

Neurociência da Linguagem

Aniela Improta França (UFRJ/CNPq)
aniela@gmail.com

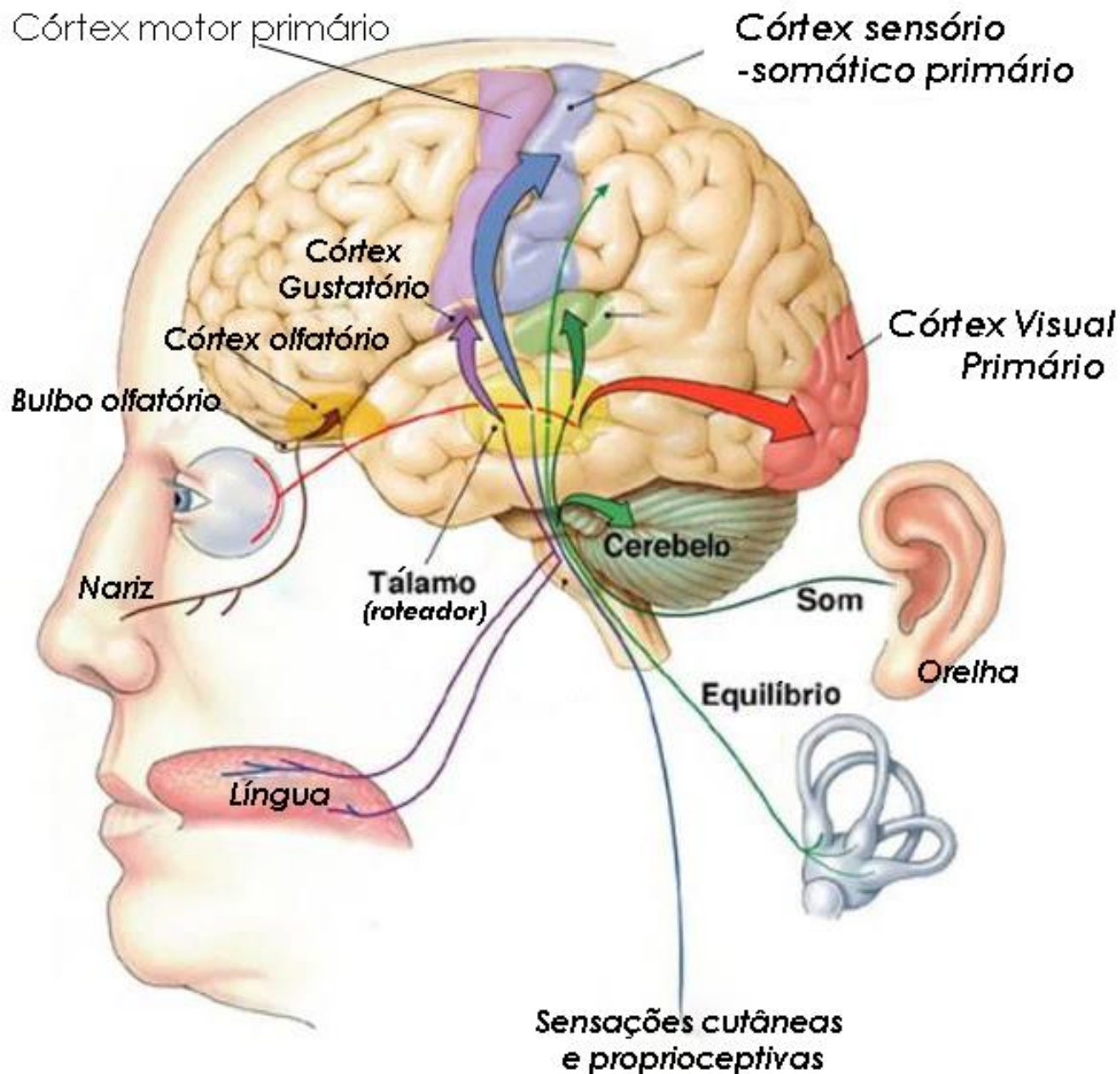
Aula 2

pandemia
2020_2

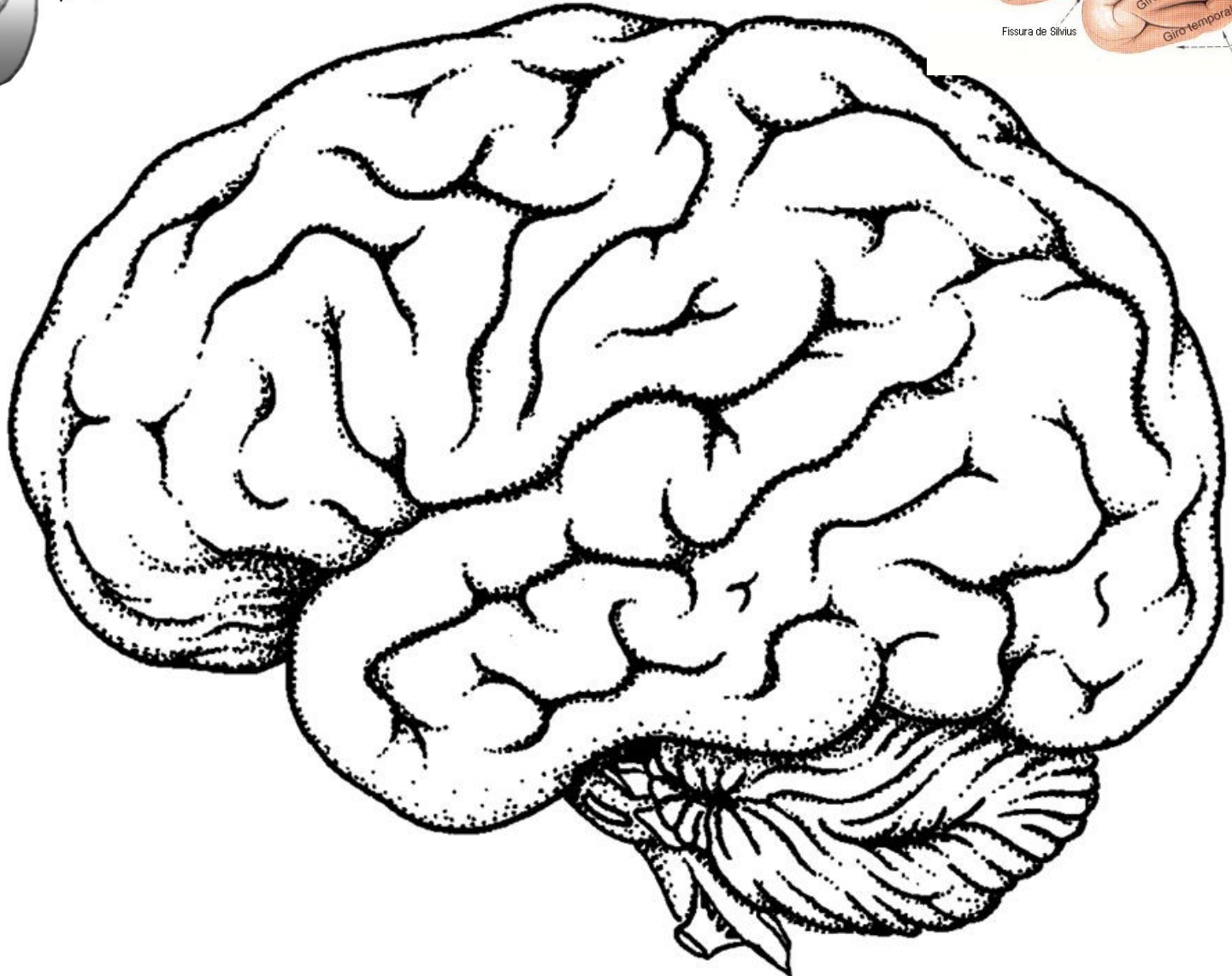
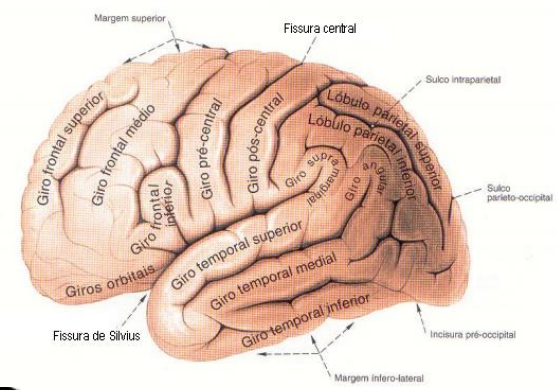
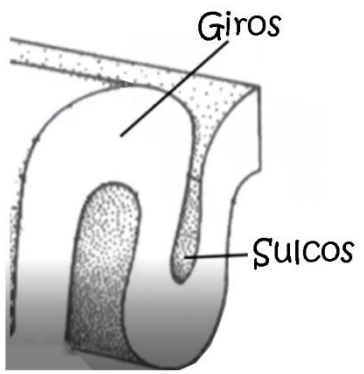




