Three Twentieth-Century Multiauthored Neurological Handbooks – A Historical Analysis and Bibliometric Comparison

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The emergence of neurology as a separate specialty from internal medicine and psychiatry took several decades, starting at the end of the nineteenth century. This can be adequately reconstructed by focusing on the establishment of specialized journals, societies, university chairs, the invention and application of specific instruments, medical practices, and certainly also the publication of pivotal textbooks in the field. Particularly around 1900, the German-speaking countries played an integral role in this process. In this article, one aspect is extensively explored, notably the publication (in the twentieth century) of three comprehensive and influential multivolume and multiauthor handbooks entirely devoted to neurology. All available volumes of Max Lewandowsky's Handbuch der Neurologie (1910–1914) and the Handbuch der Neurologie (1935–1937) of Oswald Bumke and Otfried Foerster were analyzed. The handbooks were then compared with Pierre Vinken's and George Bruyn's Handbook of Clinical Neurology (1968–2002).

Over the span of nearly a century these publications became ever more comprehensive and developed into a global, encompassing project as is reflected in the increasing number of foreign authors. Whereas the first two handbooks were published mainly in German, "Vinken & Bruyn" was eventually published entirely in English, indicating the general changes in the scientific language of neurology after World War II. Distinctions include the uniformity of the series, manner of editorial involvement, thematic comprehensiveness, inclusion of volume editors in "Vinken & Bruyn," and the provision of index volumes. The increasing use of authorities in various neurological subspecialties is an important factor by which these handbooks contrast with many compact neurological textbooks that were available at the time.

For historiographical purposes, the three neurological handbooks considered here were important sources for the general study of the history of medicine and science and

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the history of neurology in particular. Moreover, they served as important catalyzers of the emergence of neurology as a new clinical specialty during the first decades of the twentieth century.

Keywords German and Dutch handbooks, clinical neurology, history of medicine, history of neurology, bibliometric analysis, specialization in medicine

Introduction

Specialization in medicine was an important phenomenon through which new clinical and basic disciplines, diagnostic technologies, and research perspectives emerged in the second half of the nineteenth century, a trend that continued well into the twentieth century. When comparing the neurological communities in various countries, visible differences can commonly be identified within the general development process of emerging academic societies, university chairs, scientific journals, diagnostic and research instruments,¹ and textbooks (Koehler, 1998, 2007). Conversely, however, daily routine practices remained as a combination of neurological and psychiatric approaches in most research and clinical institutions (Rosen, 1944; Stevens, 1966; Eulner, 1970; Bynum, 1994; Weisz, 1994, 2006; Juch, 1997; Louis, 2010). During the first International Congress of Neurology in Berne, Switzerland in 1931,² a special symposium was organized on the “Relation of Neurology to General Medicine and Psychiatry in Universities and Hospitals of the Various Countries.”³ Despite the increasing tendency of disciplinary specialization in various countries, clinical neurology had not yet been completely separated from psychiatry and internal medicine (Anonymous, 1932; Koehler, 2007; Louis, 2010). The German neurologist and neurosurgeon Otfried Foerster (1873–1941) of the University of Breslau (today: Wrocław, Poland), for example, stated that

Neurology represents an entirely independent specialty in Medicine. Unfortunately, this fact has not been sufficiently recognized in various countries. The First International Neurological Congress hopes that the Universities and Hospital Authorities of the various States will take active steps to further the progress of Neurology. (Anonymous, 1932, p. 376)

The following resolution to “take active steps to further the progress of neurology” was unanimously accepted among the participants of the Berne International Neurological Congress. The aftermath of the conference also shows that, even decades later, the field

¹Such instruments included, for example, reflex hammers, ophthalmoscopes, applicators for electrotherapy, etc.

²This would be the first in a series of 20 international congresses: 1931: Bern 1st; 1935: London 2nd; 1939: Copenhagen 3rd; 1949: Paris 4th; 1953: Lisbon 5th; 1957: Brussels (Neurosciences) 6th; 1961: Rome 7th; 1965: Vienna 8th; 1969: New York 9th; 1973: Barcelona 10th; 1977: Amsterdam 11th; 1981: Kyoto 12th; 1985: Hamburg 13th; 1989: New Delhi 14th; 1993: Vancouver 15th; 1997: Buenos Aires 16th; 2001: London 17th; 2005: Sydney 18th; 2009: Bangkok 19th; and 2011: Marrakesh 20th.

³The chairman of the International Congress of Neurology, Baltimore neurologist Bernard Sachs (1858–1944), explained that the “informal talk” was organized because “our Continental friends” felt that “things were not as they should be in regard to the relations between Neurology, General Medicine and Psychiatry” (Anonymous, 1932, p. 360).

of neurology still continued to struggle for its disciplinary independence and international recognition as a separate specialty (Koehler, 2007).⁴

Various social, academic, and economic forces played a role in the general establishment of specialization in medicine, including new technologies, new forms of knowledge production, changing clinical practices, institutional conditions, and collective self-interests of the physicians and researchers involved (Weisz, 1994, p. 150; Weisz, 2006). In Germany, Austria, Switzerland, and the Netherlands, more than four decades passed before neurology became sufficiently independent from its mother disciplines of internal medicine and psychiatry, a situation that influenced many other countries thereafter. Between 1870 and 1914, as the American historian of science Thomas Neville Bonner (1923–2003) noted in his seminal book, *American Doctors and German Universities* (1963), the German-speaking countries had become very popular places for American, Russian, and Japanese medical students and physicians, who wished to study abroad.

In the present article, one particular aspect of the historical development of neurology towards greater disciplinary independence is examined, notably the publication of large multivolume handbooks that were devoted entirely to neurology. These handbooks were indicative of the increasing growth of knowledge in the respective scientific field and provided their readers with an important reference for knowledge and problem-solving activities in neurology. Due to the unique situation that had been pertinent to the German-speaking countries, in this article we were particularly interested in analyzing prominent German-language volumes that were then compared to other contemporary textbooks published in mostly English-speaking countries. Three large multiauthored neurological handbooks between 1910 and 2002 have been analyzed and compared, that is, Lewandowsky's *Handbuch der Neurologie* (*LH*, 1910–1914), Bumke and Foerster's *Handbuch der Neurologie* (*BFH*, 1935–1937), and Vinken and Bruyn's *Handbook of Clinical Neurology* (*VBH*, 1968–2002). Furthermore, because it may be considered a transitional publication (bridging the gap from the former situation in medicine), the multivolume handbook on internal medicine edited by Viennese internist Carl Wilhelm Hermann Nothnagel (1841–1905), *Specielle Pathologie und Therapie* (*NSPT*, Special Pathology and Therapy), is also discussed to provide further comparative perspectives. This handbook includes separate volumes on neurology and strongly reflects the personal research interests of its editor-in-chief (Nothnagel, 1895–1915). The significance of these neurological handbooks is then discussed against the background of both earlier and contemporary textbooks from countries such as England, Germany, the United States, France, Austria, and the Netherlands.

In addition to these large multiple-volume medical handbooks and compact textbooks, several other types of publications appeared during the period of interest, notably themed monographs (focusing on apoplexy, epilepsy, migraine, electrotherapy, etc.) and books containing lecture transcripts, such as those of Jean-Martin Charcot (1825–1893; Goetz, Bonduelle, & Gelfand, 1995). These books, however, would demand a detailed study on their own and, therefore, could not be included in the in-depth analysis of this article. Nevertheless, various references and comparisons will still be made in the sections below.

We first sampled the titles of *NSPT* and then analyzed all volumes of *LH* and *BFH*. *LH* and *BFH* were then compared to *VBH* as a similar, later reference publication, which has been analyzed on the basis of the revised series of the original editors in the year

⁴This was further evidenced through the foundation of local and national neurological societies, the establishment of independent university chairs of neurology, and the publication of journals devoted entirely to neurology.

