (747-749), Gowers noted that the "interparoxysmal mental state of epileptics ... often presents grave deterioration ... In its slightest degree there is merely defective memory, especially for recent acquisitions. In greater degree the intellect suffers generally ..." (748). Furthermore, "The mental state is not, in all cases, entirely the result of the attacks of epilepsy. In some it is, in part at least, the expression of a cerebral imperfection, of which the epilepsy is another manifestation. In such instances mental defect may exist before the occurrence of the first fit" (748). Certainly there is some modern evidence corroborating this formulation.

The possible adverse cognitive effects of medication, specifically bromides, of which Gowers was an enthusiastic prescriber,⁵ are noted: "... patients may become ... forgetful ... The effect is often ascribed to the remedy used, especially if this is bromide" (749).

Disseminated or insular sclerosis

In disseminated or insular sclerosis (multiple sclerosis), Gowers noted that "slight mental change is common; considerable alteration is very rare. ... There may be failure of memory, but especially frequent is an undue complacency and contentment" (552).

Alcohol

Describing the effects of "Chronic alcoholism", Gowers noted that "persistent mental changes"

such as "failure of memory" might occur (981). "Chronic alcoholism may aid in the production of many forms of definite insanity, but the only variety that can be certainly ascribed to this cause, acting alone, is chronic dementia – failure of memory, commonly progressive for a time" (983). He noted a resemblance to general paralysis of the insane but "differing in the non-progressive character of the disorder if alcohol is given up". He makes no reference as far as I can see to the alcohol-related amnesic syndrome described by Korsakoff in 1887, or the earlier work of Robert Lawson which had appeared in the inaugural volume of *Brain* in 1878.⁷

Syphilis

Although Gowers' major interest related to tabes and locomotor ataxy, he was aware that this might co-exist with general paralysis of the insane, and noted that "syphilis predisposes to both" (1892 edition of *Manual*, volume 1, p. 417).

Discussion

Evidently, from a brief perusal of some parts of his *Manual*, Gowers was familiar with the symptoms of cognitive dysfunction and with disorders of the nervous system causing such dysfunction. This reflects his astute clinical skills. His comments on cognitive impairment in Parkinson's disease may be prescient, and certainly the cognitive impairments he noted in multiple sclerosis and epilepsy were relatively little studied until recent times. Lacking specific tools to assess cognitive function, the development of which was in its infancy, he could not really take these clinical observations much further.

It is intriguing to wonder what new information relevant to cognitive disorders might have been contained in the 3rd edition of volume 2 of the *Manual*. "Brain degenerations" is apparently one of the surviving sections of the proposed third edition of volume 2, with Gowers' handwritten revisions, although Eadie et al. state that in this section "deletions were trivial" (Ref 4, p. 3180). It would be fascinating to know if this section mentioned the seminal publications of Arnold Pick on focal lobar degenerations of 1892 and 1906 (Gowers had learnt German), and likewise those of Alois Alzheimer of 1907 and 1911, although it was not until 1912 that the first publication on "Alzheimer's disease" in English appeared, by Solomon Carter Fuller,⁸ by which time Gowers had ceased to publish.

Box: Major books published by Sir William Gowers

A Manual and Atlas of Medical Ophthalmoscopy
Pseudo-hypertrophic Muscular Paralysis
The Diagnosis of Diseases of the Spinal Cord
Manual of Diseases of the Nervous System
Syphilis of the Nervous System
Epilepsy and Other Chronic Convulsive Disorders
The Border-land of Epilepsy: Faints, Vagal Attacks, Vertigo, Migraine, Sleep Symptoms and their Treatment