curiosidade

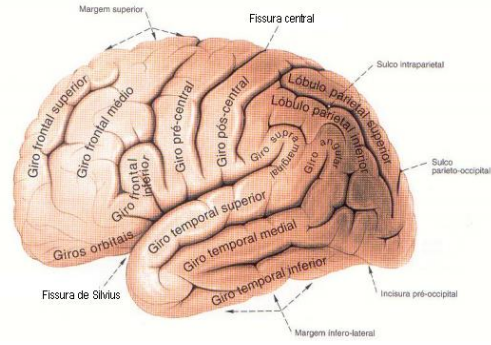
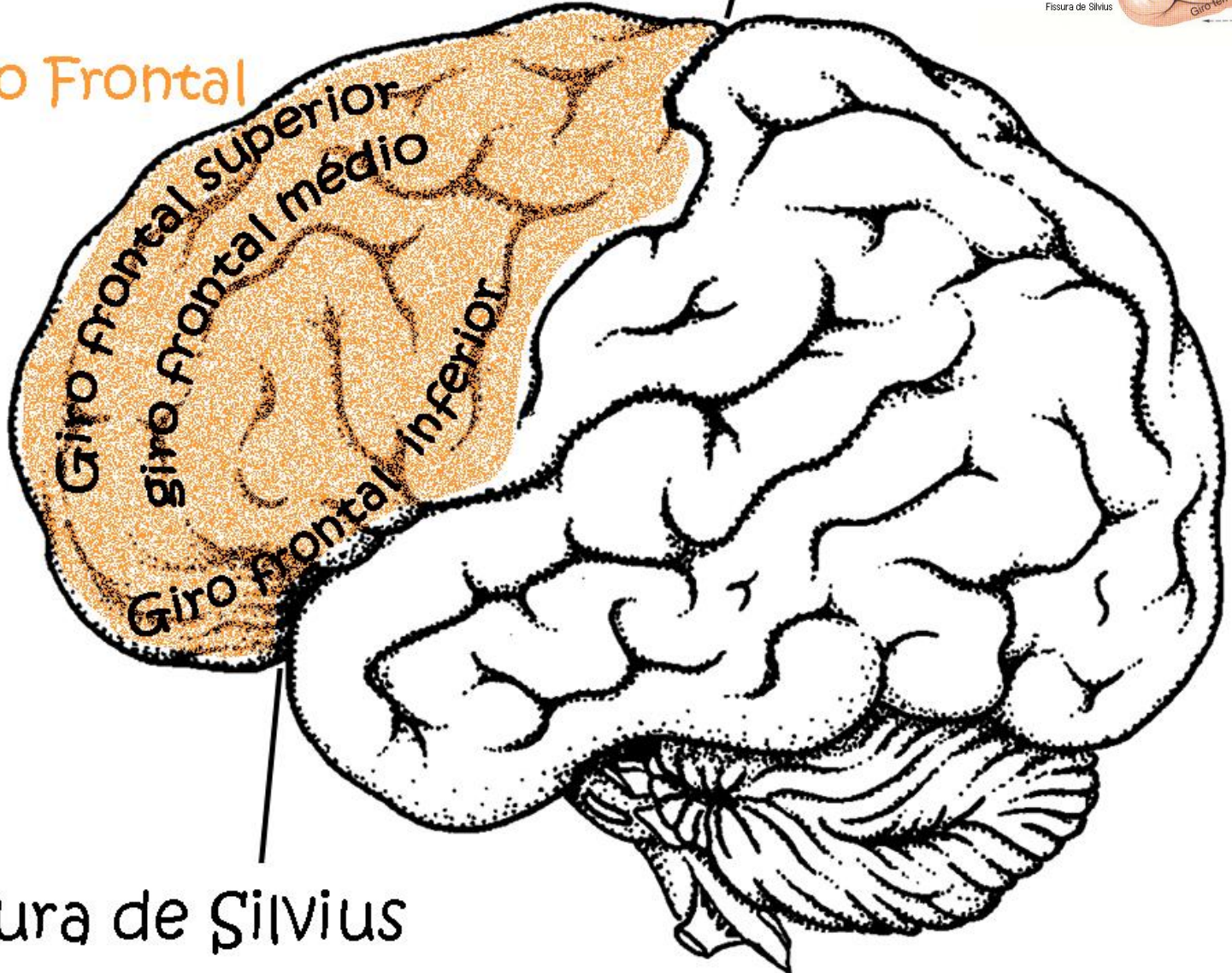


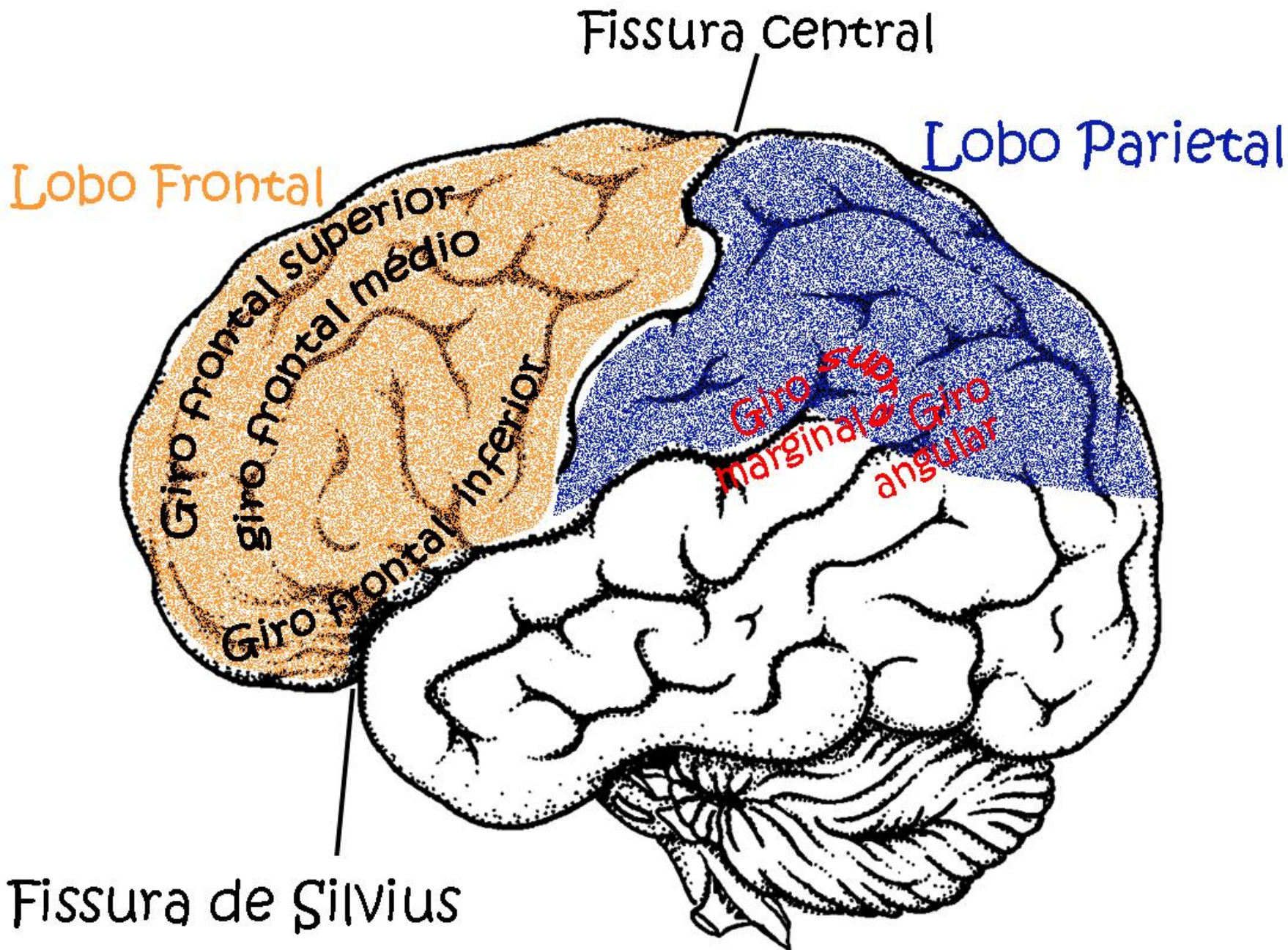
Adaptado de <https://www.theoilystory.com>