2002 and published in a preceding paper.⁵ In order to develop an understanding of the international dissemination of *LH* and *BFH*, the general spread of the distribution was researched by using the electronic World Catalogue resource of the OCLC (n.d.)⁶ library consortium (*WorldCat*, n.d.).⁷ Bibliometric information on the dissemination of *VBH* has already been obtained and published in a previous paper (Koehler & Jennekens, 2008). Here, it could be compared with that of *LH* and *BFH*, while methodologically proceeding similar to the earlier work published by historians of medicine and science (Bonah, 1995; Otis, 2007). For the purpose of comparison, a list of neurological textbooks was compiled which contains all publications that were mentioned in a standard volume on the history of neurology, including German, English, American, and French books, to which one Dutch textbook was added.⁸

Prelude: Neurology Textbooks and Handbooks of Clinical Medicine

Several compact textbooks of neurology had appeared in the decades before the publication of the first large handbook of Max Lewandowsky, which will be analyzed below (Table 1). The textbooks of the British physician John Cooke (1756–1838), the German neurologist Moritz Romberg (1795–1873), the American neurologist William Hammond (1828–1900), the German neuropsychiatrist Carl Wernicke (1848–1905), the British neurologists James Ross (1837–1892) and Sir William Richard Gowers (1845–1915), as well as the American physician Francis Xavier Dercum (1856–1931) and German neurologist Hermann Oppenheim (1858–1919) were multivolume editions. The textbooks edited by Dercum, the Rostock internist Hans Curschmann (1875–1950), and the Paris neurologist Pierre Marie (1853–1940), however, were multiauthored and one-volume editions. Most others had been single-authored and one-volume books. Several of the widespread German textbooks were also translated into English (such as the volumes authored by Moritz Romberg, Hermann Oppenheim, and the Breslau physician Ludwig Hirt [1844–1907]), while Hammond's early textbook, conversely, appeared in French. Many of these textbooks, including those by Hammond, Oppenheim, and Sir James Purves-Stewart (1869–1949), went through multiple editions, but for the present purpose a selection was made.

As described elsewhere (Stahnisch & Koehler, 2012), it could not easily be proven that these textbooks had influenced the process of specialization in neurology directly. These publications may, nevertheless, be considered important representations of a steep growth in knowledge about the brain, the nerves, and the spinal cord at the time, but also as catalysts for fertile exchanges of innovative concepts and practices. These publications introduced such information to experts and novices alike.

⁵For our analysis of Vinken & Bruyn's *Handbook of Clinical Neurology*, we refer to Koehler and Jennekens (2008); with regard to a more concise review of the large neurological handbooks and their influence on the separation from psychiatry, we refer to Stahnisch and Koehler (2012).

⁶"Online Computer Library Center" at Columbus, Ohio.

⁷The analysis of the distribution of the *LH* and *BFH* through the use of *WorldCat* is pursued in historiographical approximation due to the lack of general bibliometric information. However, it must be mentioned that many contemporary medical libraries in Europe had been severed by the destructions of World War II or are not yet fully electronically catalogued. Analyses of the collections in major academic libraries through *WorldCat* appear nevertheless as a reliable heuristic approach, since the succeeding publishing houses and their archives are often not in a position to provide the contemporary information concerning the sales and distribution of the *LH* and *BFHs*.

⁸The selection of the three multiauthored textbooks has not been random but based on preceding explorations and qualitative assessments of nineteenth- and twentieth-century publications in neurology pursued in the seminal work of McHenry (1969). See also Table 1, which is reproduced from Stahnisch and Koehler (2012) with permission from the publisher.

Table 1
Textbooks of neurology in the nineteenth and twentieth centuries; authors selected from McHenry (1969)

Author	Year	Edition	Vol.	Pages	Single/ Multiauthored		Ref.	Illustrated	Language	Published in:
Cooke	1820–1823	1	3	919	s		Footnotes	–	English	London
Romberg	1840–1846	1	2	856	s		In text	–	German	Berlin
Romberg	1853	2nd	2	818	s		Footnotes	–	English	London
Reynolds	1855	1	1	251	s		Footnotes	–	English	London
Hammond	1871	1	1	754	s		Footnotes	45	English	NY
Hammond	1879	2nd (Fr)	1	1278	s		Footnotes	116	French	Paris
Hammond	1889	8th	1	945	s		+	112	English	NY
Wernicke	1881–1883	1st	3	943	s		+	+	German	Kassel/Berlin
Grasset	1881	2nd	1	1096	s		Footnotes	35+6col	French	Montpellier/ Paris
Schwalbe	1881	1	1	1026	s		Endnotes	319	German	Erlangen
Ross	1881	1st	2	1530	s		–	+280	English	London
	1883	2nd	2	2103	s		+	330+	English	London
Wood	1887	1	1	501	s		In text	–	English	Philadelphia
Gowers	1886–1888	1st	2	1438	s		Footnotes	341	English	London
Gowers	1902	3rd	2	692+	2		+	192	English	Philadelphia
Monakow	1897	1st	1	924	s			211	German	Vienna
Monakow	1905	2nd	1	1320	s			357	German	Vienna
Oppenheim	1898	2nd	1	985	s		– (names)	287	German	Berlin
Oppenheim	1900	2nd	1	900	s		–	+	English	Philadelphia
		1st (Am)								
Oppenheim	1904	2nd (Am)	1	953	s		–	343	English	Philadelphia
Oppenheim	1905	4th	2	1447	s		–(names)	393	German	Berlin

(Continued)

Table 1
(Continued)

Author	Year	Edition	Vol.	Pages	Single/ Multiauthored	Ref.	Illustrated	Language	Published in:
Oppenheim	1908	5th	2	1641	s	Footnotes	432	German	Berlin
Dana	1892	1st	1	524	s	—	210	English	NY
Dercum	1895	1st	1	1056	24	Footnotes	341 + 7col	English	Philadelphia
Mills	1898	1st	1	1056	s	—	459	English	Philadelphia
Church & Peterson	1899	1st	1	843	2	Footnotes	305	English	Philadelphia
Hirt (tr. Hoch)	1899	1st	1	715	1	Endnotes	181	English	NY
Dejerine	1901	1st	1	1158*	s	—	+	French	Paris
Starr	1907	2nd	1	816	s	Footnotes	282+26col	English	NY
Curschmann	1909	1st	1	977	18	—	289	German	Berlin
Marie	1911	1st	1	1402	11	Footnotes	302	French	Paris
Bing	1913	1st	1	606	1	—	111	German	Berlin
Jelliffe & White	1917	2nd	1	938	2	Footnotes	424	English	Philadelphia
Bouman & Brouwer	1923–1930	1st	4	2891	14	Endnotes	1030	Dutch	Haarlem
Wilson	1940	1st	2	1838	2	+	330+24col	English	London
Wilson	1955	2nd	3	2060	2	Foot/end	280	English	London
Purves Stewart	1908	2nd	1	451	s	Footnotes	208	English	London
Purves Stewart	1945	9th	1	880	s	Footnotes	358	English	London

*First 358 on other organs/only symptomatology.

In Table 2, important multiauthored handbooks of *clinical medicine*, that preceded the publication of *LH*, *BFH*, and *VBH* since the 1900s, are represented. In direct comparison, in Nothnagel's *SPT* there are 17 volumes that deal with neurological subjects (see Table 3), and therefore, it can be considered as a transitional publication, from the preceding handbooks of clinical medicine to the new genre of specialized and highly focused neurological handbooks. Several of these 17 volumes have themselves become well-known contributions to neurology, including the volume on *Gehirnpathologie* ("Brain Pathology") by the Zurich neuroanatomist Constantin von Monakow (1853–1930). In the second edition of his *Gehirnpathologie*, von Monakow used the term "diaschisis" for the first time and defined it as a process that was caused by an abolition of excitability due to the local disruption of brain substance from one pathologically distinct group of neurons to another, adjacent group of neurons in the afflicted part of the brain (von Monakow, 1905; Finger, Koehler, & Jagella, 2004). While the Vienna psychologist and neurologist Sigmund Freud's (1856–1939) work on psychopathology is well known, such as his work in psychoanalytical theory and practice, his publications on several neuropathological subjects during his early time at the University of Vienna are often ignored. They include explorations of such central neurological subjects as "peripheral nerve transmission" and "cerebral palsy" (Freud, 1897; Guttman & Scholz-Strasser, 1998). The Swiss surgeon Emil Theodor Kocher's (1841–1917) comprehensive book on intracranial pressure became a classic since the beginning of the twentieth century, summarizing nearly all contemporary clinical and experimental data on the subject, including cerebrospinal fluid (CSF) measurement, intrathecal surgery, and drug administration (Kocher, 1901). However, the last volume of Nothnagel's handbook on internal medicine had not yet appeared before another Berlin physician started a new handbook project, and one that was devoted entirely to neurology and that is taken here as the starting point of our comparative analysis.

