Abstract

Introduction
Neuropsychology, a field at the crossroads between neurology and psychology, is rooted in Egyptian and Greek Antiquity (Imhotep and Eratistrate, respectively). By pondering intelligence, Descartes and Spinoza, the most famous philosophers of the 17th century, conceived a way of thinking about memory and emotion, the foundations of the concepts that contemporary neuroscience endeavors to explore with precision. The advances the discipline has made from the end of the 19th century to the present result from the work of neuroscientists and no longer that of philosophers. Here we present a brief biography
of each of the most noteworthy personalities in this young discipline, a discipline that has achieved its most important advances in the 20th century. Each of these biographies identifies key aspects of the training and work of these individuals, who are too often forgotten. They are listed here in alphabetical order.

Théophile Alajouanine (1890–1980)

Théophile Alajouanine (1890–1980) may not be universally known to neuropsychologists, yet he deserves to be remembered because he founded a working group which was one of the most active in the world in the years that followed World War II. He contributed to our understanding of several aspects of aphasia and he arguably can be considered one of the fathers of neurolinguistics [1].

Nothing in his family background could have predicted his career. He was born in a small village of Central France, an area known as Bourbonnais, from a relatively humble family and went to a high school in Moulins, the nearest large town. There his brilliant intelligence was noted and he went to Paris where he had to make a hard choice between art, his first passion, and medicine. He performed brilliantly in medical studies, but also befriended many famous artists, prominent among them Valery Larbaud (1881–1957) whom he examined and superbly described, after the cosmopolitan writer, translator of James Joyce’s Ulysses, became aphasic. Perhaps because his interest in the arts was well known, he examined other famous artists. This led to a publication in Brain [2] in which he described the effect of aphasia on the artistic production of Larbaud, of Maurice Ravel (1875–1937) and of a painter whom he did not name, but whose identity, Paul Elie Gernez (1888–1948), is now well established [3]. In 1914, he was named Interne des Hôpitaux. World War I had just started and he soon was drafted as a physician where he started as an “alienist,” but he left it as a neurologist. His first teachers were psychiatrists including Philippe Chaslin (1857–1923) and Jules Séglas (1856–1939). His neurology mentors included Georges Guillain (1876–1961), Pierre Marie (1853–1940) and above all Charles Foix (1882–1927) [1] with whom he described the so-called Foix-Alajouanine syndrome in 1926, also known as angiodysgenetic necrotizing myelopathy.

In 1927, he became Professeur Agrégé and when he finally obtained a Chair, it was not in Neurology, but in History of Medicine. It was only in 1947, when Guillain retired, that he was named to what had been Charcot’s Chair at the Salpêtrière. Alajouanine’s approach
to brain and behavior was influenced by Jackson’s ideas and he often applied to the analysis of language disorders, the so-called Baillarger-Jackson principle of dissociation between voluntary and automatic or emotional language. He applied this principle in studying such diverse phenomena as dysprosody, agraphia, and stereotypes. He was prompted to study the latter by the famous “Tantan” case described by Paul Broca (1824–1880) and by the case of the writer Valery Larbaud whose only verbal output was the literary sounding “bonsoir, les choses d’ici-bas” (farewell, material things from this earth).

It has been stated that the publication, in 1939, of the book “Le Syndrome de Désintégration Phonétique” (SDP), by Alajouanine, André Ombredane (1898–1958) and Marguerite Durand (1904–1962) marks the beginning of modern Neurolinguistics [1]. SDP was meant to characterize the language output of patients with anarthria and Broca’s aphasia. Alajouanine and his colleagues studied articulatory phenomena first by transmitting pressure changes to a pen on a rotating cylinder and later with an oscilloscope. They were able to study the phonetic aspects of these articulatory disorders and inferred their physiopathological basis by isolating within the disorder paralytic aspects, dystonic aspects, and apraxic aspects.

Another contribution of Alajouanine was to postulate the existence of 2 language systems. The first is sensory-motor or auditory-phonemic and is responsible for both the production and reception of phonemic units. It is typically impaired in phonemic jargon. The second is a semantic system supposed to control the connection of thoughts and language. Semantic jargon was proposed as a typical effect of disruption of this system. These ideas had the advantage of suggesting a general parallel between language input and output. Modern psycholinguistics abandoned this approach, but some aspects of semantic dementia and the handling of functor words by patients with Broca’s aphasia can be explained by principles resembling the postulates of Alajouanine and his group. Many other aspects of language and aphasia, particularly aphasia in children, were developed in a monograph that still provides worthwhile reading [4].


Alajouanine was very attached to his native Bourbonnais. When he retired in 1960, he became a self-described bibliophile. I visited him in his estate in Central France in 1974. Rather than talk about the brain, he preferred showing his beautiful garden and proudly described his rare book collection, many of which he had bound in luxurious leather with his own hands. He lived there, obviously enjoying life, until his death in 1980 at the ripe age of 90.

François Boller
Henry Charlton Bastian (1837–1915)

Henry Charlton Bastian (1837–1915), born in Cornwall, graduated at the University College of London in 1861, and obtained his medical degree in 1866. He practiced at the National Hospital, Queen Square from 1868 to 1902, eventually becoming a Professor of pathological anatomy at his alma mater. Although he described the anterior spinocerebellar tract in 1867, it became known as Gowers’s tract after 1880. In 1878, he was appointed to the Chair of Medicine [1]. From 1884 to 1898, he was an advisor for the Crown in cases of questionable insanity. Bastian had published numerous papers on parasitology. He gained international recognition for his methods of diagnosis and the quality of his teaching in neurology.

Bastian was interested in hysteria, as Charcot was in Paris, but when speaking of the so-called “hysteria major,” he noted: “Anything like a complete form is only very rarely met with in this country” [2]. In 1887, his controversial paper on “the muscular sense, its nature and cortical localization” was published, in which Bastian contended that “neither on physiological nor on psychological grounds was it needful to postulate the existence of motor centres in the cortex.”

In 1869, he described a characteristic speech impairment; this was the first account of word blindness (alexia) and of word deafness, which Carl Wernicke (1848–1905) described 5 years later as sensory aphasia. Since then the disorder has been known as Wernicke’s aphasia. As a Lumleian lecturer, Bastian dealt with aphasia and other speech defects. It was his belief that we think with words representing a recollection of sound impressions stored in the auditory brain centers. He also held that aphasia depends either on damage of one or the other of 4 centers in the cortex which are involved in the production of speech.
of spoken or written language, or on disruption of the neural tracts connecting them. Bastian’s emphasis on cell-circuit physiology enabled him to formulate the distinction between punctuate, topographical localization, and distributed localization in a remarkable fashion [3]. Taken together, his lectures on aphasia formed the basis of a classical treatise on the subject: “A treatise on aphasia and other speech defects,” 1898.

In 1890, Bastian was the first to demonstrate that after transection of the upper spinal cord, reflexes and muscle tone are abolished in the lower limbs (Bastian’s law) [4]. Bastian considered his 1880 book, The Brain as an Organ of Mind, to be his greatest contribution to neuro-philosophy. He presented in this book several prescient ideas, for example that memories activate the same cortical areas as those activated during initial perception, to put it briefly. At the end of his life, Bastian spent time unsuccessfully defending an unorthodox theory of the origins of life [5].

Olivier Walusinski

References

4 Bastian HC: On the symptomatology of total transverse lesions of the spinal cord; with special reference to the condition of the various reflexes. Med Chir Trans 1890;73:151–217.
5 Bastian HC: The Brain as an Organ of Mind. London and New York, Appleton, 1880.

D. Frank Benson (1928–1996)

D. Frank Benson
Victor W. Henderson, personal collection.

Through clinical research and mentoring, Frank Benson was instrumental in establishing behavioral neurology as a neurological specialty. Born in Grand Forks, North Dakota, he received his undergraduate degree from the University of North Dakota. After serving 2 years in the United States Army during World War II, he took his M.D. from Northwestern University and completed an internship at Good Samaritan Hospital in Portland, Oregon. Before resuming his education in the neurology program at the Veterans Administration Hospital in San Francisco, California, he was a general practitioner in Sweet Home,
Oregon. After neurology residency, he was in the private practice of neurology in Eugene, Oregon, for 3 years.

In 1965, Benson completed a research fellowship with Norman Geschwind (1926–1984) at the Aphasia Research Center at the Boston Veterans Administration Medical Center. This was the year of Geschwind’s landmark article on cortical disconnection syndromes [1], sometimes viewed as the inception of behavioral neurology. Afterwards, Benson remained as the new Section chief and a member of the Boston University neurology faculty. He remarked that he was given few resources but had the freedom to rename his service, which he did in 1972, following a sabbatical at the Institute of Psychiatry, University of London. His new designation – the Neurobehavioral Center – was central to the branding of behavioral neurology as an emerging discipline. In 1979, Benson became the first behavioral neurologist honored with an endowed academic chair, when he moved to the University of California, Los Angeles.