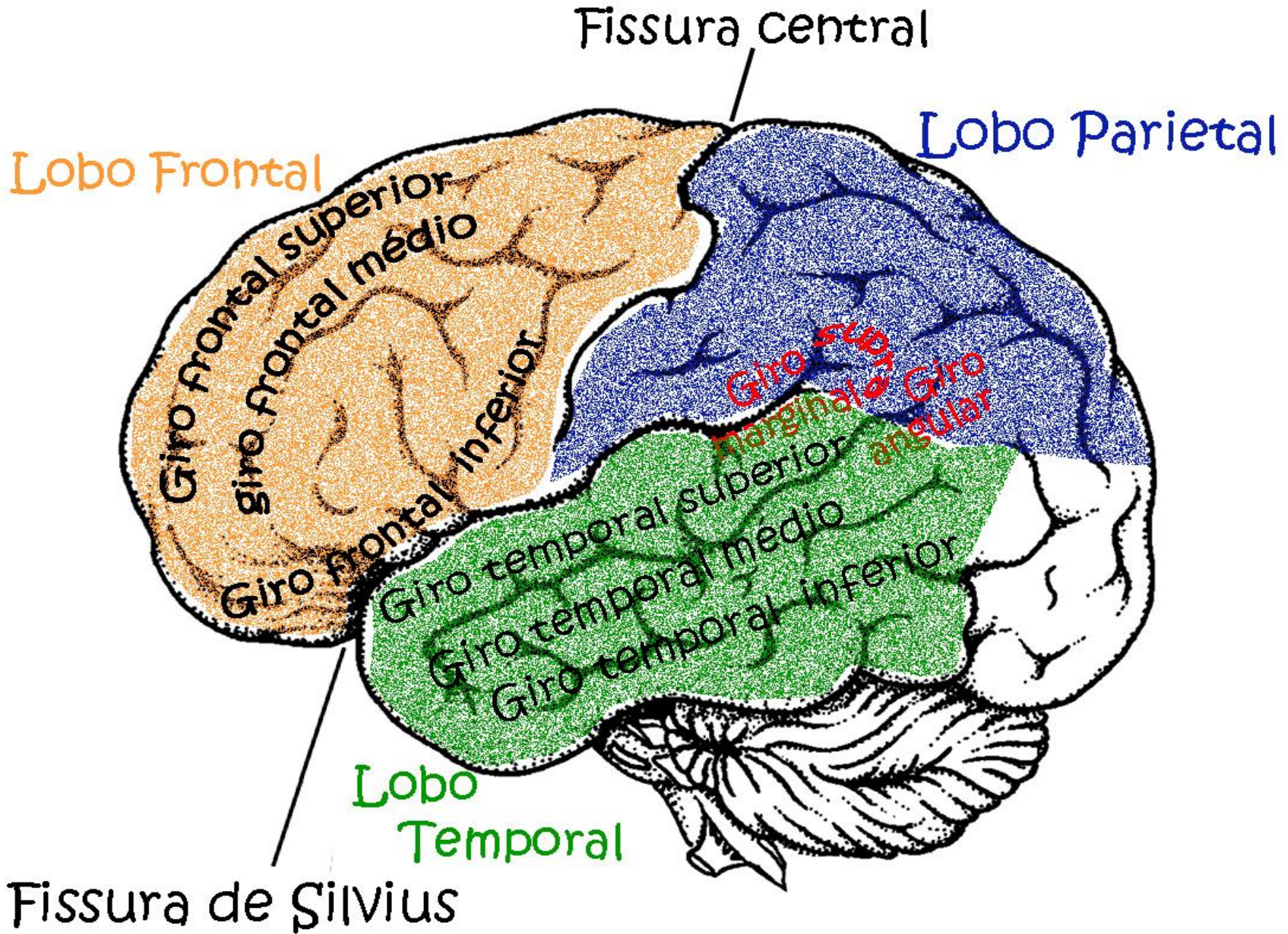


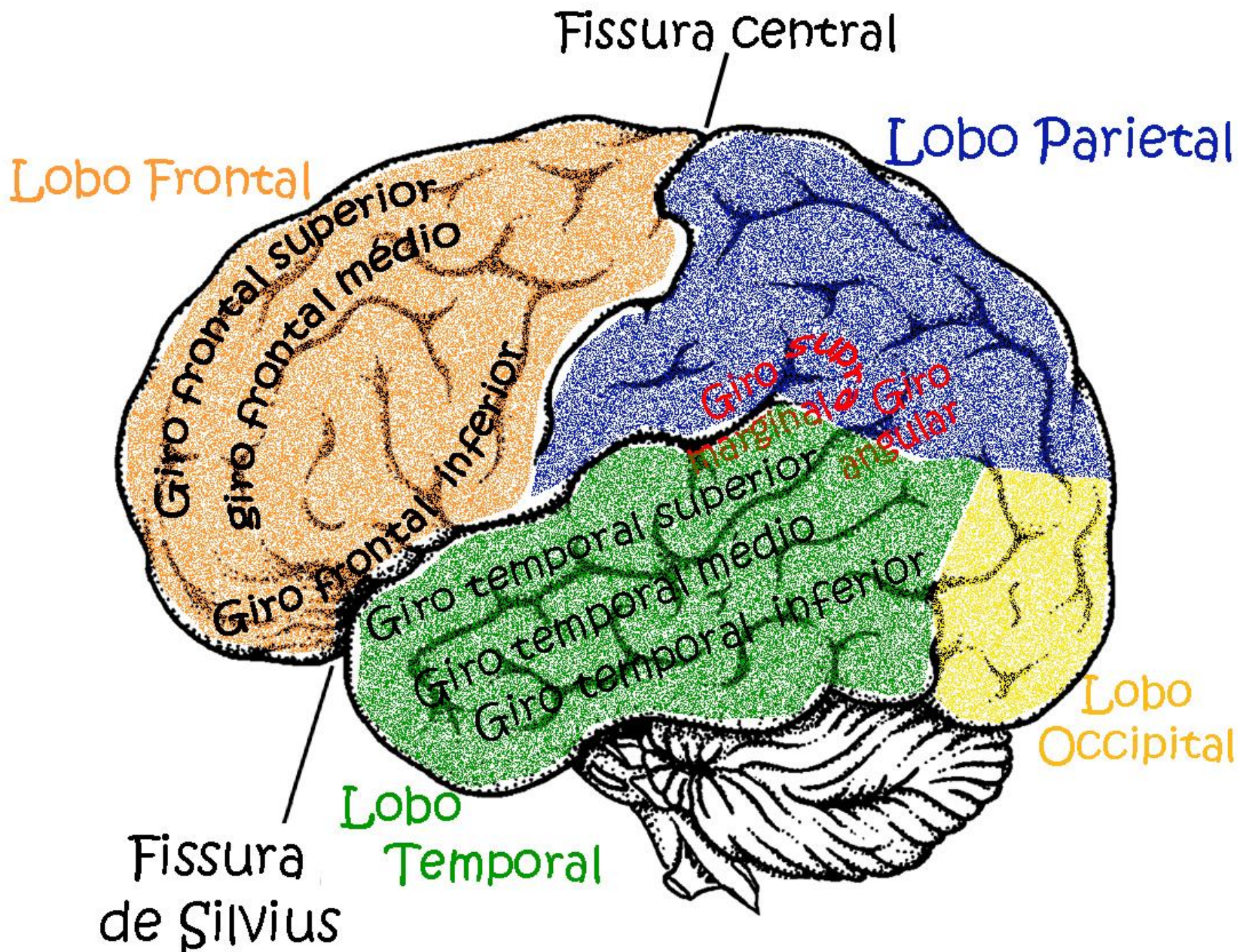
Lobo Frontal

Fissura de Silvius









Fissura Central

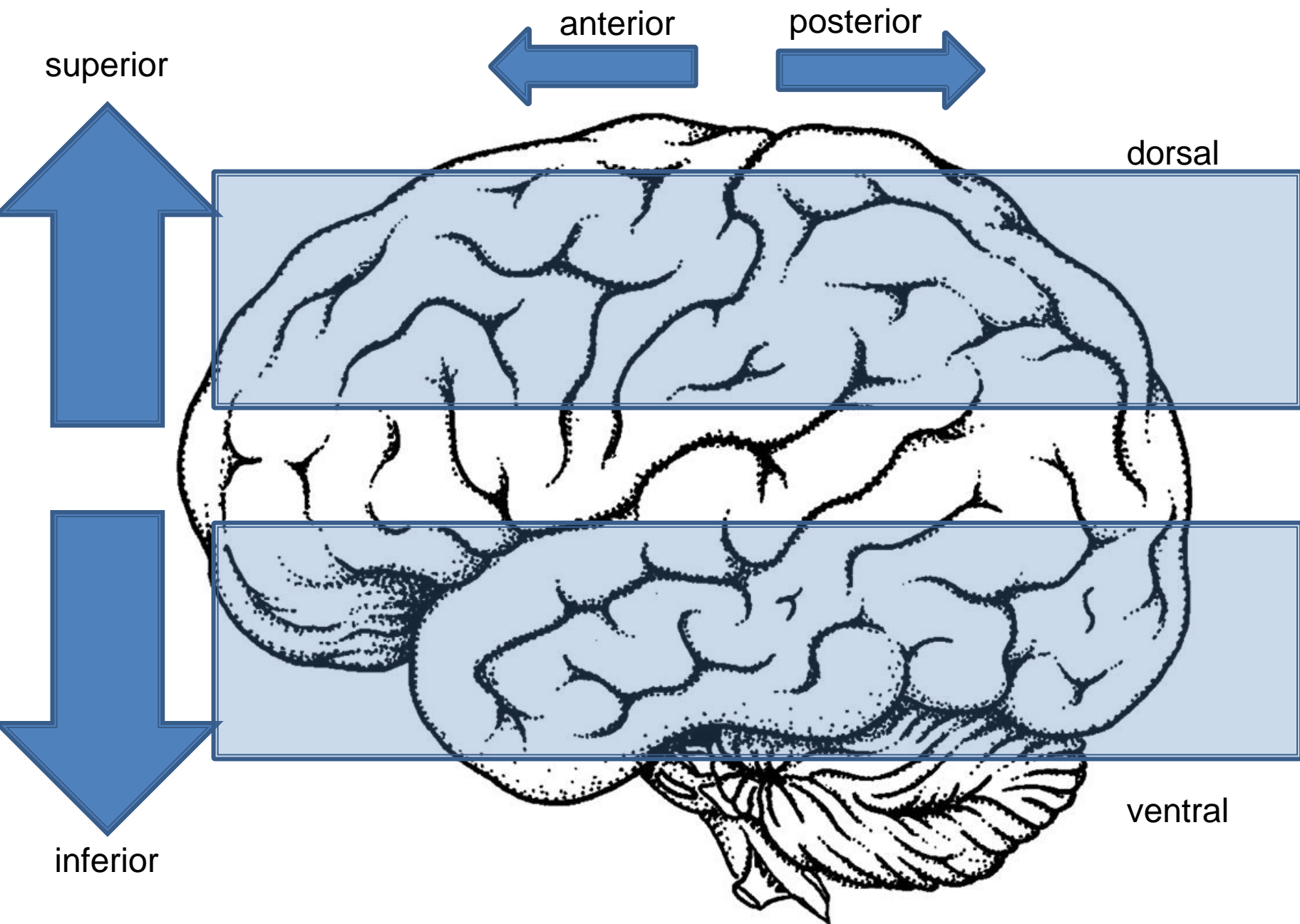


Fissura
de Silvius

Temporal

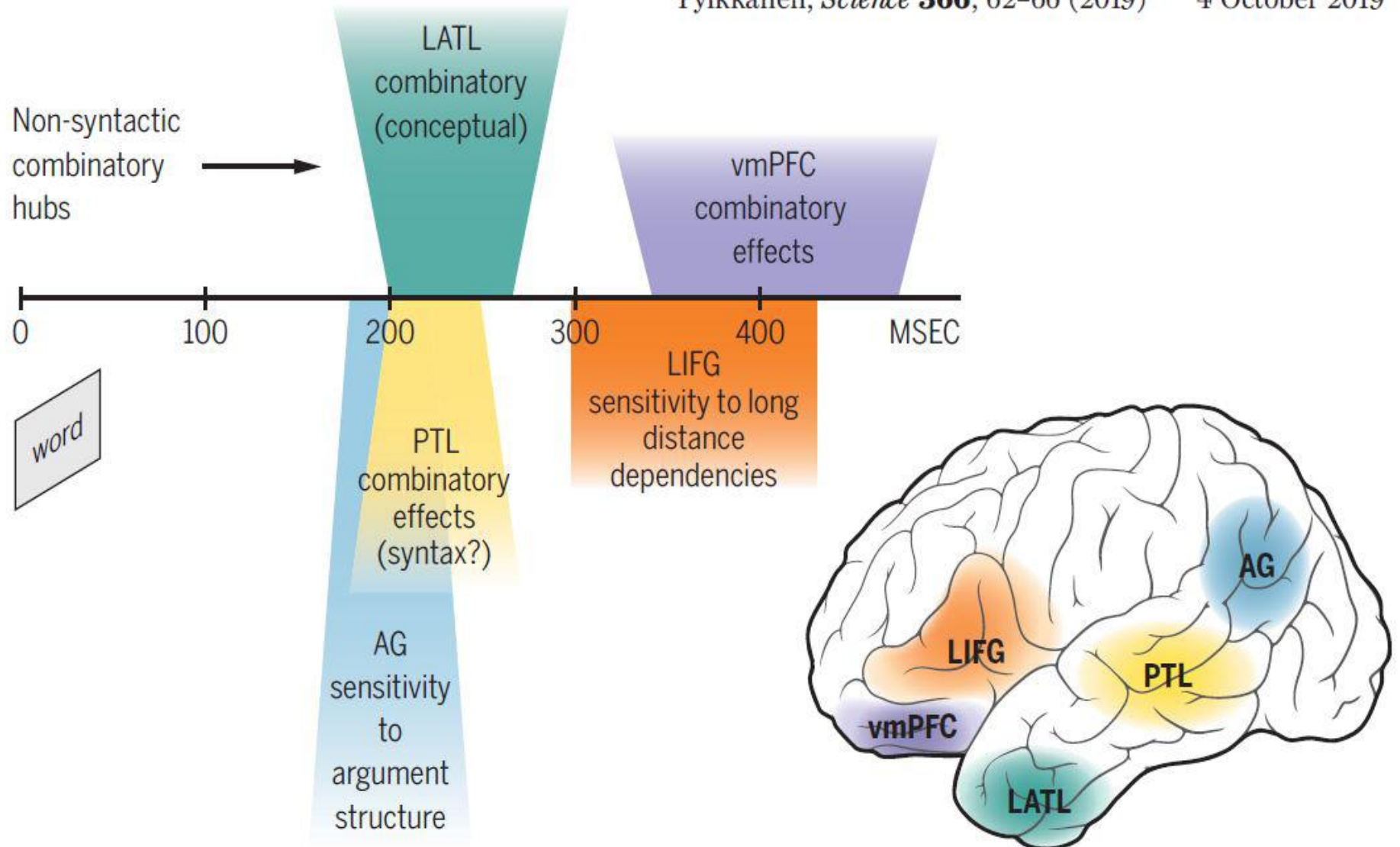


A coisa real



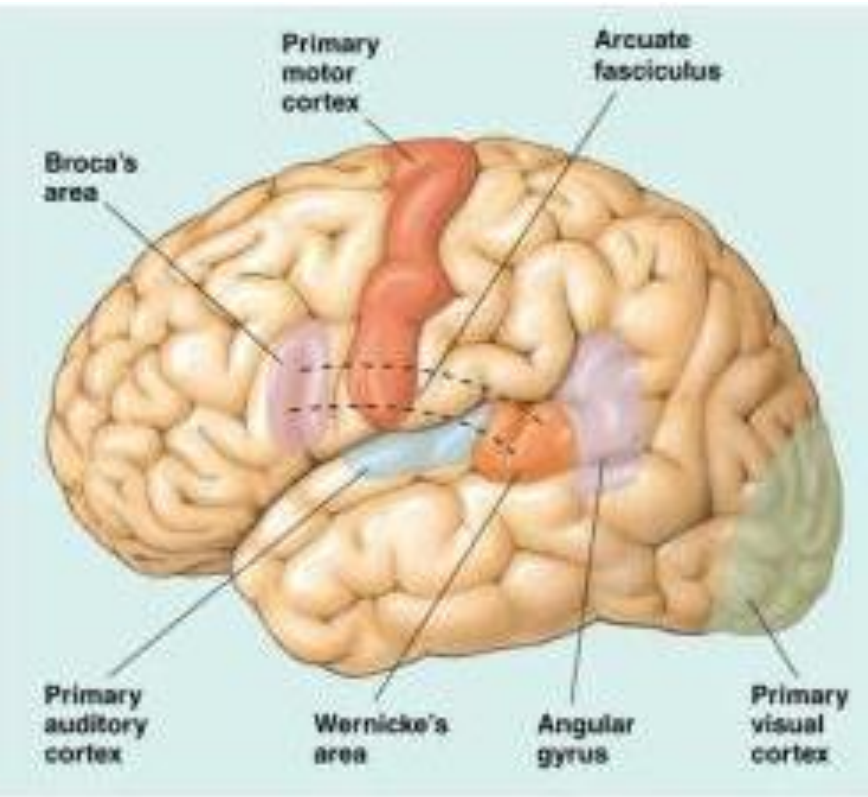
Objetivo do curso: Mapeamento último da linguagem no cérebro