Table 2
Multivolume handbooks of clinical medicine

Author/editor	Title	Volumes	Years of publication	Language
John Russell Reynolds (1828–1896)	<i>System</i>	5	1866–1879	English
Thomas Clifford Allbutt (1836–1925)*	<i>System</i>	8	1896–1899	English
Humphry Davy Rolleston (1862–1944)	<i>System</i>	9 (11 books)	1905–1911	English
Hugo von Ziemssen (1829–1902)**	<i>Handbuch</i>			German
Ziemssen & Albert H. Buck, b. 1826**	<i>Cyclopaedia</i>	20	1874–1881	English
Emile Sergent (1867–1943), André Ribadeau-Dumas (1870–1958), and Léon Babonneix (b. 1876)	<i>Traité</i>	33	1920–1925	French
Carl Wilhelm Hermann Nothnagel (1841–1905)	<i>NSPT</i>	41	1895–1915	German

*Rolleston edited the second edition of "Allbutt." **Buck coedited the English translation of Ziemssen's original *Handbuch*.

Table 3

The 17 neurological volumes in Nothnagel's *Specielle Pathologie und Therapie* (1895–1915)

Author	Title	Volume	Edition	Year of Publication
Monakow	<i>Gehirnpathologie</i>	9, Part 1	1st	1897
Monakow	<i>Gehirnpathologie</i>	9, Part 1	2nd	1905
Oppenheim	<i>Die Geschwülste und die syphilitischen Erkrankungen des Gehirns; Die Encephalitis und der Hirnabscess</i>	9, Part 2, 1st Division	1st	1897
Freud	<i>Die infantile Cerebrallähmung</i>	9, Part 2, 2nd Division	1st	1897
Krafft-Ebing	<i>Die progressive allgemeine Paralyse</i>	9, Part 3	1st	1901
Schultze	<i>Die Krankheiten der Hirnhäute und die Hydrocephalie</i>			
Kocher	<i>Hirnerschütterung, Hirndruck und chirurgische Eingriffe bei Hirnkrankheiten</i>			
Leyden	<i>Die Erkrankungen des Rückenmarkes und der Medulla oblongata</i>	10	1st	1895–1897
Leyden & Goldscheider	<i>Die Erkrankungen des Rückenmarkes und der Medulla oblongata</i>	10	2nd	1905
Bernhardt	<i>Die Erkrankungen der peripherischen Nerven</i>	11, Part 1–Part 2, 1st Division	1st	1895–1897
Bernhardt	<i>Die Erkrankungen der peripherischen Nerven. Theil 1</i>	11, Part 1	2nd	1902
Bernhardt	<i>Die Erkrankungen der peripherischen Nerven. Theil 2 (augmented by subjects on senses)</i>	11, Part 2	2nd	1898–1906
Lorenz	<i>Die Muskelerkrankungen</i>	11, Part 3	1st	1904
Remak & Flatau	<i>Neuritis und Polyneuritis</i>			

Binswanger	<i>Die Epilepsie</i>	12, part 1, 1st division	1st	1899
Binswanger	<i>Die Epilepsie</i>	12, Part 1, 1st division	1st	1904
Wollenberg	<i>Die Hypochondrie</i>			
Bruns	<i>Die traumatischen Neurosen: Unfallsneurosen</i>			
Binswanger	<i>Die Hysterie</i>	12, Part 1, 2nd Division	1st	1904
Binswanger	<i>Die Epilepsie</i>	12, Part 1, 1st Division	2nd	1913
Krafft-Ebing	<i>Nervosität und neurasthenische Zustände</i>	12, Part 2	1st	1903
Hitzig	<i>Der Schwindel (Vertigo)</i>			
Wollenberg	<i>Chorea, Paralysis agitans, Paramyoclonus multiplex (Myoklonie)</i>			
Möbius	<i>Die Migräne</i>			
Rosenbach	<i>Die Seekrankheit</i>			
Hitzig, Ewald, & Wollenberg	<i>Der Schwindel (Vertigo)</i>	12, Part 2	2nd	1911

Lewandowsky's *Handbuch der Neurologie* (LH; 1910–1914; Table 4)

Max Lewandowsky's (1876–1918) motivation to begin the handbook project included his observation that, at the end of the nineteenth century many Jewish physicians — often immigrating from Eastern European countries — had studied and practiced medicine in Berlin (along with other major university cities in Germany).⁹ As Jews still faced frequent exclusion from higher university positions, due to blatant anti-Semitism among traditional professors and university administrators, they were partially forced to work in outpatient clinical settings and private clinics.¹⁰ As a form of social compensation for their ambition, publishing houses (including Springer and Karger) often invited such physicians to edit journals, handbooks, and yearbooks.¹¹ In the preface to the first volume (1910, Figure 1)

Table 4
Lewandowsky *Handbuch der Neurologie* (1910–1914)

Subjects	Volume	Year	No. of chapters	Pages	No. of authors*
GN Histology, Anatomy, Experimental Physiology	1	1910	See Vol. 2	See 2	See 2
GN, GP, Symptomatology, Diagnostics, GT	2	1910	46	1606	25 (6)
SP Neuromuscular Diseases, Spinal cord, Tabes, Meninges	3	1911	24	1161	16 (7)
SP Congenital, Trauma, Circulation, Abscess, Syphilis Tumors, Hydrocephalus, Cerebellum, Chorea, Paralysis Agitans	4	1912	23	1165	16 (6)
SP Endocrine Disorders and Morbus Paget	5	1913	13	493	9 (5)
SP Neuroses: Organ Neuroses, Herpes Zoster, Migraine, Tics, Dysarthria, Psychopathy, Sexual Pathology, Neurasthenia, Hysteria, Epilepsy	6	1914	18	1170	15 (5)
Total:	6		124	5595	81 (29)

*Number of foreign authors in brackets. GN = general neurology; GP = general pathology; SP = special neurology; GT = general therapy.

⁹For a biographical sketch of Lewandowsky, see Stahnisch and Koehler (2012) and Holdorff and Winau (2001, pp.160–162).

¹⁰Jewish physicians with advanced academic training, during prolonged periods of aspiring for continuing academic positions, also sought to advance their scientific recognition. Although many had been legally entitled to apply for positions at German-speaking universities and research institutions after the inauguration of reform laws, for example in Bavaria, Prussia, Wurttemberg, and also in Austria-Hungary, there still existed strong cultural and personal stances that marginalized Jews in the academy (see Schmiedebach, 1995; Volkov, 2001).

¹¹Personal communication with B. Holdorff, April 2006 and January 2008; see also Holdorff and Winau (2001, pp. 127–137).