Benson’s early, highly-influential work focused on classic disorders of higher cortical function: agnosia, amnesia, acalculia, and – above all – aphasia [2]. He and his collaborators went on to study frontal lobe functions [3] and psychiatric manifestations of neurological disease. In Los Angeles, he focused increasingly on neurobehavioral aspects of Alzheimer’s disease and other dementias at a time when dementia was only beginning to be recognized as a highly prevalent, devastating disorder of great importance to neurology.

Benson’s preferred methodology was the descriptive case series, often focused on clinical-anatomical associations. He used a large repertoire of bedside techniques to reveal and parse impairments in cognition and behavior. He wrote prolifically and well, publishing nearly 250 articles and chapters, and 9 books. A forte was clinical nosology and the enumeration and tabulation of key clinical findings, distinguishing characteristics, associated features, and differential diagnoses.

Benson was an astute clinician, deeply committed to his patients, and an enthusiastic, nurturing teacher [4]. He had the uncommon ability to see through a morass of distracting symptoms and signs, discern the clinical essence, and then – as often as not – proclaim the case as “absolutely classic” for conduction aphasia [5], for posterior cortical atrophy [6], or for some other neurobehavioral disorder. He attracted a steady stream of postgraduate trainees from neurology and psychiatry, many of whom rose to leadership positions in research and academia. Benson inspired a generation of behavioral neurologists, neuropsychiatrists, neuropsychologists, and scientists with interests in brain-behavior relations and – in doing so – helped secure the foundation of behavioral neurology.

Victor W. Henderson

References


Following World War II, Neuropsychology developed considerably in the US. Similarly to what had happened in Europe, several of the founders of this new field were neurologists such as Derek Denny-Brown (1901–1981), Fred Quadfasel (1902–1981) and, most importantly Norman Geschwind (1926–1984). Among the many PhDs who contributed to this rise, Arthur Lester Benton (1909–2006) stands out because of his considerable interest in and knowledge of the brain-behavior relationships, his introduction of new tests and his rigorous attachment to the methodology. In addition, throughout his life and particularly during his long tenure in Iowa City, he founded a laboratory which trained a large number of students who later became outstanding researchers and clinicians. He also developed close ties with many of the other main contributors to this new field.

A native of New York City, he received his B.A. and his M.A. from Oberlin College, where he studied until 1933. Close to Cleveland, but remote in spirit from the metropolis, Oberlin with its combination of small rural town and cosmopolitan attitude was the perfect place for him to start forming and developing. He went back to New York City and Columbia University for his PhD, which he obtained in 1935. There he could trace his educational lineage to Karl S. Lashley (1890–1958), John B. Watson (1878–1958) and back to Hermann Emminghaus (1845–1904) and Wilhelm M. Wundt (1832–1920) [1]. He was training as a psychologist at the Payne Whitney Psychiatric Clinic of New York Hospital when World War II started and he volunteered for service in the US Navy where he was commissioned as a lieutenant in the medical department. During that time, he worked at the San Diego Naval Hospital with the neurologist Morris Bender (1905–1983) and together they examined a large number of servicemen who had sustained penetrating brain wounds. He was discharged from the Navy in 1946. After a short stay in the Department of Psychology at the University of Louisville, in 1948, he moved to the University of Iowa where Arthur Sachs, one of the founders of neurology in the Midwest offered him a position within his Department of Neurology. There he reached the grade of Director of grad-
Shining a Light on Some of the Most Famous 19th and 20th Century’s Neuropsychologists

I was fortunate for having a personal interaction with him on many occasions, starting in 1964 when he came to Milano for a 2 months course which led to a book [5]. As pointed out in the article on Ennio De Renzi (1924–2016), the translation of Benton’s lectures by De Renzi and Luigi Vignolo (1934–2010) played an important role in spreading the knowledge of neuropsychology among neurologists and psychologists. Benton urged the Milan group to adopt a set of rigorous experimental procedures, which was further elaborated and refined in subsequent years. He had sufficient knowledge of French, Italian, and German to discover hitherto obscure early descriptions of many disorders. Together with his wife Rita, a noted musicologist, he spent considerable time at the Bibliothèque Nationale in Paris and in other great places of learning.

The citation that accompanied the award of the American Psychological Association Gold Medal for Life achievement well summarizes his work “... lifetime contributions that include pioneering clinical studies and brain-behavior relations.” One must add that thanks to his warm and endearing personality, he developed close working and personal ties with many other neuropsychologists. They included Ennio De Renzi (1924–2016) and other members of the Milan Group. Norman Geschwind (1926–1984), MacDonald Critchey (1900–1997), Klaus Poeck (1926–2006), Henry Hécaen (1912–1983), the Japanese aphasiologist Sumiko Sasanuma and many others. A grossly incomplete list of people associated with his Laboratory includes Helena Chui, Hanna Damasio, Antonio Damasio who later chaired the Department of Neurology. Paul Eslinger Kerry Hamsher, Julia Hannay, Robert Joynt, Harvey Levin, Manfred Meier. Otfried Spreen, and last but not least his daughter Abigail Sivan. His former student Daniel Tranel currently directs his Laboratory which is now part of an Interdisciplinary Graduate program in Neuroscience.

François Boller
Julian de Ajuriaguerra (1911–1993)

Julian de Ajuriaguerra (1911–1993) was a French neuropsychiatrist of Spanish Basque origin. He left his native city of Bilbao to study medicine in Paris and become a psychiatrist. After working in Paris psychiatric hospitals as an interne (house officership) from 1933 to 1936, he defended his thesis in 1937, entitled “La douleur centrale” (central nervous system pain) [1]. After fighting with the Republicans during the Spanish Civil War, Ajuriaguerra took part in the French Resistance while working in Paris at Hôpital Sainte-Anne between 1942 and 1944. In 1946, he became an assistant neurology professor with foreign status, obtaining French nationality in 1950. At that point, he was able to become a practicing physician and thus defended a doctoral thesis entitled “Aspects des troubles mentaux au cours des tumeurs mésodiencephaliques” (mental disorders during mesodiencephalic tumors). As he did not have the possibility to become a full professor in France, he accepted a position at the Geneva medical school in 1959, where he held the Chair of Psychiatry and directed the cantonal university clinic. Finally, in 1975, he was appointed to the Developmental Neuropsychiatry Chair at the College de France in Paris [1].

Continuing the work of his master Jean Lhermitte (1877–1959), Ajuriaguerra focused on aphasia and rejected strict brain mapping based on various deficits, arguing instead in favor of diffuse and evolutive processes. His research on pain led him to identify pseudothalamic pain originating in the parietal lobes.

With Ludovic Marchand (1873–1976), in 1948 he published “Epilepsies, leurs formes cliniques et leurs traitements” (epilepsy, clinical forms and treatment) in which his aim was to study psychic auras, paroxysmic mental disturbances, and psychomotor automatisms, both in terms of the cerebral substrate and the localization value of these symptoms.

References

With André Thomas (1867–1963), Ajuriaguerra worked on developmental neurology and neuropsychiatric ontogenesis in children. They identified the evolutive chronology of reflexes present at birth. His 1948 book “L’axe corporel” Musculature et innervation (corporal axis, musculature and innervation) laid the ground for his 1949 “Etude sémiologique du tonus musculaire” (semiological study of muscle tone), which introduced concepts of muscle examination such as consistency, extensibility, and passivity, which until then had not been isolated [2]. His partnership with Henry Hécaen (1912–1983) led him to study left-handedness (manual prevalence and cerebral dominance), writing, and “integration and disintegration of somatognosis” during hemispatial neglect and corporal hallucinations.

With Jean Piaget (1896–1980), Ajuriaguerra explored the relationships between muscle tone, corporal expression, and emotional experience as well as concepts of non-verbal communication. His psychogeriatric writings highlight the constant order of psycho-behavioral disorganization during dementia, in contrast to the hierarchical order of development. Finally, his “Manuel de psychiatrie de l’enfance” is still a reference in the history of child psychiatry, revealing the influence of evolutionist and ethological thinking [3, 4].

Olivier Walusinski

References


Ennio De Renzi (1924–2016)

There are prominent early examples of Italian clinicians and researchers who dedicated their work to human neuropsychology. These precursors, active between the end of the 19th and the beginning of the 20th century include Leonardo Bianchi (1848–1927) and Giovanni Mingazzini (1859–1929). However, the systematic development of neuropsychology in Italy started in the early 1960s in Milan with the neurologist Ennio De Renzi (1924–2016). De Renzi was born in Cremona in 1924. In a recent autobiographical paper [1], he elegantly summarized the political climate of Italy during his youth, engulfed in a
“repressive, untruthful and boring” fascist dictatorship which inexorably led Italy into the catastrophe of World War II. He also describes leaving the Faculty of Law to study Medicine at the University of Pavia where he was admitted to the prestigious Ghislieri College. He obtained his MD in 1950, and completed his specialization in Neurology and Psychiatry in 1953 at the Institute Casimiro Mondino, then directed by Carlo Berlucchi (1897–1992).

His first interest was psychiatry, specifically, projective tests such as the Rorschach ink block test [2]. However, he soon became frustrated by the difficulty of obtaining reliable and reproducible results from such tests, and, towards the end of the 50s, he focused on behavioral disorders associated with cerebral lesions, with a particular interest in aphasia.