Pylkkänen, *Science* **366**, 62–66 (2019) 4 October 2019

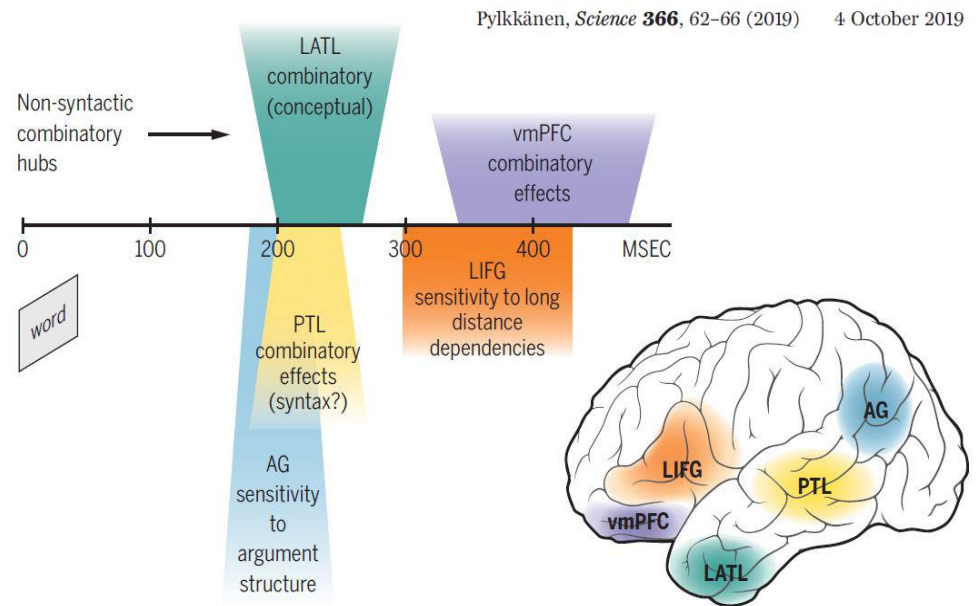


Objetivo do curso: Mapeamento último da linguagem no cérebro

De 1800 até 2000



De 2015 até agora



Aula 2

- Evolução do pensamento da neurociência
- Principais acontecimento pré e pós Modelo Conexionista
- Implementação não invasiva

Como conectar a substância no cérebro com as cognições?

Hipócrates (460 aC)