Figure 1. Title page of Lewandowsky's first volume (1910; color figure available online).

of his handbook, Lewandowsky accordingly described his personal motivation for starting the handbook project:

Until today, the field of neurology has not been mapped out by means of a student handbook. By such a treatment in handbook form, I [Max Lewandowsky] mean a publication approach that circumscribes and integrates the whole field, with a uniform thoroughness and professionalism and which, in distinction with a shorter textbook, is based on an extensive presentation of the available literature in a documentary style. (Lewandowsky, 1910, pp. iii–iv)¹²

Looking at Lewandowsky's handbook, as it became consecutively published for the prolonged period of five years, it is noteworthy to see that most of the 81 authors had been German compatriot neurologists, psychiatrists, and internists. Only 29 chapters (36%) were written by foreign authors (this group comprised of 21 individuals), from seven different European countries: Austria (Robert Bárány [1876–1936], Heinrich di Gaspero [1875–1961], Friedrich Hartmann [1871–1937], Otto Marburg [1874–1948], Eduard Phleps [1874–1952], Fritz Redlich [1910–2003], Arthur Schueller [1874–1957], Heinz Schrottenbach [1885–1932], Josef Wiesel [1876–1928]); England (very prominently represented by Samuel Alexander Kinnier Wilson [1878–1937], whose chapter on progressive lenticular degeneration was published in German); France (André Léri [1875–1930] and Pierre Marie); Hungary (Ernoe Jendrassik [1858–1921] and Károly Schaffer [1864–1939]); the Netherlands (Johannes Wertheim Salomonson [1864–1922], Frans H. Quix [1874–1946], and Karl Heilbronner [1869–1914]); Poland (Edward Flatau [1869–1932] and Georg Flatau [1865–1942]); and Sweden (Salomon Henschen [1847–1930] and Otto Wickman [1872–1914]).

Among the German and foreign authors, several outstanding scholars can be identified, such as the 1914 winner of the Nobel Prize for Physiology or Medicine, Robert Bárány (his eponym is still associated with “Bárány's Caloric Test” and “Bárány's Syndrome”; he wrote a chapter on his key area of interest: disorders of the cochlear and vestibular apparatus), Samuel Alexander Kinnier Wilson (who is known for “Wilson's Disease”), and Ernoe Jendrassik (who became famous for his 1880s studies on tendon reflexes and their augmentation manoeuver, and who contributed a chapter on hereditary diseases, spinal cord tumors, and abscesses). Edward Flatau (known for his law of the position of the long spinal cord fiber tracts) wrote a central monograph on migraine and an additional chapter on the spinal cord; Friedrich Heinrich Lewy (1885–1950; renowned for his seminal paper on the inclusion bodies in Parkinson's disease; see Figure 2); Korbinian Brodmann (1868–1918; celebrated for his mapping of the cerebral cytoarchitectonic regions); Samuel Henschen (who analyzed the neuroanatomical projection of the retina to the calcarine cortex) contributed a chapter on central vision disorders; Pierre Marie (the famous aphasiologist being associated with the eponym of “Charcot-Marie-Tooth Disease”) wrote a chapter on “Paget's Bone Disease” and its associated brain affections in cooperation with the above-named André Léri. This is only to mention a few of the very prominent physicians and scientists who contributed their specialized chapters on neurology to Lewandowsky's handbook.

¹²*Das Gebiet der Neurologie hat bisher eine handbuchmaessige Bearbeitung nicht erfahren. Als handbuchmaessig ist eine Bearbeitung zu bezeichnen, die das ganze Gebiet mit moeglichst gleicher Gruendlichkeit und Sachlichkeit umfasst, und die, im Unterschiede von einem kuerzeren Lehrbuch, auf einer ausfuehrlichen Darstellung des vorliegenden literarischen Materials gewissermassen dokumentarisch aufgebaut ist.*

Figure 2. F. H. Lewy (1912): Intracellular eosinophilic inclusion bodies, from Foerster's and Lewy's chapter on paralysis agitans in Volume 4 of Lewandowsky (1912; color figure available online).

In comparison to other neurological textbooks that were available at the time, *LH* not only provided important scientific references — as did most other textbooks — but was also larger and more comprehensive; Lewandowsky himself stated, it “circumscribes and integrates the whole field, with a uniform thoroughness and professionalism” (1910, pp. iii–iv). *LH* is also noteworthy for the fact that the emergence of a new kind of “sub-specialization” within neurology became visible in comparison to contemporary handbooks. Specialists in certain areas of neurology dealt with their subjects of interest, for example, neuromuscular diseases, central visual pathways, and cochlear/vestibular systems. Lewandowsky indicated that he intended to publish a supplementary edition within two years; however, a new edition had to await the end of WWI, before a number of supplementary volumes would be published by brain-psychiatrist Oswald Bumke (1877–1950) in association with neurologist and neurosurgeon Otfried Foerster of the University of Breslau.

From the individual chapter titles in the later group of supplementary volumes, it becomes obvious that they were chiefly based on authors’ neurological observations of wounded veterans of WWI (see Table 5). Almost half of the 10 chapters of these first supplements deal with related subjects, likewise testifying to the enormous social impact WWI had had on this generation of clinical and basic neurologists. Moreover, they represented the artificial “field laboratory character,” as the war had offered contemporary neurologists tens of thousands of brain- and nerve-wounded patients and psychologically war injured. Bumke, for instance, began to publish intensively on the contentious issue of “war neuroses”; Fritz Lange (1900–1944) wrote on their neurological and somatic treatment forms; and Georg Lenz (1881–1953) analyzed the injuries to the visual pathways from a clinico-neuroanatomical perspective. A large chapter devoted to the disease classifications of “hysteria” and “neurasthenia” further demonstrated that these afflictions were still considered as having important neurological bases.

The second supplementary volume almost entirely represented observations from war injuries of the peripheral nerves and spinal cord, and were single authored by Foerster himself (altogether 1,152 pages!). Foerster had served as an advisory physician to the health office of the Munich-based Sixth German Army on the western front in France and had gathered abundant information on injuries of the peripheral nervous system and spinal cord (due to the specifics of trench warfare, such as machinegun fire, shrapnel explosions, single-shot injuries, and bayonet lesions). In a previous chapter from a different book (Foerster, 1922), he had published his own observations of some 3,963 cases (Koehler & Lanska, 2004). In the chapter on surgical therapy of peripheral nerve injuries for the postwar *LH*

Table 5
Bumke’s and Foerster’s supplement volumes to Lewandowsky’s *Handbuch der Neurologie*

Subject	Suppl	Year	No of chapters	Pages	Authors*
(Psychopathy, war neuroses, hysteria, epilepsy, visual pathway injury in war trauma, etc.)	1	1924	10	784	11 (1)
Foerster on peripheral nerves (war injuries)	2	1929	1	1152	1
Total 2 books			11	1936	12

*Number of foreign authors in brackets.

supplement, Foerster mentions 4,117 peripheral nerve injuries, not counting the purely sensory nerve injuries that he had personally seen and treated. Nearly 25% of these lesions had to be surgically operated upon (939), testifying to the breath-taking and strenuous amount of clinical work Foerster and the neurological collaborators within his field staff performed between 1914 and 1918, as well as in the Breslau hospital service after the war. The treatment protocols included nerve sutures, nerve transplantations (auto-grafts from other body regions; i.e., transpositions), and arm and leg plexus surgeries (Foerster, 1929). All those approaches integrated well with Foerster's own clinical and research programs, which he pursued in his Neurobiological Laboratory beginning in 1925. With the foundation of the Breslau Neurological Institute in 1934, this work was continued with substantial support from the Deutsche Forschungsgemeinschaft, the Kaiser Wilhelm Gesellschaft, and international financial contributions from the Rockefeller Foundation (Stahnisch, 2011). When taken together, Bumke's and Foerster's cooperation in the editing and writing processes of the two supplementary volume series to Lewandowsky's handbook eventually resulted in a new edition, six years after the publication of the second supplement.

Bumke's and Foerster's *Handbuch der Neurologie* (BFH; 1935–1937; Figure 3)

The new series no longer mentioned the name of Lewandowsky, but, when closely scrutinized, resembled the original series of *LH* (1910–1914) and the Foerster-Bumke supplementary volumes (1922–1929), written to a large extent in the interwar period during the Weimar Republic in Germany. Not only are the layouts, series title, and medical publisher

Figure 3. Title page of Bumke's and Foerster's first volume (1935) (color figure available online).

