Early 19th century debates about the frontal lobes:
phrenology gets it right and wrong, while neuropathology remains uncommitted.
Franz Joseph Gall 1758-1828

proposed that brain damage to an organ would cause a physiological dysfunction of that organ. He examined several brain-damaged patients sent to him by Dominique Larrey, Napoleon's surgeon. These case histories aren’t remarkable in and of themselves, nor is Gall's examination of them, they establish the clinico-pathological correlation method as part of Phrenology
• Alexander Hood, a country doctor practicing in a small village near Edinburgh, Scotland, adopted a phrenological model to explain the consequences of cerebrovascular accidents in his patients; why?
• An answer: For over two decades books, as well as editorials and articles in major medical journals, endorsed and supported both Gall’s and Spurzheim’s ideas.
• This, despite the fact that phrenology had been criticized and satirized for almost the same length of time.
George Combe
The Phrenological Journal and Miscellany [1823-1847] was the house organ of the Edinburgh Phrenological Society; the society was founded in 1820 by George Combe (1788-1858)
Hood, Alexander (1824) "Case 4th - July 28, 1824 (Mr. Hood's Cases of Injuries of the Brain.)" The Phrenological Journal and Miscellany, Vol. II: 82-94.
Adam M'Conochie, a 48 year old gardener from Dankeith, Scotland, sustained a mild left hemisphere CVA on the morning of May 31, 1824.
To indicate where the problem lay, M'Conochie obligingly raised his hand to the left side of his head, and, pointing particularly to his temple behind the angle of the eye, said there was "something about it".
He had no apparent difficulty in comprehending any question which might be put to him: but his answers were always such as these: "something about it", "plenty about it", "little about it", "nothing about it"
M'Conochie was able to tell the hired laborers by means of gestural signs, which plots needed to be dug or hoed and which crops needed to be thinned or weeded.
His judgment did not appear to be in the least impaired, from anything which could be observed in his conduct, and his recollection of facts and circumstances was clear and distinct, as exemplified in activities of daily living.
Hood notes that there were some words, even when pronounced for him, that he could not articulate, which induced Hood to believe that some of the small muscles of articulation used in the pronunciation of certain words, were somewhat paralyzed.
“A psalm-book was presented to him as on a former occasion, but instead of naming the letters of the alphabet, or pronouncing the words, he numbered them accurately in the order of reading from left to right, thus,—one, two, three, four, five, six, seven, &c; and when he came to the end of the line, he started again at unity…numbering the words in each line instead of reading.”
June 9th: “McConochie has by now made considerable improvement: he not only has the use of a much greater number of words than before, but he also has "recovered the power of reading, though very imperfectly, as there are still many words which he cannot pronounce”
when McConochie is asked questions, “if he has any uneasiness in his mind, his answer is uniformly, that there is a hantle about it,”
June 21st: Hood notes that by now the patient can read tolerably well…The patient cannot, however, repeat a “sentence or even a syllable of the Lord's prayer, or any other portion of the sacred volume with which he was formerly familiar.”
July 2nd: M'Conochie has been rather melancholy; his right arm and leg are affected with weakness and irregular nervous action; he can read pretty well, but he cannot repeat anything which he had formerly committed to memory
July 2 (cont.) there are still some words which he cannot pronounce, though they are much fewer than they were three weeks ago. “A strong degree of excitement seems to give him temporary command of a few words which he has not in his calmer moments.”
He can use both arms and hands equally well and perceives little difference with regard to strength, but a striking difference with regard to sensation.
However, when he picks up something with his right hand, he often has to apply his left hand so as to enable him to judge accurately of the temperature of bodies.
July 10. M'Conochie told Hood, when a book was previously given to him and he was asked to read, he had "numbered" the words, that is, spoken the words 'one, two, three, four, five, six' &c. “he comprehended the import of the actual words given as numbers, although he did not recollect how to pronounce or name them.”
Hood’s review of his cases: “the last of these cases is not without considerable interest, in as much as it unfolds to us the nature of that affection by which individuals sometimes suddenly lose the verbal recollection of almost every term in the language, without the ideas being lost, or the judgment impaired.”
In reference to the sequelae of brain damage, Hood notes that although the parts heal up, they never acquire the "perfect organization" with which they were originally endowed.
"The tongue and its related organs in the act of speech can be separately paralyzed, that is to say, without the other parts being affected simultaneously;" … "The loss of speech (however) depends now upon the loss of the memory of words, now upon the loss of the muscular movements by which speech is composed, or, what comes perhaps to the same thing; Now upon a lesion of the gray matter and now upon that of the white matter of the anterior lobes"
"An attentive perusal of these cases suggests some important reflections concerning the pathology of the brain. ...(they) show to what an alarming extent this important organ may be injured without destroying life or the functions of health. It would neither be professional, nor philosophic, however, from a few remarkable cases, to infer that the brain is of little consideration in the animal economy, or totally unconnected with the operations of the mind. Were the patients in all such cases capable of giving a distinct and accurate account of their feelings and sensations, and the medical observer fully adequate to point out every deviation from the healthy condition of body and mind, much of our surprise would cease, and the apparent anomaly would disappear (p.88)."
Hood fractionated the organ of Language into three parts:

[1] one directly controlling articulatory muscles,

[2] another controlling verbal expression and

[3] a third controlling the memory or ideas for words.
1824: That Was the Year That

• Alexander Hood's paper was published on July 28, 1824
Pierre Paul Broca Was Born on July 28, 1824
RECHERCHES
ANATOMICO-PATHOLOGIQUES
SUR
L'ENCEPHALE
ET SES DÉPENDANCES;
PAR F. LALLEMAND,
PROFESSEUR DE CLINIQUE CHIRURGICALE DE LA FACULTE DE MÉDECINE
DE MONTPELLIER, CHIRURGUE EN CHEF DE L'HÔPITAL CIVIL ET
MILITAIRE DE LA MÊME VILLE, ETC. ETC.