Galeno (129 /200 dC)
Até o Sec 17

Era Galênica



GALENI IN LIBRVM HIPPOCRATIS

*Substância?
O que importa
é o espaço*

Como conectar a substância no cérebro com as cognições?

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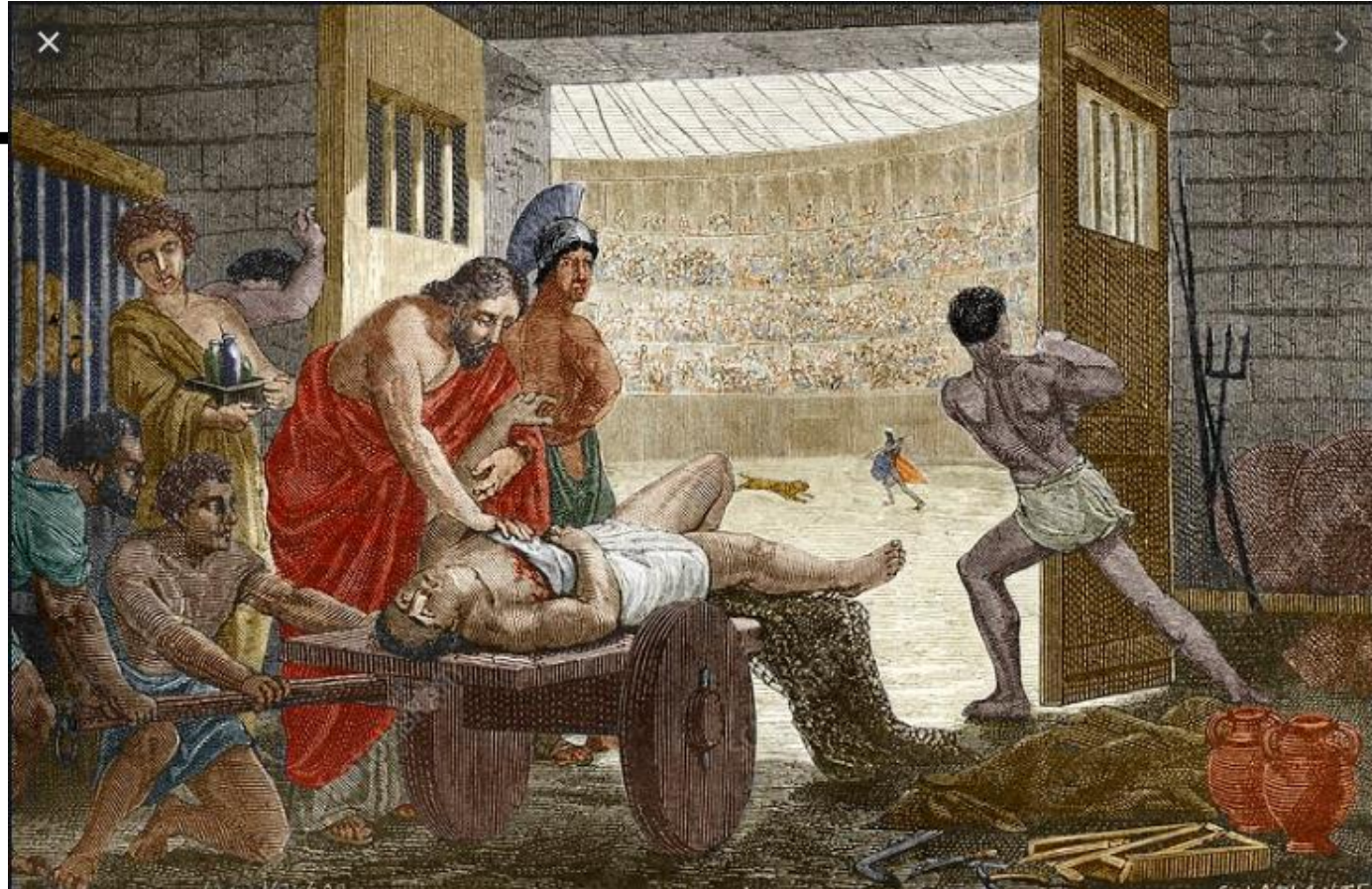
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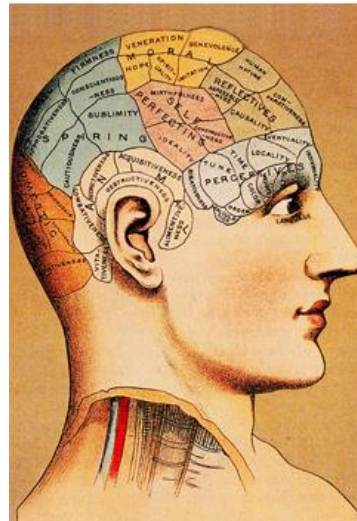
Franz Gall
(1758-1828)