(Springer Verlag in Berlin, Germany) very similar but also major sections of text refer back to the preceding editor of *LH* and the individual volume editors of the series. Moreover, the first volume does not contain a preface or introduction that would have discussed the changes which had taken place in the editorial team.¹³ Bumke who had studied medicine in Freiburg, Leipzig, Munich, Halle, and Kiel and worked at several psychiatric and neurological institutes at the universities of Freiburg, Rostock, Breslau, and Leipzig, published an influential *Lehrbuch der Geisteskrankheiten* ("Textbook of Psychiatry") in 1919 and, in 1923, was one of the physicians who visited Vladimir I. Lenin (1870–1924) after he had suffered from a stroke.¹⁴ In 1924, he was given the sole dictatorship of the psychiatric clinic at the University of Munich, which he had to share with Emil Kraepelin (1856–1926) before.¹⁵ Bumke became the subject of disciplinary action after WWII, due to the involvement of Munich neuroscience institutions in the Nazi euthanasia program. He was permitted to reclaim his chair in 1946 after "personal clearance" from the US Military Court, but soon after Bumke retired from his academic duties.

Foerster had studied medicine at Freiburg, Kiel, and Breslau. Following his medical graduation, he published a central *Atlas des Gehirns* ("Atlas of the Brain") collaborating with his former teacher Carl Wernicke in 1903. Although he had started his career as a neurologist (from the 1900s to the 1920s), Foerster later became an influential neurosurgeon. In 1934, with the help of the American Rockefeller Foundation and various local German sources, the Neurological Institute of Breslau was opened, which later simply came to be known as the "Otfrid Foerster Institute."¹⁶ In 1935, Foerster was invited to give the 10th Hughlings Jackson Honorary Lecture, during the 2nd World Congress of Neurology in London, which highlighted the international acceptance of his clinical research, particularly on nerve lesions, brain tumors, and epilepsy surgery. His collaborator Bumke once described Foerster in the following terms: "There was an enormous energy in this usually miserable, and even quite ill looking man [. . .]. I don't know a second person who had been so engaged or I would rather say obsessed by his science as he" (Bumke qtd. in Zuelch, 1973; see also von Weizsaecker, 1941; Schimmelpfennig, 1993).¹⁷

Table 6 provides a further overview of the handbook: Obviously, it was much larger than Lewandowsky's handbook from 1910 to 1914, before WWI, illustrating the increase

¹³However, it should not be overlooked that the adjustment of the editorial team occurred exactly two years after the Nazi "*Machtergreifung*," when the situation had been further severed (in 1935) with the anti-Semitic "Nuremberg Race Laws," which also marked the year of the official change in the editorship from *LH* to *BFH*. In this context, Foerster and Bumke's silence on Lewandowsky's role as a founder appears as an opportunistic kowtow to the new Nazi political leadership, which wilfully comprised and eclipsed Jewish accomplishments and leadership (cf. Volkov, 2001).

¹⁴The group of physicians included Foerster as the leader of the team, Adolf von Struempell (1812–1899) from Leipzig, Max Nonne (1861–1959) from Hamburg, Salomon Henschen from Uppsala, Sweden, two surgeons, and an internist (see Crome, 1972).

¹⁵From 1928 to 1930, Bumke edited the 11-volume *Handbuch der Geisteskrankheiten* ("Handbook of Mental Diseases"), which was also published by Springer Press in Berlin.

¹⁶Foerster's Breslau clinical department received many world-leading neuroscientists of the time, who stayed for often extended research and training periods, including, for example, the Chicago neurosurgeon Percival Bailey (1892–1973), the Montreal neurosurgeon and four-time Nobel-nominee Wilder Penfield (1891–1976), the Chicago neuropathologist Paul Bucy (1902–1994), Cleveland neurosurgeon John Arthur McLean (1894–1938), and Cornell (and later Yale) neurophysiologist Margaret Kennard (1899–1976).

¹⁷*Es steckte eine ungeheure Energie in diesem meistens elend, ja eigentlich krank aussehenden Mann [und ich] weiss [. . .] keinen zweiten, der von seiner Wissenschaft so ausgefuellt, ich moechte sagen: besessen gewesen waere wie er.*

Table 6
Bumke's and Foerster's *Handbuch der Neurologie*

	Vol.	Year	Chapters (Engl)	Pages	Authors	American
GN Anatomy	1	1935	12	1152	11 (6)	2
GN Experimental Physiology	2	1937	12 (1)	561	11 (6)	3
GN S/E Muscles, nerves, etc.	3	1937	3	1128	4	
GN S/E Cranial nerves, pupils	4	1936	8	701	6 (1)	
GN S/E Spinal cord, brainstem, cerebellum	5	1936	6	639	6 (3)	
GN S/E Vegetative NS, figure, constitution	6	1936	9	1153	8 (2)	
GN S/E Humoural pathology of ND	7.1	1935	4	505	2 (2)	
GN S/E CSF, brain puncture, X-ray imaging	7.2	1936	4	553	4 (1)	
GN General therapy	8	1936	10	749	11 (6)	1
SN Muscles and peripheral nerves	9	1935	6	258	4 (2)	1
SN Vertebral column and skull	10	1936	7	465	7 (4)	
SN SC/B Trauma, dementia, circulation	11	1936	3	548	3 (2)	
SN SC/B Infections and intoxications 1	12	1935	8	776	8 (5)	
SN SC/B Infections and intoxications 2	13	1936	12	1116	13 (4)	
SN SC/B Space occupying lesions	14	1936	6 (2)	417	4 (3)	2
SN SC/B Endocrine disorders	15	1937	12	469	2	
SN SC/B Congenital- heredofamilial diseases	16	1936	34	1172	21 (6)	
SN SC/B Epilepsy, narcolepsy, etc.	17	1935	7 (1)	575	8 (2)	
Total:	18 books		163 (4)	12.937	133 (55)	9

Notes. B = brain; GN = general neurology; E = examination; ND = nervous diseases; S = symptomatology; SC = spinal cord; SN = special neurology.

*Number of foreign authors in brackets.

of knowledge in the general field of neurology. The editors invited 133 authors, including 55 from abroad, and completed 12,937 pages in 17 volumes (published as 18 books). Half of the books consisted of general neurological subjects (Volumes 1–8, including two parts of Volume 7), such as anatomy, cranial nerves, and brain puncture, while the other half dealt with specific neurological subjects, for example, trauma, infections, and space-occupying lesions.

There are several interesting aspects of this large series worth mentioning: The first volume on anatomy contains a chapter by the well-known 1906 Nobel Prize Laureate, Santiago Ramón y Cajal (1855–1939); the subject obviously being the development of “Die Neuronenlehre” (“Neuron Theory”). The volume on neurophysiology (Vol. 2) comprises of several chapters by other well-known neuroscientists, such as Jena psychiatrist Hans Berger (1873–1941), who published the discovery of the human electroencephalogram (EEG) in 1929 and wrote a chapter on “Physiologische Begleiterscheinungen psychischer Vorgaenge” (“Physiological Accompaniments of Psychic Events”; Figure 4). Johannes G. Dusser de Barenne (1885–1940), a Dutch physiologist who had emigrated to New Haven (Yale University), wrote chapters on experimental physiology of the cerebellum and cerebral hemispheres. Gysbertus G. J. Rademaker (1887–1957), professor of physiology and neurology at the University of Leiden, wrote a chapter on experimental physiology of the brainstem, which built on his important book *Das Stehen* (1931, “On Standing”).¹⁸ Margaret Kennard (1899–1976), a pioneer in the study of the sparing and recovery processes of brain functions — after having visited Bernard Brouwer (1881–1949) in Amsterdam — also joined Otfried Foerster in 1934 during a European study tour. She contributed a chapter on the cortical influence on the autonomic nervous system (Finger, 1999; Koehler, 2003). Harold G. Wolff (1898–1962) from the Vermont College of Medicine, who later worked in New York and became world renowned for his research on migraines, wrote a chapter on the “Die bedingte Reaktion” (“Conditioned Reflex”) (Blau, 2004).

While Foerster contributed several large chapters to *BFH*, his coeditor-in-chief Bumke wrote considerably less, namely only two chapters; however, Bumke’s involvement was still very important in the acquisition process of chapter editors, in the popularizing and

Figure 4. Image from Berger’s chapter on “Physiological Accompaniments of Psychic Events” in Volume 2 of Bumke and Foerster (1937), showing an EEG of a 30-year-old physician (color figure available online).