Meanwhile, he had moved from Pavia first to Modena, and then to the Clinica delle Malattie Nervose e Mentali (Clinic of Nervous and Mental Diseases) of the University of Milan, where he found a suitable environment for his research. There he was able to study a large number of patients with histories of stroke and brain tumors. He informally founded the “Milan group,” the first nucleus of the Italian neuropsychological school. Among the members of the group, first and foremost was Luigi A. Vignolo (1934–2010), who had been trained in Paris before returning to Italy, and Anna Basso, who also received training in Paris, and who established and directed the first Service for the Rehabilitation of Aphasia, as well as a School for Speech Language Pathologists. They were soon joined by others including Hans Spinnler and Pietro (“Pierino”) Faglioni. I was privileged to join the group at that early stage, and to be part of De Renzi’s daily patients’ rounds. I distinctly remember his clinical acumen, his vast knowledge, his empathy towards the patients and his sense of humor. He conducted rounds in a relaxed yet very demanding style, writing, sometimes to our dismay incisive comments in a fountain pen on our painfully prepared clinical reports.

These early years saw several landmarks which contributed to establishing the position of De Renzi and the Milan group on the international scene. These included an article on the Token Test in Brain [3] which can be considered the first modern Italian neuropsychological study to be published in an international journal.

Together with the group he participated in the International Neuropsychological Symposium in 1964, beginning a period of work and personal friendships with neurologists and psychologists from various European countries as well as the US and Canada. He founded the journal Cortex which he led as Editor-in-Chief for over 25 years. In 1964, Arthur Benton (1909–2006) taught a 2-month course in Milano. The translation of Benton’s lectures by De Renzi and Vignolo was the first textbook on neuropsychology published in Italy, and played an important role in spreading this culture among neurologists and psychologists [4].

From the beginning, De Renzi established a standard of experimental methodology in the group. The approach was primarily based on quantitative assessment of the cognitive ability of interest in left- and right-brain-damaged patients, and in neurologically unimpaired participants (controls), by means of ad hoc devised and standard tests, followed by statistical comparison of the patients’ and controls’ performances, taking into account,
and partiailling out the influence of sex, age, and education. Faglioni was the principal developer of these advanced statistical methods.

The group focused mainly on hemispheric differences in higher-order mental processes. Two sets of results may be mentioned: the greater and more frequent impairment of spatial abilities consequent to right than to left hemispheric damage; different patterns of impairment after unilateral hemispheric damage in stimulus recognition: the right hemisphere proved to be more involved in the perceptual discrimination of the stimulus’ qualities, the left one in its identification (“recognition,” with retrieval of its semantic associations). This hemispheric asymmetry held for visual material, but also involved color processing and auditory stimuli.

In subsequent years, De Renzi became Chairman of Neurology at the University of Modena and continued to be a prominent and productive researcher as well as a superb teacher. His book on Disorders of Space Exploration and Cognition [5] is a classic. The list of persons whose professional lives and thinking were influenced by him is too long for this Editorial. Many of them went on to productive careers of their own. To mention only a few, Paolo Nichelli is the current Chair of the Department of Neurology in Modena, Giuseppe Vallar is Head of the Department of Psychology in Milano Bicocca, and Sergio Della Sala is the current Editor-in-Chief of Cortex.

Following his retirement in 2000, Ennio ostensibly focused his interest on other areas, becoming an assiduous visitor to the wonderful Modena Public Library where he could be found just about every afternoon. However, he also enjoyed keeping in touch with his former pupils. A touching contribution of his came on the occasion of a symposium entitled “Modern Italian Neuropsychology: origins, developments and future perspectives” organized by Giuseppe Vallar and Guido Gainotti and held in Como in May 2013. Ennio made the keynote introduction and participated actively in the entire symposium. He also thoughtfully reviewed an article summarizing the history of Neuropsychology in Italy [6]. We are grateful to him also for these last contributions to Neuropsychology.

François Boller

References

Norman Geschwind (1926–1984)

Many people contributed to the rise of interest in brain-behavior relations in the US after World War II, but Norman Geschwind (1926–1984) unquestionably played a major role. He shaped modern neurology, particularly through his decisive role in the development of Behavioral Neurology and Neuropsychology. These disciplines barely existed in the United States when he arrived on the scene, but, thanks in great part to him, they are now prominent, as attested to by the many Societies and by more than 35 Journals currently dedicated to them. The Geschwind family left Poland for Brooklyn NY in the 19th century. His father, Morris, was religiously skeptical, but the family enrolled Norman in a Jewish elementary school. Although young Norman disliked the Yeshiva education, it provided him with a key element for his future professional life by encouraging him to use his own judgment in interpreting texts rather than relying on what other people said. Just like Henri Hécaen (1912–1983), Ennio De Renzi (1924–2016) and others, he first intended to become a psychiatrist but shifted his interest to neurology, influenced by teachers such as Marcus Singer (1926–2016). At that time, he began to develop an interest in language disorders and epilepsy. He graduated from medical school in 1951 and continued his studies at London’s National Hospital, where he studied with Sir Charles Symonds (1890–1978) who also influenced Geschwind’s development.

In 1955, Geschwind became the chief resident in the Neurology Department at Boston City Hospital, then directed by Derek Denny-Brown (1901–1981). Following a 2-year fellowship at MIT, Geschwind joined the Neurology Department of the Boston Veterans Administration Hospital in 1958, where he met Alfred (Fred) Quadfasel (1902–1981), a pupil of Karl Bonhoeffer (1868–1948), who was in turn a pupil of Karl Wernicke (1848–1905). Quadfasel played a major role in shaping Geschwind’s future development by encouraging him to study aphasia, and also to read classic texts of neurology from the 19th and early 20th century, exposing him to classic localizationist theory. Because of his knowledge of French and German, Geschwind could read these texts in their original language relatively easily. He convinced himself that, contrary to what had been stated by “distinguished neurologists” like Pierre Marie (1853–1940) or Henry Head (1861–1940), the writings by Wernicke, Jules Dejerine (1849–1917), Henry Charlton Bastian (1837–1915) and others were not “the chaotic confabulations of a group of tedious imperceptive 19th century scholars,” but rather the healthy disagreements of a lively science [1].
Geschwind became the Chief of Neurology at the Boston VA Hospital and Chair of the Department of Neurology at Boston University in 1966. In 1969, he returned to Harvard Medical School’s James Jackson Putnam Professor of Neurology and Director of the Harvard Neurological Unit at Boston City Hospital. In 1975, the Unit moved to Beth Israel where he remained as Chief until the time of his death.

Geschwind created 2 major beehives of research which remain highly active to this day. At the VA, together with Edith Kaplan (1924–2009), he established the Boston University Aphasia Research Center in 1966. The Aphasia Research Center would go on to become a pioneer in interdisciplinary aphasia research, including luminaries like Harold Goodglass (1920–2002) and D. Frank Benson (1928–1996). He kept his ties with the VA after he moved across town.

Geschwind’s best known and most often quoted paper is his “Disconnexion syndrome” paper published in 1995 [2, 3]. What led to that paper is undoubtedly his reading of papers by Wernicke, Ludwig Lichtheim (1845–1928), Hugo Karl Liepmann (1863–1925), Dejerine and others emphasizing the importance of interruptions of cortical connections. On top of this came the clinical observation by Edith Kaplan (1924–2009) of a patient, the famous Mr. K who could perform praxic (symbolic) movements with his right hand but not with his left hand, even though that hand had no primary motor or sensory deficit. The patient’s left hand did not seem to know what his right hand was doing. Geschwind proposed that the patient was displaying a classic disconnection syndrome, one of the first documented in humans. In his 1995 paper, Geschwind defined a disconnexion lesion as “a large lesion either of association areas or of the white matter leading from that association area.” The paper discusses in a novel fashion such syndromes as conduction aphasia, agnosia, and various forms of apraxia. In the 1980s, the neuroscience world tended to move away from the connectionist views but current imaging techniques have largely contributed to their revival [4].

Geschwind’s work on aphasia was also quite significant. Until Geschwind’s time, the standard neurological examination paid relatively little attention to language. He emphasized the importance of testing various aspects of language such as fluency, naming, repetition, comprehension, and reading and writing. This was the prelude to a better understanding of specific syndromes like conduction aphasia or pure alexia. Through the work of his colleagues, this led to such classic works such as the Boston Diagnostic Aphasia Examination of Harold Goodglass (1920–2002) and Kaplan, first published in 1972 and still widely used.

His many other achievements include his demonstration of major anatomical asymmetries in the brain, particularly at the level of the planum temporal [5]. He contributed to the understanding of epilepsy and its accompanying behavioral disorders such as hypergraphia. The list of fields where he performed and often pioneered research includes traumatic amnesia, disorders of attention, and the neurology of emotions. Not too long before his death, he went in a completely different and novel direction: showing that lefthanded individuals have a higher incidence of autoimmune disorders.
Two crucial inter-related elements are extremely important in understanding Geschwind, the man and the physician. His warm and generous personality and his extraordinary clinical ability. He did not hesitate to offer hospitality in his own house to some of the newly arriving visitors and residents. His clinical ability, acumen, and kindness were on full display when examining patients, with truly amazing results. Through a mixture of deep knowledge and intuition, he was always able to demonstrate “live” clinical elements and signs that illustrated his lectures and rounds.