Era Galênica



GALENI IN LIBRVM HIPPOCRATIS

Frenologia



- (1) o cérebro é o órgão da mente;
- (2) os poderes mentais humanos podem ser analisados em um número definido de faculdades independentes;
- (3) essas faculdades são inatas, e cada uma tem sua sede em uma região definida da superfície do cérebro;
- (4) o tamanho de cada uma dessas regiões é a medida do grau em que o corpo docente nela sentado constitui um elemento constituinte no caráter do indivíduo; e
- (5) a correspondência entre a superfície externa do crânio e o contorno da superfície do cérebro abaixo é suficientemente próxima para permitir ao observador reconhecer os tamanhos relativos desses vários órgãos pelo exame da superfície externa da cabeça.

*Substância?
O que importa
é o espaço*

*Através
da forma
do crânio*



A frenologia na vida cotidiana
(1892)

A
PHRENOLOGICAL
CHART OF CHARACTER
(with Supplementary Tables)

BY
STACKPOOL E. O'DELL & Mrs. STACKPOOL E. O'DELL
Consulting Phrenologists.

DEFINITIONS OF THE MENTAL FACULTIES

BY
GASPARD SPURZHEIM, M.D., L.R.C.P., LOND.

CONTENTS.

	s. d.
1—PHRENOLOGICAL CHART OF CHARACTER	4 0
2—SUMMARY OF CHARACTER	Extra 2 0
3—HEALTH TABLE.....	, 2 0
4—DIET TABLE	, 5 0
5—MARRIAGE TABLE	, 2 0
6—A COMPLETE DELINEATION, CONSISTING OF 30 PAGES WRITTEN, TOGETHER WITH THIS BOOK COMPLETE	42 0

After the first Chart is filled up, any or all the others will be marked if the book be sent, with the requisite fee, to the Institution.

M. S. G. M. H.
Date *October 1920*

LONDON:

THE LONDON PHRENOLOGICAL INSTITUTION,

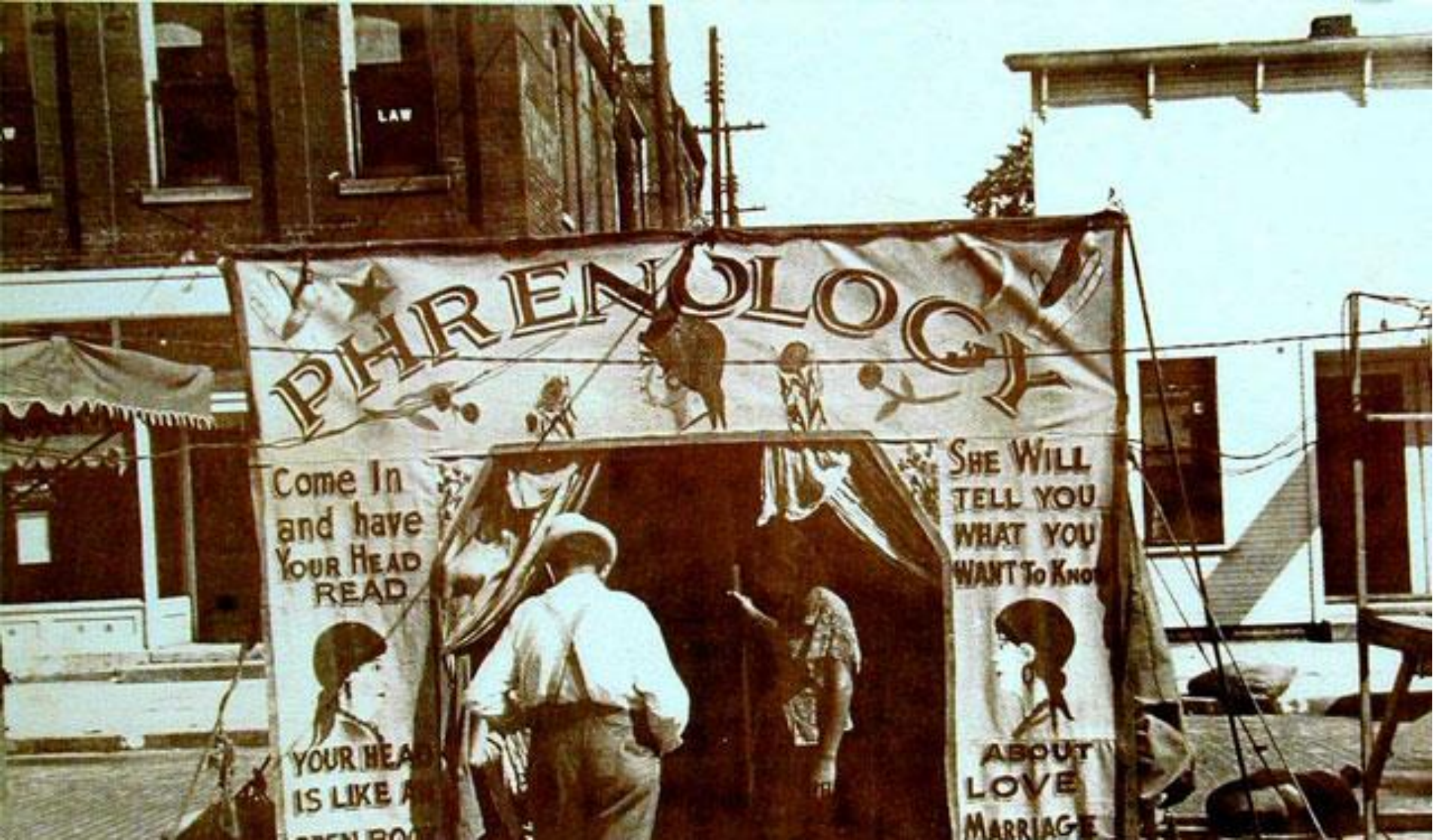
(Founded by Stackpool E. O'Dell, 1868. Established in London, January 1879)

8 LUDGATE CIRCUS, E.C. (Corner of Fleet Street),

AND

GALL-SPURZ-COMBE, PALEWELL PARK, EAST SHEEN, S.W.

Conclusão: apesar de sua implementação errada, o objetivo principal da Frenologia, localizar a função cerebral, se constituiu na agenda de pesquisa certa



Como conectar a substância no cérebro com as cognições?

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Galeno (129 /200 dC)
Até o Sec 17

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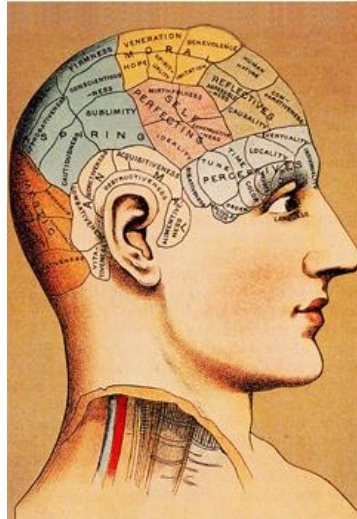


The Galenic era



GALENI IN LIBRVM HIPPOCRATIS

Frenologia



Campo Agregado



*Substância?
O que importa
é o espaço*

*Através
da forma
do crânio*

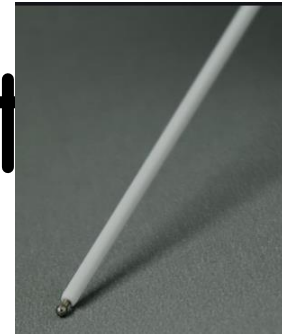
*As cognições são
representadas de
uma forma
difusa por todo
o cérebro*