¹⁸Translated in 1980 as *The Physiology of Standing*, with a foreword written by the famous neurologist from New Zealand Derek Denny-Brown (1901–1981).

marketing process of the publications, and because Bumke had kept close relationships with leading German-speaking brain psychiatrists, who either got involved in the production of *BFH* or served as facilitators in the reception process of the books for the next decades to come.

Volume 4 contains several chapters by Walter Riese (1890–1976), a Jewish neurologist from Frankfurt am Main, who at that time worked as a refugee-physician in Lyon, France.¹⁹ Another remarkable chapter in Volume 6 was published by Ernst Kretschmer (1888–1964), who contributed “Koerperbau und Konstitution” (“Body Figure and Constitution”), including his well-known clinico-diagnostic classification in leptosome or asthenic, athletic, and pyknic body features.

Volume 7 Part 1 contains a section with the remarkable title “Humoralpathologie der Nervenkrankheiten” (“Humoural Pathology of Nervous Diseases”), which included an introduction in which the authors, the Swiss neurologist Felix Georgi (1893–1965) and Oedon Fischer (1900–1975?), prudently remarked that not a single chapter in *LH* had thus far discussed the relationship between nervous system diseases and humoural findings. However, they then emphasize that the term “humoural pathology” should not be identified with the ancient physiological doctrine that had reigned up to the middle of the nineteenth century, when it was still taught in university courses on *Materia medica*. In accordance with the authors’ views, modern humoural pathology concentrates on the body’s fluids, which are scientifically investigated through “immune-biological, chemical, and physico-chemical” examinations.

Volume 7 Part 2 (~ 553 pages) discusses the physiology, chemistry, and clinical anatomy of the CSF system, brain puncture, X-rays, and pneumoencephalography (Figures 5–7) while Volume 8 deals with general therapy in neurology, including a

Abb. 56. Suboccipitalpunktion im Sitzen.

Figure 5. Suboccipital puncture from Volume 7.2 of Bumke and Foerster (1936) (color figure available online).

¹⁹After active war broke out between Nazi-Germany and France, in 1940, Walter Riese continued to flee with his wife through Casablanca in Morocco and eventually reached the United States. In Richmond, Virginia, he became a respected neuroanatomy professor and created a program in the history and ethics of medicine (see Benzenhoefer & Kreft, 1997).

Abb. 119. Parasagittales Meningeom der Fronto-Parietalregion rechts. Fokale Epilepsie; Diskrepanz zwischen Tumorsitz und klinischer Symptomatologie.

Figure 6. Pneumoencephalogram of a right fronto-parietal meningioma that depresses the ventricle (color figure available online).

chapter by the Austrian brain-psychiatrist and 1927 Nobel Prize Laureate in Physiology or Medicine, Julius Wagner von Jauregg (1857–1940). Wagner von Jauregg particularly wrote on his central scientific interest— “Infektions und Fiebertherapie” (“Infection and Fever Therapy”) — that built on his foregoing introduction of “malaria therapy” for “general paralysis of the insane” at the Clinical Department for Psychiatry and Nervous Diseases in Vienna in 1917. Other remarkable chapters in this volume are on surgical therapy, electrotherapy (Figure 8), and X-ray therapy, which had come greatly *en vogue* by clinicians for three decades, following the discovery made by Wuerzburg physicist Conrad Roentgen (1845–1923) in 1895. This volume also highlights diseases for which radiation therapy is still applied today (e.g., brain tumors and gliomas) but also diseases that are no longer considered for such treatment (such as hydrocephali, epilepsies, syringomyelias, multiple sclerosis, and even chronic headaches). Knowledge about cerebrovascular diseases increased greatly during the 1930s, following the development of new diagnostic techniques, such as CSF pressure measurement and X-ray imaging. This became represented

Figure 7. Brain puncture from Volume 2 of Lewandowsky's handbook (color figure available online).

in a large chapter of almost 300 pages in Volume 11, written by Munich neurologist Friedrich Hiller (d. 1953). The extensive discourse on cerebrovascular disease contrasts with shorter chapters of only 40 pages on “Praesenile und senile Erkrankungen” (“Pre-senile and Senile Diseases”). Alzheimer's and Pick's Disease were mentioned as eponyms. The strong consideration of cerebrovascular pathologies may also be attributed to the fact that the new diagnostic and technological advances were rendered by neurologists into a strong argument that the process of mastering these new scientific instruments could only be sustained and developed if disciplinary specialization could be reached.

Volume 12 and parts of Volume 13 contain a wealth of material on central nervous system infections, including tuberculosis, syphilis, poliomyelitis, and epidemic encephalitis (*Encephalitis lethargica* or von Economo's disease), amounting to no less than 200 pages, but also on *Chorea infectiosa*, which was much more common at the time than it is today. Stockholm neurologist Nils Antoni (1900–1962) wrote a chapter on the pathology of spinal cord tumors. American John Arthur McLean (1894–1938), who was a leader at the forefront of neurosurgery in the early 1930s, published one of the few and large English language chapters on intracranial tumors (both chapters appearing in Volume 14). Robert Wartenberg (1886–1956) wrote about cerebral and spinal abscesses. Wartenberg was a Jewish physician, who had worked with Max Nonne in Hamburg and later Otfried Foerster in Breslau and who was forced to emigrate from Germany in 1935, two years after the Nazi “Law on the Re-Establishment of a Professional Civil Service” had ousted him from his position as *Privatdozent* (~ adjunct professor) at the Clinical Department of Neurology at the University of Freiburg (Noth, 2002). After his arrival in the United States, he settled in San Francisco.²⁰

²⁰There, Wartenberg assumed the Headship of the Department of Neurology at University of California – San Francisco and became one of the most prominent German-speaking émigrés who attained a leadership role in this field in the United States. He became highly influential as an expert

Abb. 292. Stationärer Apparat für Galvanisation und Faradisation.

Abb. 293. Stromwechsler.

Abb. 294. Turbinen-Dynamo.

Figure 8. Electrotherapy devices from Toby Cohn's chapter on electrotherapy in Lewandowsky's handbook (Volume 2) (color figure available online).

Volume 15 is likewise remarkable in that it provides an abundance of innovative knowledge on endocrine physiological disturbances, a very advanced research field at that time. Although the subject would have seemed misplaced in a contemporary handbook of neurology, its author explicitly argues in the introduction that the consideration of the endocrine organs in the textbook should be accepted, since neuroendocrine physiological processes would not only have a slow chemical regulation but also a fast nervous regulation.

Volume 16 contains chapters by the Russian neurologist Lazar Salomovitch Minor (1855–1942) on hereditary tremors — with which his name later became associated with — and by the Rostock internist Hans Curschmann, who wrote on his neurological field of expertise, the “Myopathies and Myasthenia.” Diseases of the thyroid glands, pituitary glands, and adrenals were also included.

Kinnier Wilson's chapter on epilepsy can be found in Volume 17. It is one of only four chapters in English, the others being Kennard's on “The Cortical Influence on the Autonomic Nervous System” in Volume 2 and the two chapters by McLean on “Intracranial Tumours” and “Pituitary Tumours” in Volume 14.

reviewer to dozens of academic search committees at central medical schools and served for more than 10 years on the residents' certifying board of the American Academy of Neurology (AAN).

Table 7Authors from abroad publishing in Bumke and Foerster's *Handbuch der Neurologie*

Country of residence	Number of authors	Names
America	8	Freedom, Rosenstein, Dusser de Barenne, Kennard, McLean, Wartenberg*, Wolff, Wexberg*
Austria	11	Brunner, Froehlich, Hirsch, Marburg, Pollak, Schlesinger, Sgalitzer, Stiefler, Strasser, Wagner Jauregg, Wilder
Czechoslovakia	2	Gamper, Sittig
Holland	4	Boeke, Brouwer, Rademaker, Stenvers
England	1	Kinnier Wilson
France	1	Riese*
Hungary	5	Fischer, Koernyey, Richter, Sarbó, Schaffer
Portugal	1	Wohlwill*
Russia	2	Kroll, Minor
Spain	2	Ramón y Cajal, Villaverde
Sweden	2	Antoni, Lennart Ehrenberg
Switzerland	3	Georgi*, Gruenthal*, Lotmar
Turkey	2	Frank*, Winterstein*
Uruguay	1	Schroeder

*Physicians who fled the Nazis.