Geschwind’s legacy is illustrated in a striking fashion by the number of persons he trained or otherwise influenced not only in North America, but throughout the world [6]. I will particularly mention 4 “schools” which to this day continue his work: that of Alberto Galaburda in Boston, MA, Kenneth Heilman in Gainesville, FL, M-Marsel Mesulam in Chicago, IL, USA, and Andrew Kertesz in London, Canada.

François Boller

References

Kurt Goldstein (1878–1965)

Kurt Goldstein
US National Library of Medicine, public domain.

Kurt Goldstein (1878–1965), born in Kattowicz (Poland), studied philosophy and literature at the universities of Breslau and Heidelberg. He went on to obtain his doctoral degree in medicine in 1903. Studying under Carl Wernicke (1848–1905), he became interested in aphasia. He then worked as a post-doctoral assistant at the Frankfurt neurological institute, where he studied comparative neurology in the neuropathological laboratory of Ludwig Edinger (1855–1918). In 1906, he moved to Königsberg, where he worked as a psychiatrist and neurologist. He also became acquainted with the Würzburg
school of experimental psychology, which emphasized “imageless thought.” In 1914, based on his clinical work, Goldstein established the Institute for Research into the Consequences of Brain Injuries where he collaborated with Adhémar Gelb (1887–1936). He was appointed to the Frankfurt neurology chair in 1923, succeeding Edinger. In 1930, he left Frankfurt for Berlin, where he was a professor at the university in the neurology and psychiatry department; he also directed a large neuropsychiatric clinic. He developed a close friendship with his cousin Ernst Cassirer, the neo-Kantian philosopher. When Hitler was appointed chancellor in 1933, Goldstein, who was Jewish, was arrested and imprisoned in a basement. After a stay in Amsterdam, he moved to New York City in 1935 where he started a new career at Columbia University and the Montefiori Hospital [1].

Goldstein worked to further understanding of trauma in soldiers returning from duty in World War I. He was particularly interested in soldiers with acute frontal lobe injuries. He developed the finding of Eduard Hitzig (1838–1907) that monkeys with frontal lesions were especially blunted in the domain of abstract thought. In addition, Goldstein was influenced by John Hughlings Jackson (1835–1911) and his concepts of negative symptoms related to local damage and positive symptoms caused by modifications of surrounding areas [2]. After studying the effects of brain damage in soldiers, he argued that the loss of abstract thinking was the key feature of frontal lobe damage [3]. He believed these defects to underlie maladaptive emotional responses and memory loss. Goldstein developed a number of tests for measuring abstract thought and concrete behaviors, notably using fables and proverbs. The so-called Goldstein test battery was also used for neuropsychological rehabilitation [4]. His continued work led him to postulate that memory involved engram patterns spread throughout the cortex, “each of which involved a central figure and a peripheral ground.” Goldstein went on to develop a theory that the brain, following traumatic experiences, is in a constant state of active shock and that “slight catastrophic reactions” occur as the individual attempts to come to terms with the world [5].

Goldstein was one of the major proponents of the holistic movement, notably for aphasiology, at the beginning of the 20th century. His holistic views of brain activity were influenced by Naturphilosophie, a current in the philosophical tradition of German idealism. According to Naturphilosophie, both normal and abnormal behaviors are the result of the antagonism between the brain and the environment; thus, both normal and abnormal states of mind are an expression of adaptation. Symptoms of illness are not secondary effects, but a sign of positive development towards a new state, indicative of the organism’s struggle to re-establish equilibrium [6]. In this way, Goldstein can be seen as a philosophical scientist.

Olivier Walusinski
Sir Henry Head (1861–1940)

After learning physiology at Cambridge, Henry Head (1861–1940) studied for 2 years in the laboratory of University of Halle in Germany, then worked in Prague in the laboratory of Ewald Hering (1834–1918) on the physiology of respiration. His first paper was on the action potential of nerves. In 1889, he published a masterly treatise on the respiratory effects of the vagus nerve. He is credited with having been the first to use endotracheal intubation for his experiments, now a common technique in anesthesiology. After his house officership at University College Hospital in London, he took his MD at Cambridge in 1892. In 1896, he was appointed to the London Hospital. From 1905 to 1921, he was editor of the journal *Brain* [1].

His thesis “on disturbances of sensation with special reference to the pain of visceral disease” was later expanded and published in *Brain* in 1893 [2]. In 1903, with William Rivers’s assistance (1864–1922), he was his own subject in an experiment on the transection of cutaneous nerves, the results of which he used to develop theories of 2 separate sensory systems, protopathic and epicritic [3]. Head then investigated pain caused by herpes zoster and thus explained the anatomic distribution of cutaneous disturbances as selective by dermatomes. Following his study on dermatomes, Head’s investigations were devoted almost wholly to the sensory system and to refining the clinical method of sensory examination. Collaborating with an Australian neurologist, Alfred Walter Campbell (1868–1937), he was able to chart the cutaneous distribution of different fibers originating from the cells of each ganglion and reaching the corresponding segment of the spinal cord [4]. Head studied the physiological
basis for sensation, that is, the manner in which afferent impulses subserving sensation are integrated and conducted to the forebrain, and the specific brain areas that process these afferent impulses. Based on all of his researches, Head can be considered to have provided the first rational explanation of the nature of sensory dissociation.

In 2 other fields, Head’s contributions were also outstanding: he shed new light on spinal reflex functions, notably on the nature of the stimulus. His collaboration with Gordon Holmes (1876–1965) led to the first accurate account of the functions of the optic thalamus and its relation to the cerebral cortex. Head and Holmes then defined 2 distinct types of body representation that can be impaired, the body schema and the body image. In their view, the brain constantly updates the status of the body shape and posture as an ongoing, mainly unconscious integration of successive proprioceptive signals (body schema), somehow distinct from a more conscious representation of the body, or body image [5].

Head retired from the hospital in 1919, following the onset of Parkinson’s symptoms. He dedicated the end of his career to 2 large volumes under the title Aphasia and Kindred Disorders of Speech (1926). He investigated the psychical processes and the physiological integrations necessary for the comprehension and expression of ideas as language. Thus, he described “semantic aphasia” which provided a link between the linguistic and the intellectual aspects of speech, based on the concepts developed by the French neurologist Pierre Marie (1853–1940). Suffering the effects of his disease, his study was in part concerned with the loss of his own faculties of speech [6, 7].

Olivier Walusinski

References

Henry Hécaen (1912–1983)

Most persons associate Neurology and Neuropsychology in France with la Salpêtrière, the famous Paris hospital. It is true that major personalities in those disciplines have worked at that Institution. However, some crucial personalities have operated in France without any tie with la Salpêtrière. This is the case for Henry Hécaen (1912–1983) who was based at Sainte-Anne Hospital (now Centre Hospitalier Sainte-Anne) for most of his professional career. Hécaen was born in 1912 in the city of Brest in Brittany. After graduating from medical school in Bordeaux, he started his professional career as a Navy officer, but soon realized that he was not fit for spending his life on boats. He moved to Paris where he selected Sainte-Anne as his place of training to become a psychiatrist. There he met Julian de Ajuriaguerra (1911–1993) and, for a while, their careers developed in parallel. Both men were trained in Psychiatry by Henri Ey (1900–1977), and in Neurology by Jean Lhermitte (1877–1959) who later wrote an affectionate introduction to their book, the 1949 edition of “Le Cortex Cérébral,” arguably the first textbook of neuropsychology ever written in any language.

This tall, elegant man was quite striking in his appearance and in his demeanor. He was reserved and yet very generous. He and his wife Renée enjoyed receiving friends at their apartment in the Faubourg Saint Germain. Because of the depth of his knowledge and his human warmth, he had an extraordinary ability to communicate in private or in small gatherings. By contrast, his capacity as a public speaker was poor. This was true not only in English (he could or would never overcome his horrendous French accent), but also in French. It has been written that this was because his mind was so quick and acute that when listening to him or reading him, one had “to understand what he had not yet expressed.” Nevertheless, in spite of these difficulties, listeners and readers kept listening and reading, “obviously aware that he had great knowledge to share” [1]. After a while, he decided that he was not happy as a psychiatrist and opted for neurology, perhaps because “the ways and means of psychiatry were unsatisfactory to his Cartesian mind” [1].

In 1952, he spent several months at McGill Montreal Neurological Institute where he worked with Wilder G. Penfield (1891–1976) and Brenda Milner (1918–). One paper written after his return to Paris propelled him on the international scene. This paper “The syndrome of apractognosia due to lesions of the minor cerebral hemisphere” [2] was based on material he had gathered at the Montreal Neurological Institute. It opened the eyes of the scientific community on the role of the right hemisphere, a portion of the brain often considered until that
time without specific functions. In 1968, he moved to the newly constructed Centre Paul Broca. Over the years, Hécaen and his group grew steadily in size and influence and his IN- SERM Unit 111 became known all over the world as one of the leading laboratories in the field. Hécaen did not invent the term “neuropsychology” which had been used by William Osler (1849–1919), Kurt Goldstein (1878–1965), Karl S. Lashley (1890–1958), and Donald O. Hebb (1904–1985). However, he was the first to use it in its present meaning when, in 1962, he founded the Groupe de Neuropsychologie et Neurolinguistique.