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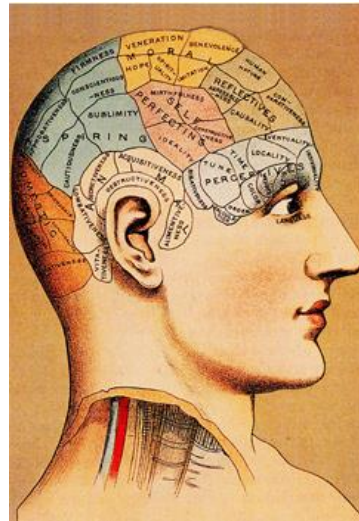


The Galenic era



GALENI IN LIBRVM HIPPOCRATIS

Frenologia



Campo Agregado

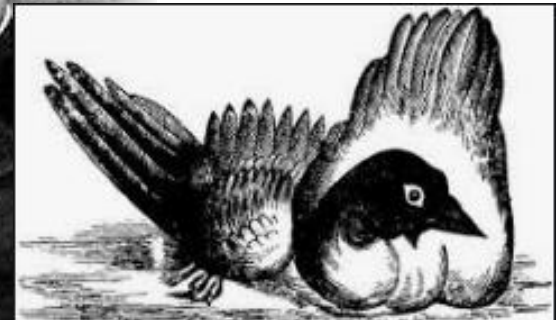


FIG. 26.—Pigeon from which the cerebellum has been removed.

*Substância?
O que importa
é o espaço*

*Através
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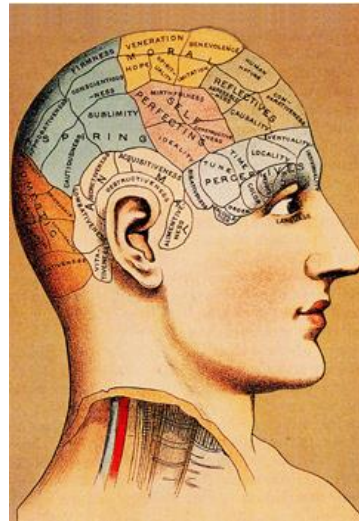


The Galenic era



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The Phineas Gage case
(1823-1860)
Dr. John Harlow

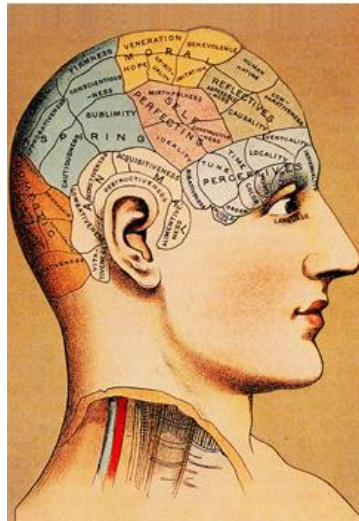


The Galenic era

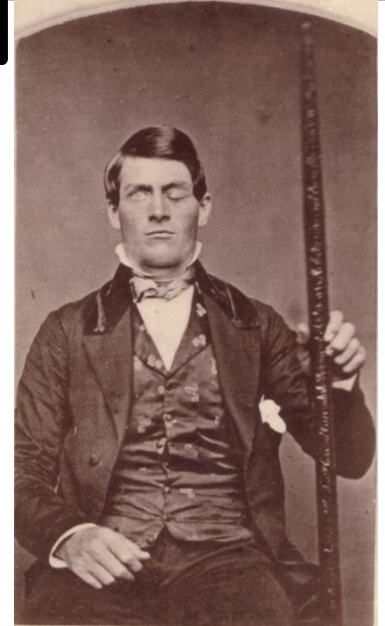


GALENI IN LIBRVM HIPPOCRATIS

Frenologia



Campo Agregado



*Substância?
O que importa
é o espaço*

*Através
da forma
do crânio*

*As cognições são
representadas de
uma forma
difusa por todo
o cérebro*

*O temperamento
humano está inscrito
em algum lugar
específico no cérebro*



CROWBAR IN HIS SKULL.

The Most Extraordinary Case in the Annals of American Surgery.

A correspondent of the *Medical and Surgical Reporter* writes: While in Boston recently I saw this skull and bar, and made the enclosed hasty sketch.

The story of this uncanny object is as follows:

Phineas Gage, aged twenty-five years, a native of Lebanon, N. H., was foreman of a gang of men who were employed in blasting rock at Cavendish, Vt. Gage had never had a day's illness from childhood, and was, as far as could be determined, perfectly healthy.

At the time of the accident, on September 13, 1848, he was charging a drill-hole for blasting, and sat on a shelf of

—In 1848, Phineas Gage, of Cavendish, Vt., has a tamping iron three and one-half feet long, weighing thirteen pounds, blown by a quarry blast through the roof of his mouth and out at the top of his head, but got well in sixty days and lived thirteen years, dying of disease in 1861. Last week his skull was deposited in the museum of the Massachusetts Medical Society.

Amazing Story: Man Survives Iron Bar Bl...

blog.genealogybank.com

We are well acquainted with several of the leading men in the village where the above occurrence took place, and have been assured by them that the statement relative to the wound and recovery is correct. But that there was no difference in his mental manifestations after the recovery, is, however, not true.

We have been informed by the best authority that after the man recovered, and while recovering, he was gross, profane, coarse, and vulgar, to such a degree that his society was intolerable to decent people. Before the injury he was quiet and respectful. If we remember correctly, the iron passed through the regions of the organs of BENEVOLENCE and VENERATION, which left these organs without influence in his character, hence his profanity, and want of respect and kindness; giving the animal propensities absolute control in the character. The above report probably alludes to *Intellectual* "perceptions," while it erroneously uses the word *mental*, which involves all the faculties, the feelings as well as the intellect.

The Curious Case of Phineas Gage's Brai...

npr.org

Mr Joseph Larbin Austin, eldest son of Mr Eleazer Austin, was found deceased near the south side of

PASSAGE OF AN IRON ROD THROUGH THE HEAD.

To the Editors of the Boston Medical and Surgical Journal.

DEAR SIR,—Having been interested in the reading of an account of "Injury of the Brain," reported in your Journal by Professor Simpson, of Connecticut, N. Y., I am induced to offer you the case of a very severe, singular, and so far as the result is taken into account, entirely unrecorded case, of that class of injuries, which has recently fallen under my own eye. The accident happened in this town, upon the line of the Rutland and the Boston and Lowell, on the 13th of Sept. last, at 4½ o'clock, P. M. The subject of it is Phineas P. Gage, a foreman, engaged in building the road. 25 years of age, of middle stature, vigorous physical organization, temperate habits, and unimpaired of coordinate energy of faculties.

It appears from his own account and that of his by-standers, that

Reading About Phineas Gage : The Univ...

uakron.edu



THE "STRANGE CASE IN SURGERY."

We gave some account, a few weeks ago, of the wonderful case of Mr. Gage, foreman on the railroad in Cavendish, who, in preparing a charge for blasting a rock, had an iron bar driven through his head, entering through his cheek, and passing out at the top of his head, with a force that carried the bar some rods, after performing its wonderful journey through skull and brains. The iron was in diameter an inch and a quarter, and in length three feet and

THE

AMERICAN JOURNAL

OF THE MEDICAL SCIENCES

FOR JULY 1850.

ART. I.—Dr. Harkness's Case of Recovery from the passage of an Iron Rod through the Head. By HENRY J. DUTTON, M. D., Professor of Surgery in Harvard University. (With a plate.)