Table 7 provides a comprehensive list of foreign authors, as well as the countries where they resided and worked. It should also be noted that several of the researchers and scholars, who contributed chapters from institutions outside the German-speaking countries, had genuinely German names. Many were of Jewish origin and had written their contributions to these textbooks either long before or soon after the Nazis' rise to power in Central-Europe.²¹ Others were to follow in the years leading up to the outbreak of WWII, before it was impossible to leave the countries of the "Middle Powers," Germany and Austria. Famous persons from this particular category of late-émigrés included the Breslau neurosurgeon Ludwig Guttmann (1899–1980), Munich neuroserologist Felix Plaut (1877–1940), and Berlin neurohistologist Max Bielschowsky (1869–1940), who left for Amsterdam and then to London (Stahnisch, 2003).

Although the number of foreign authors is generally limited in the two German handbooks, in comparison with *VBH*, it becomes obvious from the chapters' reference lists that the authors were all highly aware of the work conducted internationally. It is important to realize that this was a decisive period of transition in the neurosciences (and perhaps more generally in medicine), when neither the United States nor Canada were prepared to take on the leading role that the German-speaking countries still assumed. However, the foundation for the creation of a new clinical research tradition on the other side of the Atlantic had already been laid by many returning neurologists and neurosurgeons, including Harvey Cushing (1869–1939), Wilder Penfield (1891–1976), and Herbert Jasper (1909–1999).

The *BFH* differed from other neurological textbooks of the time in its extraordinary size and in the vast number of references, reflecting the comprehensiveness of this

²¹Indicated by an asterisk in Table 6.

publication endeavor. Moreover, another defining feature of *BFH* was the vast number of leading neurologists who had specialized in certain research or clinical areas and were engaged by Bumke and Foerster to discuss the specific topic of expertise: *BFH* thus became the authoritative source of most up-to-date knowledge in the emerging discipline of neurology, readily available for novices and experts in clinical and basic research fields alike.

The Language Shift: Vinken and Bruyn's *Handbook of Clinical Neurology* (*VBH*)

The language of communication in neurology gradually shifted from German and French to English during the interwar period and also marked an important transformation after WWII: The Dutch neurosurgeon Pierre Vinken (1927–2011) and his compatriot coeditor and personal friend, the neurologist George Bruyn (1928–2002), wished to publish a succeeding handbook of clinical neurology in the English language following Bumke's and Foerster's "Masterpiece." At first, there was some doubt about the title, as "no human hand could hold thirty volumes!," and in their preface of the first volume they wrote about the work of their predecessors:

At that time [when *BFH* was published], the limited amount of knowledge pertinent to neurology enabled a relatively small number of people to master the field and, as a group, to compose a uniform, closely knit treatise. Today, a similar attempt would be unrealistic, since it needs a large team of experts to cover even a certain part of the field in sufficient depth. (Vinken, Bruyn, & Garcin, 1969, pp. v–vi)

And with respect to the language, they remarked:

In medicine, as in so many other disciplines, English is in this century what Latin and later French and German were for our forebears. Every effort has been made to render the texts of contributors whose native language is not English into correct English. (Vinken, Bruyn, & Garcin, 1969, pp. v–vi)

For an extensive report on *VBH*, we refer to a previous publication, the data of which were used here only for comparative purposes with *LH* and *BFH* (Koehler & Jennekens, 2008). The *VBH* handbook originated from the publication of the *Excerpta Medica*, a medical abstract journal that can be considered a postwar continuation of the German-language abstract journal titled the *Zentralblatter*.²²

Comparing the Three Neurological Handbooks

In Table 8, we compare *LH*, *BFH*, and *VBH*. Several issues can be clearly identified from this table: The number of chapters and pages increased dramatically between 1910 and 2002, which can also be seen as a representation of the vast growth of neurological knowledge since the middle of the twentieth century. Over the years these publication projects became ever more differentiated in their subject areas and rendered thoroughly international endeavors by inclusion of increasing numbers of foreign authors. Whereas in *LH* a total of 29 out of 81 chapters (~ 36%) were written by 21 non-German authors, *BFH* contained 55 out of 133 chapters (~ 41%) by 45 authors from foreign countries.

²²See also Footnote 7 on the subject of the historiographical methodology applied.

Table 8
Comparing the three handbooks

	Lewandowsky	Bumke & Foerster	Vinken & Bruyn
Volumes	6 + 2 suppl.	18	78
Pages	5595 + 1936	12937	46025
Chapters	124 + 11	163 (4 English)	1909
Chapters by editor	21 (17%)	2 + 4 (+3 suppl.)*	Index + 68 (4%)
Authors	81 + 12	133	2799
Chapters by foreign authors	29 + 0	55**	40% Eu/48% Am
Language	German	German	English

*Foerster and Bumke wrote three chapters in the supplements to Lewandowsky's book.

**The number of "chapters by foreign authors" is larger than the number of foreign authors as mentioned in Table 7, because several foreign authors contributed more than one chapter.

Since the genuine number of Dutch authors in *VBH* was fairly limited, we compared the gross numbers of European (40%) and American (48%) authors, in order to determine their ratio as contributors and to arrive at a better understanding of the international outlook of the contemporary projects. However, considering the names of the central authors in these neurological handbooks, it is obvious that the editors were successfully striving to attract as many of the best-known researchers and scholars from the various fields within neurology as possible, including Nobel Prize Laureates (e.g., Ramón-y-Cajal, Bárány, Wagner-von Jauregg, Roger Sperry [1913–1999], Stanley B. Prusiner [b. 1942]) and other contributors of basic knowledge from laboratory experimentation that further helped to advance clinical neurology, including Heinrich Lev(we)y (1885–1950), Otto Marburg, Samuel Alexander Kinnier Wilson, Ernoe Jendrassik, Edward Flatau, Samuel Henschen, Korbinian Brodmann, André Léri, and Pierre Marie in *LH*; Hans Berger, Johannes Dusser de Barenne, Derek Denny-Brown, Margaret Kennard, Bernard Brouwer, Harold Wolff, Walter Riese, Ernst Kretschmer, Nils Antoni, Robert Wartenberg, Lazar Salomovitch Minor, Hans Curschmann, and Max Bielschowsky in *BFH*; and the American neurologist Raymond D. Adams (1911–2008), the British neurologist Macdonald Critchley (1900–1997), Russell N. DeJong (1907–1990; Ann Arbor, Michigan), Raymond Garcin (1897–1971; Paris), Tokyo neurologist Shigeo Okinaka (d. 1965), Bergen neurologist Sigvald Refsum (1907–1991), Klaus Joachim Zuelch (1910–1988; Cologne), Chicago neurologist Harold Klawans (1937–1998), the Russian neuropsychologist Alexander Luria (1902–1977), the Viennese neuropathologist Kurt Jellinger (b. 1931), the New York neurologist Melvin D. Yahr (1917–2004), the Swedish neurologist Erik K. H. Kugelberg (1913–1983), the Toronto neurologist J. Clifford Richardson (1909–1986) and his former pupil John C. Steele (b. 1934), the French neuropsychologist/neurologist Henry Hécaen (1912–1983), the French psychiatrist Henri Ey (1900–1977), Boston neurologist Norman Geschwind (1926–1984), Derek Denny-Brown, the Washington neurologist/neuroepidemiologist John F. Kurtzke (b. 1926), the London neurologist Peter K. Thomas (1926–2008), the Glasgow neurosurgeon Bryan Jennett (1926–2008), the Pakistan neurosurgeon Ayub K. Ommaya (1930–2008), Washington neurologist Fred Plum (1924–2010), the New York neurologist Jerome B. Posner (b. 1928), Viennese pharmacologist Oleh Hornykiewicz (b. 1926), the Edinburgh geneticist Alan E. H. Emery (b. 1928),

the Swedish pediatric neurologist Ingrid Gamstorp (1924–2007), and the British neurologist John Walton (b. 1922) in *VBH*. For the sake of space, we did not mention all the scientific and clinical fields in which these people became well known, but many of their names can still be recognized through the existing neurological eponyms.