He was a prolific writer, having written over 300 articles and books [3]. He was among the first in Europe to carry out carefully planned group studies. His research touched practically all aspects of the discipline, with major emphasis on hemispheric cerebral dominance and aphasia. His papers on conduction aphasia, particularly the 1964 article written with 2 linguists (Jean Dubois [1920–2015] and Pierre Marcie) included one of the first neurolinguistic analyses of the disorder [4]. Among the other deficits he investigated, one should mention agraphia, dressing apraxia, and visual agnosia. An article dealing with acalculia provides an example of Hécaen’s peculiar style. The paper is in French, includes very little methodology and no references. Yet the conclusions of the paper are cogent. Acalculia is found in patients with predominant alexia or agraphia, with spatial disorders and with an actual disorder of the processing of arithmetic operations which he called anarithmetia. This distinction is valid and the paper is still considered a milestone in the field [5].

Other lasting contributions of Hécaen include the foundation, in collaboration with Oliver Zangwill (1913–1987) and Hans Hof, of the International Neuropsychological Symposium, which met first in 1951 [6]. Another milestone is the foundation of Neuropsychologia in 1963 which he edited until 1981 [6]. In that year he officially retired, but remained Director of the Unit until his death in 1983.

In 1965, he was named Directeur d’Etudes at the Ecole Pratique des Hautes Etudes (now Ecole des Hautes Etudes en Sciences Sociales). As stated by François Lhermitte (1921–1998) et al. [1] “given the rigidity of the French medical pyramid and considering his academic background, the royal roads of the Salpêtrière and of Bicêtre were closed to him” and he was never officially named Professor, because the positions he could have aspired to were occupied by someone else. This was perhaps a blessing in disguise because without being preoccupied with the arcane aspects of academic life, he was free to pursue his own interest and fully develop his potential.

François Boller

References
Pierre Janet (1859–1947)

Pierre Janet (1859–1947) was born in Paris and was the nephew of philosopher Paul Janet (1823–1899). In 1878, at the Ecole Normale Supérieure, he began preparing for the competitive exam to become a philosophy teacher, along with Henri Bergson (1859–1941) and Emile Durkheim (1858–1917). After passing the exam in 1882, he moved to Le Havre in northwest France where he taught for 7 years. One of his students was the son of a hospital alienist, Joseph Gibert (1829–1899). Janet became friends with Gibert and began spending time at the hospital. For his humanities thesis, defended in 1889, he included observations of Léonie Leboulanger, “clairvoyant and magnetizer,” which he had prepared in 1885 and 1886. His thesis was entitled *Automatisme psychologique. Essai de psychologie expérimen- tale sur les formes inférieures de l’activité humaine* (Psychological automatism. Essay on the experimental psychology of the inferior forms of human activity). Janet focused on diseases of personality, especially multiple personalities, and tried to reconcile the phenomena of consciousness with the notion of a subconsciousness. Janet met Charcot in Le Havre in 1885. Accompanied by the future Nobel-prize winner Charles Richet (1850–1935), Charcot had come to examine Léonie. In 1890, Charcot created a “psychology laboratory” for Janet at La Salpêtrière where he could investigate scientific philosophy and medicine. Janet remained director of the laboratory until 1910. He defended his doctoral thesis in medicine on July 29, 1893. It was the last defense presided over by Charcot, who died on August 16, 1893. Janet practiced as a clinical psychotherapist at Le Havre and at La Salpêtrière, defending a theory of psychic trauma as the cause of hysteria. In 1897, he was appointed to the Experimental Psychology Chair at La Sorbonne and occupied the Experimental and Comparative Psychology Chair from 1902 to 1934. He founded the Société de Psychologie in 1901 and the *Journal de psychologie normale et pathologique* in 1904 [1, 2].

Janet was the first to assert that a connection existed between past events experienced by a subject and his or her current trauma. To describe the behaviors involved, he coined
the words “dissociation” and “subconscious” and later described the phenomenon of transference between patient and therapist [3].

Janet’s work covered all fields of psychology: cognitive psychology, social psychology, and dynamic psychology. He attempted to model the relationships between emotions and actions, focusing on secondary regulatory actions (reduction/amplification) that enable adjusting behavior according to the relevance of the context. His model provided the basis for explaining pathological deviations and inappropriate responses to an initial stimulation. Janet’s work dealt with fields of consciousness (perception/action), distraction/concentration, emotional responsiveness, will and belief, and judgment (adherence to/rejection of rules) [4, 5].

Olivier Walusinski

References


François Lhermitte (1921–1998)

There are dynasties of musicians (Bach), of mathematicians (Bernouillie), and of writers (Dumas). To the list of these illustrious families, we can add the dynasty of neurologists since in some instances neurology is practiced by the children of famous neurologists. One such family is the Lhermittes. Here we deal with the son of Jean Lhermitte (1877–1959), François Lhermitte (1921–1998) who made advances in several fields, particularly in an area outside the “classical” area of neuropsychology; one that deals with the relationship between individuals and the outside world. François Lhermitte’s youth and early adulthood saw a mixture of achievements in patriotism and clinical medicine. He entered Med-
Walusinski/Boller/Henderson

ical School in Paris in 1940, a time when France was being invaded by Germany. He was active in the Resistance, for which he earned the Medal of the Resistance and the Legion of Honor for military reasons. After the war, he became the “enfant prodige” of French Neurology. His doctoral thesis was written when he was only 28 under the direction of Théophile Alajouanine (1890–1980). It is entitled “Les Leucoencéphalités” and it remains a landmark for research in multiple sclerosis. Another area of interest was cerebrovascular disease.

However, his creativity found its main fulfilment in neuropsychology. Alajouanine, who had founded the first Center for study and rehabilitation of language disorders in France, entrusted its direction to François Lhermitte in 1954. It became an important Laboratory funded by INSERM for many years. His first neuropsychological studies, following the work of Alajouanine, were devoted to aphasia. He co-edited a book on aphasia with André Roch-Lecours (1936–2005) from Canada. It has been translated into English [1].

Many other eminent neuropsychologists undertook their training in Lhermitte’s Center, including Anna Basso and Luigi Vignolo (1934–2010) from Italy, Xavier Seron from Belgium, René Tissot from Switzerland, and Michel Poncet from Marseille. Other prominent cognitive neuropsychologists came from his laboratory: Jean-Louis Signoret (1933–1991), Marie-France Beauvois, Jacqueline Derouesné, and Bernard Pillon among others.

His first study on the neuropsychology of the frontal lobes was published in 1972 with Derouesné and Signoret [2]. This study was inspired by the work of Luria and provided vivid examples of abnormal behaviors in patients with frontal lobe lesions. Lhermitte later described 2 new clinical syndromes [3]. In utilization behavior, patients spontaneously grab objects put in front of them, starting appropriate behavior associated with it, but at an inappropriate time. In imitation behavior, patients imitate gestures performed by the examiner, although they were not instructed to do so. This may involve fairly conventional gestures such as praying, but also some highly unconventional ones. For Lhermitte, utilization and imitation behaviors were manifestations of a common basic disorder, an imbalance between dependence and independence from external stimuli. Utilization and imitation behaviors have contributed greatly to our clinical understanding of the frontal lobes. But, in our opinion, the major contribution of François Lhermitte to neuropsychology was his description of the “Environmental dependency syndrome” [4], a phenomenon where the affected individuals lose much of their autonomy and rely on environmental cues to accomplish goals or tasks, assuming a different, changing social role. This can occur in complex social situations such as a visit to a medical office, a walk in the garden or a gambling room. It was a striking introduction to an “ecological” neuropsychological approach to everyday life and social interactions. For the first time, neuropsychology went from laboratory studies to quasi-experimental studies in everyday life. Incidentally, thanks to Woody Allen and his 1983 movie, the phenomenon is also known as Zelig syndrome [5].

What were the relations between Lhermitte and other neuropsychologists? He was among those who inspired Ennio De Renzi and Luigi Vignolo to go ahead and form what
was to become the Milan group [6]. Lhermitte was one of the founding associate Editors of Cortex and remained on the Editorial Board of that Journal for many years. The encounter between Lhermitte and the Italians occurred in 1960 at a Paris meeting organized jointly by him and by Hécaen. In subsequent years, it must be said that Henry Hécaen (1912–1983) and Lhermitte often pretended to ignore each other. However, at Henry Hécaen’s funeral, François Lhermitte pronounced a moving and very laudatory eulogy, part of which was published in 1985 [7].