Ars medica non in observationibus.
(Fred. Hoffman.)
Neque enim numerando sunt, sed
perpendendo... observationes.
(Morgagny, Epître 51, No 47.

TOME SECOND.

A PARIS,
CHEZ BÉCHET JEUNE, LIBRAIRE
DE L'ACADÉMIE ROYALE DE MÉDECINE,
PLACE DE L'ÉCOLE DE MÉDECINE, N° 4.

1830.
In Claude-Francois Lallemand’s *Recherches anatomo-pathologiques sur l’encéphale et ses dépendances* (1820, 1822), the majority of the patients with speech and language disorders had a left hemisphere lesion; there were also many cases presenting a right frontal lesion and normal language.
Letter 2, Obs. 2. It is a clear negative case of frontal lobe lesion without language disorders. A 70-year-old woman suffered a progressive numbness and weakness of her left limbs for a few months, without however any other symptoms. She suddenly fell into coma and died two days later, without regaining consciousness. Pathology showed an extensive abscess that completely destroyed the right frontal lobe and a large part of the basal ganglia on the same side, but no language deficits were reported.
Letter 4, Obs.: A 57-year-old woman presented a progressive numbness and weakness of her left limbs, without any defect in reasoning nor speech disorder. 12 days after the onset of the disease, she suddenly fell unconscious and died the next day. Pathology showed an abscess, the size of a chicken egg, in the anterior part of the right hemisphere.
**Lettre 1, Obs. 8:** a 54-year-old widow suffered from headaches and a progressive language disorder. Approximately one month after her admission to hospital, the symptomatology suddenly evolved into a right-side paresis and a further increase of the language disorder, and, apparently, bucco-facial apraxia (*ìHer stuttering increased to the point that it was not anymore possible to understand anything of what the patient tried to say. She even could not stick out her tongueî*). She died about 2 months after disease onset. *Pathology* showed a left parietal and posterior insular lesion
Letter 4. Obs. 9: a 39-year-old man, who had suffered from persistent headaches three months before his admittance into hospital, showed a progressive language disorder and a right-side paresis. He died about 6 months after disease onset. Pathology showed a left parieto-occipital cystic abscess.
Recherches cliniques propres à démontrer que la perte de la parole correspond à la lésion des lobules antérieurs du cerveau, et à confirmer l'opinion de M. Gall, sur le siège de l'organe du langage articulé (Mémoire lu à l'Académie royale de Médecine, le 21 février 1825).
Archives Générales de Médecine, 3 (8), 25-45, 1825. par M. J. Bouillaud
Bouillaud

• he first described some positive and negative cases where the anatomo-clinical correlation actually corresponded to his expectations; he then tested the localisation of speech in the frontal lobes on the basis of two neurological and neuropathological sourcebooks published by Claude-François Lallemand (1820, 1822) and by Louis-Léon Rostan (1823).
Bouillaud

• "I carefully read their observations, starting or from the symptoms descriptions or from pathology. When a speech disorder was present I expected to find a lesion of the anterior lobes; on the contrary, when pathology identified a lesion of the anterior lobes, I expected to find loss of speech between symptoms."
He thus suggested testing the hypothesis of localisation of speech motor control in the frontal lobes. In this context he demonstrated a brilliant insight, clearly defining the principle of a "necessary and sufficient condition" to test anatomo-functional correlations: if the frontal lobes are crucial for directing speech movements, two conditions must be satisfied, *first*, when the frontal lobes are affected, speech must also be affected; and *second*, when the frontal lobes are spared the same must be the case for speech movements.
(...) il importe encore de découvrir quel point du cerveau occupe une semblable force. Or, d'après les observations que j'ai recueillies moi-même, d'après un grand nombre de celles que j'ai puisées dans les auteurs, je pense que c'est dans les lobules antérieurs du cerveau que réside le principe nerveux dont il est question, et que l'on pourrait appeler organe législateur de la parole(…)

p.29-31
Lorsque les observations précédentes, et quelques autres encore que j'ai recueillies, m'eurent fait naître l'idée d'un rapport intime entre là perte plus ou moins absolue de la parole et l'altération plus ou moins profonde des lobules antérieurs du cerveau, je résolus de mettre cette idée à l'épreuve des faits recueillis par d'autres observateurs, et notamment par MM. Lallemand et Rostan qui en ont publié un si grand nombre.
C-F Lallemand’s critique

Referring to a case Hx that Bouillaud had used in his paper, Lallemand added this footnote to the 1830 edition of his book, an ironic comment directed at Bouillaud, pointing out that the site of the lesion was incompatible with his theory:
If one would have tried to determine the lesion site on the basis of the ideas recently expressed, it must be recognised how erroneous this localization would be: since the patient's symptomatology started with a language deficit, the abscess had to be located in the anterior lobe.
Sequel: from the 1820’s until the 1860’s, researchers in Europe debated the question “is language located in the frontal lobes?”
Due to lack of understanding

- Of language laterality
- Of differential contributions to language of the frontal, temporal & parietal lobes
- Of language comprehension systems in the brain
“data” took the following forms

• RH lesion, not in frontal lobe, no language impairment: “for Gall’s model”
• RH lesion, frontal lobe, no language impairment: “against Gall’s model”
• LH lesion, frontal lobe, language impairment: “for Gall’s model”
• LH lesion, not in frontal lobe, language impairment: “against Gall’s model”