Language and Concentration of Medical Knowledge

VBH was published entirely in English, marking an important shift away from the first two handbooks which had appeared primarily in German. The change in language and participation of greater numbers of non-European, in particular American, neurologists and neurosurgeons, deserves some more in-depth treatment. During the second half of the nineteenth century, important progress in medical science and clinical applications could be observed particularly in the German-speaking countries. While Paris, after Leiden and Edinburgh in the eighteenth century, had played an important role as the major center of medical teaching in the first part of the nineteenth century, this gradually shifted to Austria and Germany in the 1860s.

The disruptions and devastations of WWI, and subsequently also WWII, further brought about important changes in the international development of the biomedical research landscape. The significance of American medicine increased and the editors of *VBH* — similar to their former colleagues who started the *Excerpta Medica* — now realized (after 1945) that a new handbook needed to be published in the English language in order to reach a larger audience of an increasingly international community in the brain and nerve sciences. The change of language from German to English undoubtedly contributed to the wider distribution of *VBH* in contrast to its precursors *LH* and *BFH*. The significance of American neurology — probably in line with the publishers' and editors' financial interests also in the US book market — are likewise reflected in the higher number of American authors in *VBH* (48% versus 40% European authors). The two previous German handbooks had comparatively fewer authors included from abroad (36% of chapters written by non-Germans in *LH* and 41% in *BFH*, which featured only eight American authors). During the three decades that *VBH* was published — between 1968 and 2002 — the number of American versus European authors changed even further in favor of American researchers and scholars, showing an ever increasing ratio of American versus European authors towards the new millennium.

Dissemination

Unfortunately, not all of the contemporary sales information on *LH* and *BFH* could be obtained for our analysis through the archival collections of the successive publishing houses, although most of the volumes of these neurological textbooks may still be found in the libraries of main European and American universities and research institutions. Dissemination abroad was studied through the available information in the meta-library databank *WorldCat*. Although this is one of the best catalogues available for bibliometric research, it does not yet provide electronic information on all available university and college libraries. Particularly those collections located in the US Veterans Administration hospitals — which were of fundamental importance to the establishment of neurology as a postwar medical specialty in North America—have been excluded. When researching the dissemination of the analyzed handbooks, it appeared that *LH* was available in several Canadian and at least 53 American (mainly university) libraries. *BFH* could also be found in at least 53 American public, state, and college libraries.

Sales of *VBH* were estimated by Vinken to have been between 2,500 and 3,000 copies (Koehler & Jennekens, 2008), which were mainly sold to medical and university libraries. The publisher and the editors agreed on publishing two or three volumes annually, thus paying attention to the limited literature budgets of most hospital and university libraries. Obviously, the situation was quite different when looking at the situation of *BFH* throughout its three-year publication period. The prices were not particularly low, based on the inside covers of *BFH*, where information on the pricing of the books was provided. The most expensive volume was No. 16 (1,183 pages), which cost 228 *Reichsmark* (hardcover: 233 RM – about \$90 to \$100 US in the early 1930s), for subscribers 112 and 117 RM, respectively. For purposes of comparison, the price for single-volume medical textbooks at the time was usually between 50 and 100 RM or between \$20 and \$40 US in the early 1930s. Particularly after the beginning of the revised series, subscriptions to *VBH* were rarely discontinued, which guaranteed solid returns on the publishers' investments.

Other criteria for judging the influence of these handbooks are the quantity and quality of the book reviews. Although it was hardly possible to find a reliable common list of the reviews for the first two handbooks, 155 reviews of *VBH* (40% of which mainly contained announcements) were identified (see Koehler & Jennekens, 2008). Yet, in what ways does the dissemination of the large multiauthor handbooks compare with the availability of the smaller textbooks at the time? It is obvious that students and practitioners would have preferred smaller textbooks for immediate purposes of memorizing clinical phenomena, standardizing and adjusting their diagnostic skills, and preparing for college and academy exams. While the large multivolume handbooks were mainly sold to medical and university libraries (see our *Worldcat* research of general library holdings), these books served as important reference sources and catalysts of scientific communication in the field of neurology. Moreover, they emerged as a central hub for the transmission of new knowledge and likewise served as translational tools at the intersection of academic communities, when being used for teaching, educational, and research purposes. With regard to the central status of medical handbooks in the nineteenth and twentieth centuries, one of their roles must be perceived as an important introduction to specialized knowledge, this being before the World Wide Web with its online encyclopedias. At the time, nonprofessorial neurologists would have rarely owned these expensive books personally, but the historical literature attests that most neurologists, assistants, and clerks in clinical settings and brain researchers in their experimental laboratories used the handbooks frequently — much like Pubmed® access in 2013. The situation may be further compared to today's when distinguishing between student course books, larger textbooks for medical practitioners, and comprehensive multivolume handbooks in large academic libraries, which have been flanked by extensive monographs for the specialized basic and clinical researcher.

Conclusions

The publication of comprehensive multivolume handbooks devoted entirely to neurology started in the early twentieth century and testifies to the increasing amount of knowledge available in this specialized clinical and research area at the time. The multivolume neurological textbooks represent a logical step forward after similar publication tendencies had been around for decades in the field of general medicine. In this context, Nothnagel's handbook on internal medicine already contained 17 neurological volumes among its 41 total volumes. Lewandowsky's working situation in Berlin was certainly of importance for the expanding network of specialized neurologists in the Prussian capital, as were the

reorganization of neurological training programs and the differentiation of the new basic and clinical neurological research landscape.

In this article, we were particularly interested in the historical aspect of the continental specialization and in the German language area due to Central Europe's important role in medical education from the 1870s to the 1930s. Furthermore, German neurology exerted an important influence on other leading countries in medical research (including France, Britain, the United States, and Japan). The three large handbooks of *LH*, *BFH*, and *VBH* were not only chosen due to their extraordinary size but also for their comprehensive layouts and long periods of continued publication activity since the early twentieth century. Moreover, a direct conceptual line could be traced from Lewandowsky's initiative to Vinken and Bruyn's English handbook. Our analysis of these three handbooks furthermore indicates that *LH* and *BFH* can be considered as one continuous series with its origins in the 1910s.

It should also be emphasized for our discussion that both *LH* and *BFH* contained many chapters by Jewish neurologists, psychiatrists, and internists. In the case of *BFH*, several authors wrote their chapter shortly before or after leaving Germany, a process that was paralleled by instances of severe human tragedy of exile, along with Germany's and Austria's "brain drain" of neuroscientists to Britain, North America, Turkey, and the Soviet Union (Peters, 1992; Weindling, 2009, 2010; Stahnisch, 2010). This development also explains why *VBH* later came to be published in English; a decision that was made shortly after WWII when Vinken and Bruyn realized that a new handbook could not be written in the German language due to the processes of devastation, the human atrocities, and forced migration during the 1930s and 1940s. However, the general outlook and intellectual conception of all three handbooks remained surprisingly intact. The increasing use of leading researchers and scholars as authorities in neurological subspecialties was also an important factor by which the handbooks contrasted with the many compact neurological textbooks available at the time.

Several other differences between the German and English handbooks could also be noted, including the fact that there were no separate volumes on the basic neurosciences (anatomy and physiology) in *VBH*, while the number of pages in *VBH* grew considerably (reflecting the steep knowledge increase of the postwar period). Furthermore, the thematic differentiation and selection of authors were also aligned with the nationality of the authors (*VBH* was oriented more globally, for example), and the duration of the publication was markedly different (five and three years for *LH* and *BFH* versus 15 and 18 years for the two series of *VBH*). Moreover, the uniformity of the series, comprehensiveness, and varying use of volume editors in *VBH*, along with the application of index volumes to enhance accessibility and reception, differed markedly. At present, the three handbooks can be seen as important historical sources which provide a deeper understanding of the emergence of neurology as a distinct scientific and clinical entity during the twentieth century.

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