A striking facet of François Lhermitte was his clinical skill as a neurologist. When he was shown a patient, his first words were: “Don’t tell me anything.” He would take the history, propose one or several diagnostic hypotheses, and then examine the patient. In so doing, one sometimes wondered if he wasn’t somehow persuading patients to behave or respond in a certain fashion, as if making up the clinical signs to prove his hypothesis. Actually, in most cases, he just showed an extraordinary intuition of what the patient might show or do. Unlike the laconic output of other clinicians such as Alajouanine, François Lhermitte thought aloud, jumping from one hypothesis to another. Inexperienced or inattentive neurologists might have trouble following his mind, but for others, the exercise was very stimulating.

François Lhermitte’s talent was widely recognized by the French scientific community. Few people in modern times have been members of both the Académie de Médecine and the Académie des Sciences. All this fame did not quell his brilliant mind and his intellectual curiosity. Until his final years, he lived by the motto he had pronounced at the closing of his own inaugural lecture: “we grow weary of everything, but of learning.”

François Boller

References

Jean Lhermitte (1877–1959) highly deserves to be included in this book on History of Neuropsychology because he had a definite formative influence on many persons who have occupied the field of neuropsychology in France in more recent years. Jean Lhermitte was born on January 30, 1877 in Mont Saint-Père on the Marne River. He came from a family of artists, in particular his father Léon Lhermitte (1844–1925) was a renowned painter, friend of such artists as Rodin and Van Gogh. Léon Lhermitte’s production can be seen in Chateau Thierry and at the Orsay Museum in Paris. His brother was an art photographer.

After High School in Meaux, Jean Lhermitte attended Medical School in Paris and became “interne des hôpitaux” in 1900. His teachers included Gustave Roussy (1874–1948), Fulgence Raymond (1844–1910), and Pierre Marie (1853–1940). His career was interrupted by the Great War. He was a field military doctor for 2 years and later a medical officer in a Neurology Center in Bourges under the direction of Henri Claude who was later to get the direction of Sainte-Anne Hospital in Paris.

His career was atypical. He did not have a formal University title until his retirement in 1947 when he was named Honorary Professor. He remained for most of his professional life Head of the Neuropathology Laboratory (an appointment he had received from Pierre Marie), which was located in rue de l’Ecole de Médecine. In 1919, he became “Chef de Service” at a relatively peripheral institution, the Paul Brousse Hospital in Villejuif.

At that time, it was customary for Neurologists to practice more than one discipline [1], but few persons were as versatile as Jean Lhermitte. He was actively involved in practice, research, and teaching of neuropathology including histology. As early as 1914, he co-authored with Gustave Roussy a classical treatise of neuropathology [2]. With Pierre Marie, he wrote an early description of the pathology of Huntington’s disease.

He was a prominent neurologist and is known all over the world for having described a characteristic phenomenon, “Lhermitte’s sign.” Flexing of the neck produces electric shock-like sensations that extend down the spine and shoot into the limbs. He described it in a patient with multiple sclerosis [3, 4], but it is not pathognomonic as it is known to be caused also by trauma to the cervical portion of the spinal cord, cervical cord tumors, cervical spondylosis, or even vitamin B12 deficiency.

He called himself a Neuropsychiatrist, but when reading the topics he covered under that label, one sees that he was clearly interested in brain and behavior relationships. In other words, his interest was “la discipline qui traite des fonctions mentales supérieures
dans leurs rapports avec les structures cérébrales,” which is as close as can be to our current definition of Neuropsychology. He wrote extensively on many subjects ranging from phantom limbs to disorders of consciousness and constructional apraxia.

He is perhaps best known to neuropsychologists for his interest in hallucinations. He was one of the first to propose a classification according to whether the patients have no insight or if they realize that the hallucinations do not correspond to reality, a phenomenon he called hallucinosis. He described the syndrome known as peduncular hallucinosis [5] whereas hallucinations are formed, colored, visual images of people, animals, plants, scenes or geometric patterns. They have been reported in vascular and infective lesions of the thalamus, the pars reticulata of substantia nigra, midbrain, pons and basal diencephalon as well as by compression of midbrain. He pointed out that these patients can also have auditory hallucinations and the syndrome of “auditory hallucinosis” as well as its neuropathological basis have been confirmed [6]. He also described a case of Alzheimer disease in a blind man who had vivid visual hallucinations. Yet the patient had defective imaging, for instance, he could not call to mind the visual image of colors [7]. One could argue that there are similarities with the so-called Charles Bonnet syndrome [8].

His biographers are unanimous in recognizing his extraordinary gift for teaching. His captivating eloquence as well as his charm inspired many students to later become involved in the field of neurology, as exemplified by the Peruvian Oscar Trelles (1904–1990). Both Henry Hécaen (1912–1983) and Julian de Ajuriaguerra (1911–1993) were among the persons who discovered neuropsychology thanks to him. They wrote some of their early papers with him [9, 10] and never lost an occasion of referring to him as their Maître.

In concluding his obituary, Trelles wrote that because of his almost unlimited knowledge, Jean Lhermitte was the last of the “Seigneurs de la Neurologie.” Fortunately, his memory lives forever through his own work and that of his pupils [11].

François Boller

References

Hugo Karl Liepmann (1863–1925) was a neuropsychiatrist born in Berlin. After studying chemistry and defending a doctoral thesis in philosophy, he pursued medical studies, becoming in 1895 assistant to Carl Wernicke (1848–1905) in Breslau. From 1899 onward, he practiced psychiatry in Berlin, treating several patients with general paralysis [1]. Observing the motor difficulties of one of his patients, referred to as “the imperial counsellor,” in 1900 he described dissociation in the execution of movements upon command and approximative execution with interference on one side of the body by inappropriate activity on the other side. The patient was not able to handle everyday objects or dress himself, but his movements improved when he was given commands. The patient presented neither paralysis nor motor incoordination but rather a disturbance of planning functions [2]. Liepmann called this symptom “apraxia,” a term first used by the German linguist Heymann Steinhal (1823–1899) in 1871 [3]. The pathophysiological explanation proposed by Liepmann was damage to the fiber tracts linking frontal regions involved in movement to the parietal lobe, rather than a localized cortical lesion. For Liepmann, a disconnection occurred between the memory of coordinated goal-oriented or functional movement (“kinetic-kinaesthetic images”) and the cortical regions controlling movement and movement perception (“movement formula”): “If one speaks of a movement image, one should be aware that the kinaesthesia part of the word ‘image’ does not apply in a strict sense; it serves only to summarize the entirety of the permanent material traces of previous centripetal stimuli. It designates not a psychological idea but a physiological one.” Liepmann highlighted the distinction between procedural learning (automated movements) and conscious representation of actions. In 1905, Liepmann added the notion of apraxia, of which he distinguished 3 varieties: ideational, ideomotor, and kinetic. Ideational apraxia or “object blindness” renders patients incapable of making appropriate use of familiar objects upon command, even though they can name the object and describe how to use it. Ideomotor apraxia is the inability to follow verbal commands or imitate actions even though the patient performs the gesture spontaneously or as an emotional response. Kinetic apraxia refers to clumsiness in performing a skilled act that is not due to paralysis, muscle weakness, or sensory loss [4]. In 1899, one year before Liepmann’s publication, the Belgian physician David de Buck used the term “parakinesis” to describe this type of motor disturbance and its pathophysiology: “The patient can conceive of actions, but
cannot call to mind the corresponding kinetic images. There is disconnection between movement centres and ideational areas” [5].

Olivier Walusinski

References


Heinrich Lissauer (1861–1891)

During his short life, the German neurologist Heinrich Lissauer (1861–1891), born in Neidenburg (today Nidzica, Poland), described “Lisssauer’s tract” and improved on the concept of visual agnosia. Lissauer studied at the universities of Heidelberg, Berlin, and Leipzig. He practiced as a neurologist at the psychiatric hospital in Breslau, serving as assistant to Carl Wernicke. He died while on vacation in Hallstatt (Austria).

“Lisssauer’s tract” is a dorsolateral tract of the spinal cord consisting of a longitudinal bundle of poorly myelinated fibers between the apex of the posterior horn and the surface of the spinal marrow. This tract transmits surface sensibility, pain, and temperature sensibility.

Lissauer was not the first to describe impaired visual object recognition. The physiologist Herman Munk (1839–1912) and the ophthalmologist Herman Wilbrand (1851–1935) tried to correlate the defective function they observed with a cortical lesion, in 1878 and 1881, respectively. Lissauer’s novel interpretation made his publication a milestone in neuropsychology [1]. He proposed that visual recognition may break down at either an apperceptive or associative level. Lissauer examined an 80-year-old patient 6 weeks after the sudden loss of his capacity to recognize objects even though he could see them. If he could touch and palpate the objects or if he could hear them, he was able to recognize them. Lisssauer developed a model of the recognition process, based on 2 successive stages: first apperception (conscious perception confined to one sensory modality) and then association (perception is linked with previously acquired knowledge and thus understood). According to Lissauer, apperception is dependent on localized cortical activity, while association involves activity of the cortex as a whole. His patient’s brain was examined post-mortem and showed impaired conduction in the splenium of the corpus callosum. For Lissauer, “psychic blindness” implied that both hemispheres would be affected simultaneously [2].
In 1883, Désiré Bernard (1853–1887) transcribed a lesson given by his teacher, Jean-Martin Charcot (1825–1893), who presented a case similar to that of Lissauer. Charcot used the expression "amnésie musculaire verbale," attributing pathophysiology to partial amnesia [3].

Olivier Walusinski

References


Alexander Romanovich Luria (1902–1977)

Alexander Luria (1902–1977), born in Kazan, moved to Moscow in 1921 where his mother became a dentist and his father a physician. Involved in the fervent cultural atmosphere of the post-revolutionary years, he began to work in psychology in the early 1920s. After a brief foray into the field of psychoanalysis, an approach which Luria soon rejected, the need for sound scientific training led him to medical studies, which he completed in 1936 at the Institute of Tbilisi. After he met Lev S. Vygotsky (1896–1934), his true mentor, in 1924, and then Aleksey N. Leontiev (1903–1979), Luria launched a project to develop a new kind of psychology, rejecting the limitations of physiological psychology based on Russian reflexology [1]. The trio replaced it by an approach which emphasized social and historical aspects of mental functions, that is, they stressed on the importance of personal and social experience in the development of cognitive abilities. Logically, they emphasized the mediatory role of language and writing in the development of higher mental functions.

During the 1930s, Luria made expeditions to Central Asia where he investigated various psychological changes (in perception, problem solving, memory, etc.) that took place in undereducated minorities as a result of cultural development [2, 3].
After the end of World War II, Luria was assigned a permanent position in General Psychology at the central Moscow State University, where he would spend most of his remaining years, becoming the director of the Neuropsychology Department. There, Luria devoted himself to the analysis of cerebral mechanisms underlying mental functions. He was particularly interested in how complex human behavior develops and how recovery takes place following injury or illness. In treating brain-injured soldiers, Luria developed the theory of neuropsychological rehabilitation, identifying uninjured components and supplementing them with external aids to reconstruct activity based on a new functional system. He used the term “syndrome analysis” for differentiation among symptoms according to higher or lower levels of integration in the damaged brain components [2, 3].

Luria can also be called a neuropsychologist in the field of special education for individuals with mental retardation. Using the same approach as for brain injuries, he considered the various brain regions as components of functional systems involved in complex psychological functions. Therefore, damage in a particular brain area should be judged by its role in the functional system and the functional system’s role in the individual’s future development [4, 5].

Early on, Luria together with Vygotsky described the role of speech in the regulation of behavior. He extended his researches after WWII, studying the functions of human frontal lobes, showing that the frontal lobes play an essential part in higher regulation of the states of activity. Luria contributed to understanding the manifold expressions of frontal lobe syndrome seen clinically by considering the evolutionary origins of these signs. He standardized neuropsychological qualitative assessments which provide a broad-scale evaluation of sensorimotor, linguistic, academic, memorial, and conceptual reasoning ability domains [4, 5].

The prodigious variety of Luria’s publications reflects the heterogeneity of his work, which moved from developmental psychology to neuropsychology, from normal child to brain-injured adult, from animal brain to human brain, from theory to rehabilitation, from clinical to experimental researches [4, 5]. According to MacDonald Critchley (1900–1997), “his achievements were a compound of intellectual tirelessness, agility and thought, and unpredictable lateral thinking.” [6].

Olivier Walusinski

References

Brenda Milner (1918–) is a British-Canadian neuropsychologist who has been an essential key in neuropsychology development since the early days of World War II. After receiving a scholarship in 1936 from Cambridge University, she became, during the war, part of a team interested in distinguishing fighter pilots from bomber pilots in aptitude tests. Brenda married in 1941 Peter Milner, an electrical engineer, and they moved to Canada after the war where he was invited to work with physicists on atomic research. She graduated in experimental psychology in 1949 in Montreal. Working for a PhD in psychophysiology at McGill University, under the direction of Donald Olding Hebb (1904–1985), she had to explore the patient P.B. who had undergone a medial temporal lobectomy and had subsequent memory impairment. Her research garnered the attention of Wilder Penfield (1891–1976) from the Montreal Neurological Institute. Alongside Penfield, she studied the behavior of a young adult epileptic patient treated with elective focal ablation of brain tissue to treat uncontrolled seizures. Milner earned her PhD in experimental psychology in 1952. Milner’s thesis was a study on the lateralization of temporal lobe functions. She was one of the first to show that temporal lobe damage can cause emotional and intellectual changes in humans and lower primates [1]. That was the beginning of fruitful researches on the effects of damage to the medial temporal lobe on memory. Brenda Milner described the deficits in the most famous patient in cognitive neuroscience, Henry Molaison (1926–2008), formerly known as patient H.M., who, in an attempt to treat seizures had undergone a bilateral temporal lobectomy. Surgery included removal of major portions of the hippocampus. H.M. suffered severe anterograde amnesia, adding to the evidence that the hippocampus was crucial in the formation of new memories. H.M. also had an inability to recall established memories from a few years immediately before damage while memories from the more remote past and other cognitive abilities, including language, perception, and reasoning were intact [2].

Brenda Milner tried to teach him to reproduce a drawing of a star by looking at it in a mirror. As with a normal subject, H.M.’s performance improved over the 3 days’ experiment but the major difference was that he had no memory of all these trials he had been through leading to a total dissociation between his experience and his normal performance. This finding introduced the concept of multiple memory systems within the brain and stimulated an enormous body of research. She also made major contributions to the understanding of the role of the frontal lobes in memory processing, in the area of organizing information, that is, the critical role of the dorsolateral frontal cortex for the tem-
Shining a Light on Some of the Most Famous 19th and 20th Century’s Neuropsychologists

Brenda Milner was also interested in studying the lateralization of function in the human brain. In 1949, Juhn Atsushi Wada (1924–) described the use of the intracarotid amobarbital procedure (i.e., Wada test) to determine cerebral language dominance. Brenda Milner modified the test to assess hemispheric memory and after that “The Wada test” was used to evaluate the risk of postoperative amnesia, to assess the risk of material-specific memory deficits, to lateralize hemispheric dysfunction, and to predict postoperative seizure outcome [4]. In this manner, she confirmed the existence of bilateral speech representations in about 15–20% of non-right-handed patients.

Theodore B. Rasmussen (1910–2002) and Brenda Milner were the first to demonstrate convincingly that damage to the brain can lead to dramatic functional reorganization: “lesions in the Broca’s area or to the posterior parieto-temporal speech zone in infancy was likely to bring about a functional reorganization of the brain in which the right hemisphere became dominant for language or in which they were bilateral representation, but that, in contrast, left-hemisphere lesions that spared these critical regions rarely affected the lateralization speech.” Brenda Milner had found a deficit in memory for new faces after right temporal lobectomy but not after left. All these data are arguments for a greater contribution from the right temporal lobe than the left to memory of visual patterns [5].

During the following years, she also demonstrated that patients with frontal lobe lesions had a heightened susceptibility to interference from the effects of preceding trials, rather than an inability to retain new information over a short time interval. Since the 1990s, neuroimaging work with normal subjects complements rather than replaces the analysis of the behavioral effects of brains lesions. All the works of Brenda Milner point out that her researches had been data-driven rather than theory-driven, authorizing her to discover the memory functions of the medial temporal lobe, hemispheric specialization, and the functions of the frontal lobes [6].

Brenda Milner concludes her autobiography with these words: “as I look over the past 50 years, it seems to me that I have had a lot of luck in being in the right place at the right time, but also enough tenacity of purpose not to be discouraged when the going got rough, as it frequently did in the early days at the Montreal Neurological Institute” [1].

Olivier Walusinski
François Boller
References


Théodule Ribot (1839–1916)

Théodule Ribot (1839–1916), who became an associate philosophy professor in 1866, went on to translate The Principles of Psychology by Herbert Spencer (1820–1903). Inspired by Spencer, he based his investigation on the mechanisms of thought, affectivity, and will on nervous and psychiatric pathology, fields which progressed rapidly during the last third of the 19th century. Ribot is known as the founder of French scientific psychology, an independent scientific discipline distinct from philosophy. After studying with Jules Baillarger (1809–1890) and Jacques-Joseph Moreau de Tours (1804–1884) at La Salpêtrière, he defended a doctoral thesis in literature in 1873. The subject was heredity – its phenomena, laws, causes, and consequences approached from a psychological perspective. This innovative theme contained the seeds of his later work. Enrolling in 1872 at the medical school, he studied under Claude Bernard (1813–1878), Alfred Vulpian (1826–1887), and Jean-Martin Charcot (1825–1893), regularly attending Charcot’s Tuesday dinners. For 3 years, he dissected brains in the histology laboratory of Charles Robin (1821–1885). He did not defend his thesis in medicine. As a close friend of Charcot, he was depicted in the famous painting by André Brouillet (1857–1914), Une leçon clinique à La Salpêtrière [1].

In 1876, he founded La Revue philosophique de la France et de l’étranger and succeeded in bringing together the best minds in science and philosophy. Also in 1876, Ribot presented a report on his research on “the duration of psychic acts, based on current studies,” in which he distanced himself from philosophy in favor of scientific experimentation [2].

In 1881, in his successful book on diseases of memory, Ribot combined his method for studying pathology with the theory of evolution and presented his “law of regression of
memories,” according to which the most recent memories are forgotten first, whereas the oldest memories are forgotten last. Ribot was appointed to the first Chair of Experimental Psychology at the Sorbonne in 1885 and entered the Collège de France in 1888. In addition to memory, Ribot investigated other areas of intellectual and affective function: Les maladies de la volonté (diseases of the will, 1883), Les maladies de la personnalité (diseases of personality, 1885), Essai sur l’imagination créatrice (essay on the creative imagination, 1900), La psychologie de l’attention (psychology of attention, 1889), La psychologie des sentiments (psychology of feelings, 1896), La logique des sentiments (logic of feelings, 1905), and Problèmes de la psychologie affective (problems of affective psychology, 1910). In each study, he used the same methodology, based on pathologies viewed as regressive, from acquisition to dissolution. According to Ribot, pathology made it possible to analyze the disorganization of mental mechanisms in the same way that dissection made it possible to penetrate anatomical parts. His use of the word “sentiment” (feeling) referred to both physical sensitivity (cenesthesia and pain) and moral sensitivity (emotions). He distinguished between the basic forms and described their complex aggregates. In 1914, he investigated “unconscious functions and movements,” studying the role of motor images, “procedural” memory, and unconscious activity; this led him to consider the existence of thought without images or words [3].

With Charles Richet (1850–1935), Ribot founded the Société de Psychologie Physiologique in 1885, presided over by Charcot for its first international congress in 1889, during the World’s Fair in Paris [4].

Olivier Walusinski

References


Shining a Light on Some of the Most Famous 19th and 20th Century’s Neuropsychologists 225
Charles Richet (1850–1935) is best known for being awarded the Nobel Prize in Physiology or Medicine in 1913 for his work on anaphylaxis. He began his extensive and varied research while only an interne (house officership). His work focused on psycho-physiological phenomena that occur at the limits of ordinary psychic function, coining the term “metapsyche” in 1905. Influenced by the research of Jean-Martin Charcot (1825–1893) on hysteria and hypnosis (Richet used the term “magnetic somnambulism”), Richet tried to materialize mental states, drawing on physiological data and attempting to objectify signs that might elucidate the enigmas of thought [1]. After his thesis in medicine in 1877 “Recherches expérimentales et cliniques sur la sensibilité,” Richet passed the competitive exam to become an associate professor in 1878, for which his thesis was entitled “Structure des circonvolutions cérébrales.” In 1887, he was appointed to the Chair of Physiology. Also in 1887, he published “Un essai de psychologie générale,” basing his work on studies of the nervous system and proposing explanations of mental activity [2]. In 1890, he founded the journal Annales de Sciences psychi ques. Although he conducted scientific research on paranormal phenomena, studying seers and ghosts, his scientific integrity leaves no room for doubt, in light of the research he conducted on serotherapy and anaphylaxis. Richet’s studies make it clear that he was tricked, but they also reveal the type of interference that may occur between the researcher and what or whom is being investigated. Deeply affected by the horrors of World War I, during which he practiced as a physician, in 1919 he published “L’homme stupide” in which he set forth his highly pessimistic view of humanity and argued in defense of pacifism. As was common in his day, Richet expressed opinions that were clearly eugenicist and racist, glorifying the colonization of African and Southeast Asian peoples [3].

Olivier Walusinski

References

Paul Sollier (1861–1933) was a student of Désiré-Magloire Bourneville (1840–1909), Jules Dejerine (1849–1917), and Auguste Voisin (1829–1898). He spent many years training as both a neurologist and a psychiatrist at Bicêtre Hospital and La Salpêtrière Hospital, where he worked alongside Joseph Babinski (1857–1932). In 1890, Sollier defended his thesis, inspired by Bourneville: Psychologie de l’idiot et de l’imbécile, which is one of the first theses on child psychiatry. In 1897, Sollier founded with his wife Alice Mathieu-Dubois (1861–?), who was also a physician, the Boulogne-Billancourt hydrotherapy center, near Paris. There, he developed new therapeutic methods, precursors to current cognitive-behavioral methods. His most famous patient was Marcel Proust, who consulted him at the end of 1905. Sollier was a prolific author, widely read and translated until World War II. He covered a variety of subjects, including doubt, psychic energy, conscience, morality, addiction to gambling, anorexia nervosa, and morphine withdrawal. He became professor of psychology at Université Nouvelle de Bruxelles in 1898 but never held this position in France. He was elected president of the Société Médico-Psychologique in 1926. As director of the neurological center of the 14th military region during the war, Sollier coordinated the preparation of a wartime clinical neurology treatise, published in 1918. His psychotherapeutic treatment of “war psycho-neuroses” was distinctly different from the more violent method using “persuasion by faradic currents,” which soldiers referred to as “le torpillage” (torpedoing) and which was advocated by Clovis Vincent (1879–1947) and Gustave Roussy (1874–1947). At the end of his career, he devoted himself to mental health in the workplace and occupational therapy, which he named “la psychotechnique” [1].

In 3 domains, emotion, memory, and hysteria, his thinking is considered modern even by today’s standards. Sollier developed a theory of memory based on neurological and psychological ideas. His main work on this subject was published in 1900. Sollier defined the conditions for memory stabilization (e.g., stimulus intensity, duration, repetition, attention, coexisting emotion, and will), cellular changes and plasticity during learning, and memory as a basic property of nerve cells. Memory organization centers are different than perception centers; the former are under the control of the frontal lobes. According to Sollier, neurophysiological mechanisms explained why a recalled memory is identified as memory rather than actual perception. Sollier was the first to analyze an involuntary surge of detailed memories and to use it during specific therapies for his patients. He linked memory with affective and emotional factors [2].
Marcel Proust (1871–1922), one of the greatest novelists of all times, is known for his extraordinary skills in analyzing the forms and psychological mechanisms of memory. With Proust as well as his other patients, Sollier used involuntary memories to trigger a kind of re-experiencing, so that the patient could reach a new mental and affective balance, which would then improve symptoms. Undoubtedly, several of Proust’s ideas on involuntary memory appear to have developed from what he learned from Sollier, both from his books and from his personal experience as a patient [3].

Olivier Walusinski

References


Carl Wernicke (1848–1905)

Carl Wernicke (1848–1905), born in Silesia, studied medicine at Breslau University. After graduation, he served as an army surgeon during the Franco-Prussian war. He served in the Franco-Prussian war of 1870 as an army surgeon. He then became assistant to Heinrich Neumann (1814–1884) in the psychiatric department of the Allerheiligen Hospital in Breslau. Neumann advised him to study neuroanatomy under Theodor Meynert (1833–1892) in Vienna. From 1875 to 1878, Wernicke was assistant to Karl Westphal (1833–1890) in the Berlin Charité clinic. After working as a neurologist in private practice, he took over Neumann’s position as head of the psychiatric department. In 1890, he became director of the neurology and psychiatry department at the university hospital, a position he held for 20 years, bringing together an outstanding team of scientists that researched apraxia, agnosia, and asymbolia [1, 2]. Wernicke died in 1905 from injuries sustained during a bicycle accident in the Thuringian forest.
Wernicke published, at the age of 26, the article that made him famous, which dealt with sensory aphasia localized in the temporal lobes (1874) [3]: “Aphasische Symptomencomplex. Eine psychologische Studie auf anatomicoser Basis.” This disorder impairs comprehension of spoken language, the ability to read (silently) and write, and articulate speech. Hearing is intact. Patients may speak fluently with a natural language rhythm, but the result has neither understandable syntax nor meaning [1].

In 1877, Wernicke observed that lesions relatively limited to the 6th nucleus resulted in the paralysis of conjugate gaze on the side of the lesion. He was the first to postulate a center for conjugate gaze in the pontal tegmentum.

In 1881, Wernicke completed the initial description published by Charles-Alphonse Gayet (1833–1904) in 1875 [4] of an encephalopathy syndrome (Gayet-Wernicke encephalopathy) characterized by behavioral symptoms (listlessness, disorientation, confusion, hallucinations, Korsakoff psychosis), oculomotor paralysis (chiefly of the external recti, conjugate paralysis, and horizontal and vertical nystagmus), and ataxia. During the autopsies, Wernicke observed punctate hemorrhages of the grey matter around the third and fourth ventricles and aqueduct, which he called “polioencephalitis haemorrhagica superioris” [5]. The disturbance was primarily due to thiamine deficiency secondary to alcoholism and/or starvation.

Wernicke wrote a 3-volume textbook of nervous disease (Atlas des Gehirns; Schnitte durch das menschliche Gehirn in photographischen Originalen, 1881–1883) and a treatise on neuroanatomy (Lehrbuch der Gehirnkrankheiten: für Aerzte und Studirende, 1897–1900). In volume one, Wernicke described the vascular supply of the brainstem. With Georg Theodor Ziehen (1862–1950), he founded the journal Monatsschrift für Psychiatrie und Neurologie in 1897.

Olivier Walusinski

References