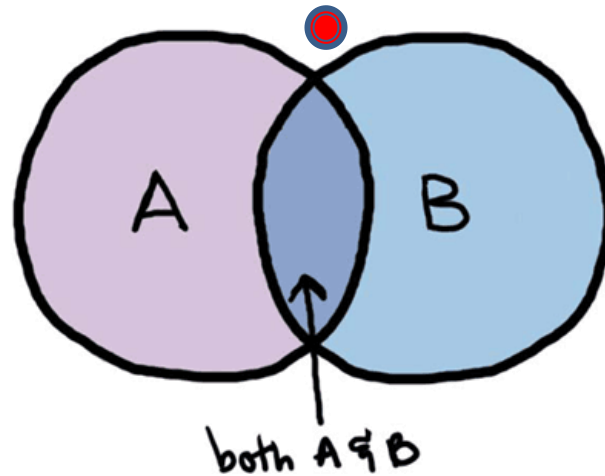
The following case, perhaps unparalleled in the annals of surgery, and of which some interesting details have already been published, occurred in the person of Dr. J. M. Harkness, of Cavendish, Vermont. Having received a verified account of the accident, a few days after its occurrence, from a medical gentleman who had examined the patient, I then became indeliberately inter-

Reading About Phineas Gage : The Univ...

uakron.edu

The Case of Phineas Gage

O advento da dissociação simples



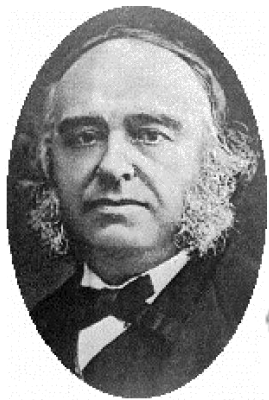
- Nos idos de 1900's os pesquisadores puderam continuar a procura localizacionista;
- Ao dissecar tarefas mentais complexas em seus subcomponentes, um pesquisador pode estabelecer uma "dissociação" entre as funções. Isso é uma lesão em uma determinada estrutura cerebral interrompe a função A, mas não a função B. Tal demonstração permite que se infira que a função A e a função B são independentes umas das outras de alguma forma, ou totalmente ou parcialmente.

Pierre-Paul Broca (1824-1880)



Como conectar a substância no cérebro com as cognições?

Pierre Broca (1824-1880)



TAN

Outros pacientes de Broca não inseriam uma sílaba com o início oclusivo e o final nasal. Eles falam assim:

Filha: Mãe fica mais aqui descansando

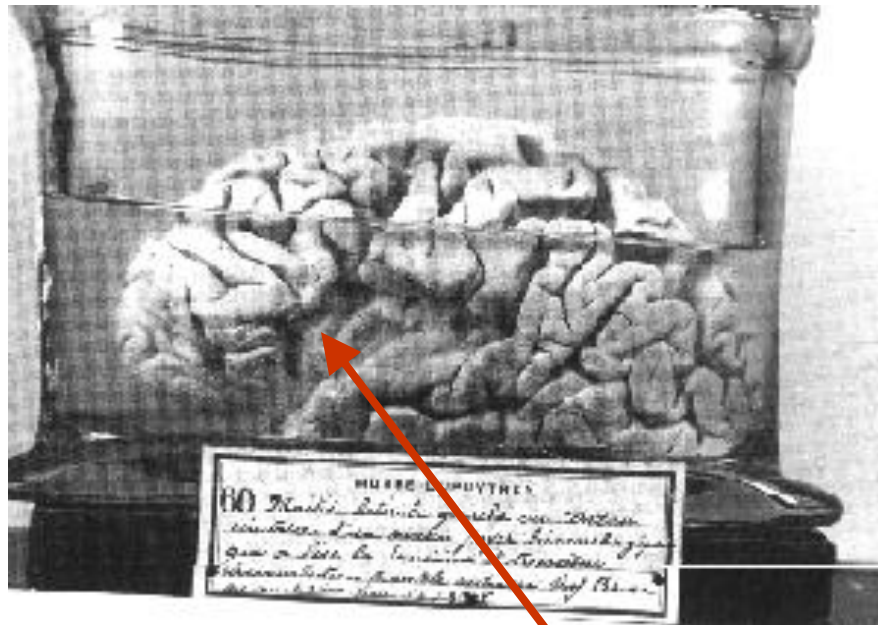
*Articula-se
linguagem
na 3ª circunvolução
do lobo frontal
anterior esquerdo
1860*



Não, não, não.
Levantar! Cozinha.
Massa empadão
almoço.

Area de Broca

Mr. Leborgne's brain



Tono: <https://www.youtube.com/watch?v=6CJW65TDHLE>



Terceira circunvolução do lobo frontal anterior esquerdo

Como conectar a substância no cérebro com as cognições?

Pierre Broca (1824-1880)

Carl Wernicke (1848-1905)

The connectionist
Scheme



O local da articulação de linguagem é na 3ª circunvolução do lobo frontal anterior esquerdo

Meus pacientes não entendem linguagem

Afasia de Wernicke

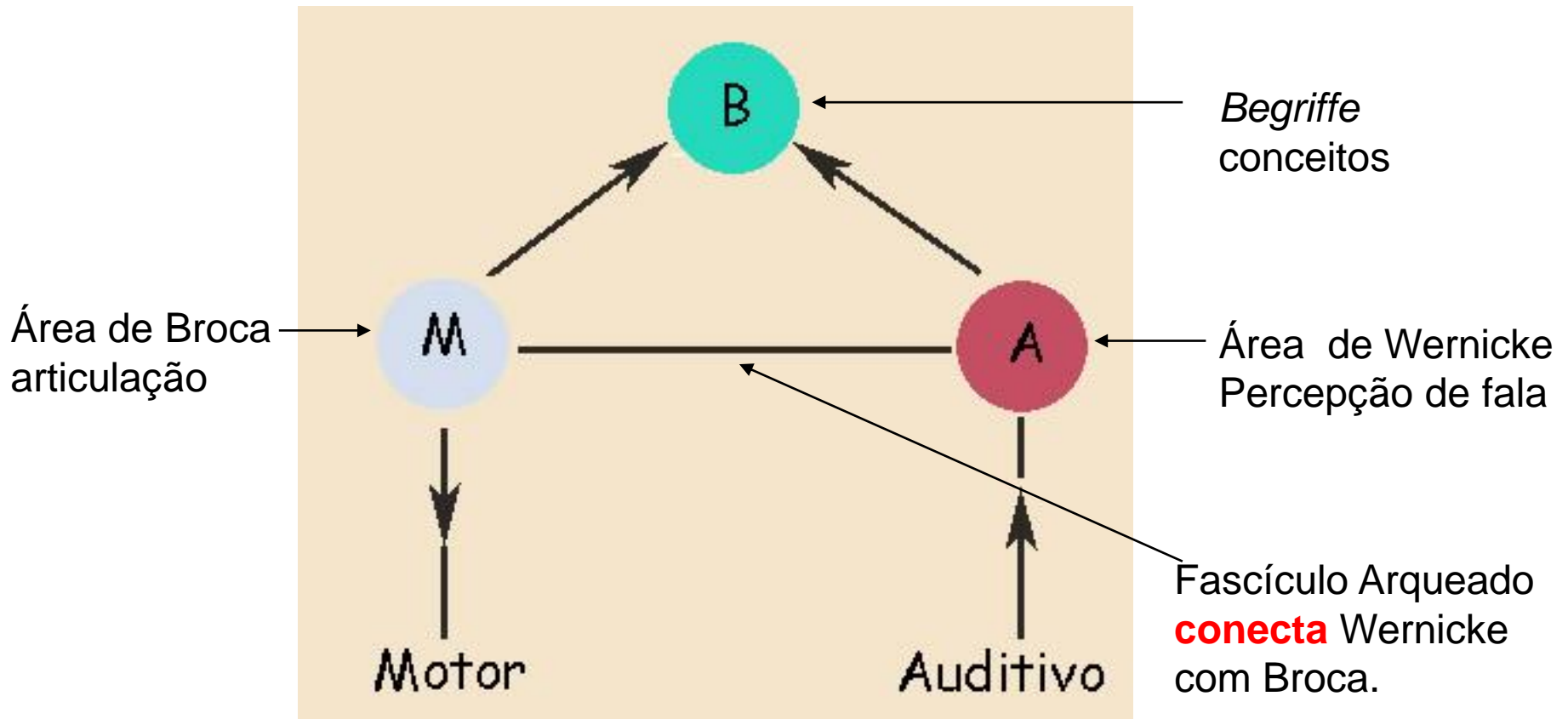


<https://www.youtube.com/watch?v=3oef68YabD0>



A pesquisa de Wernicke (1874)

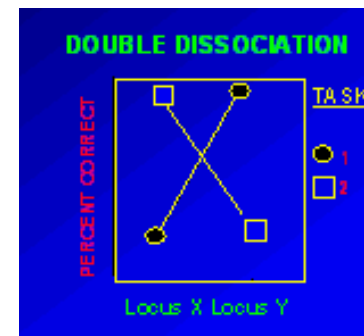
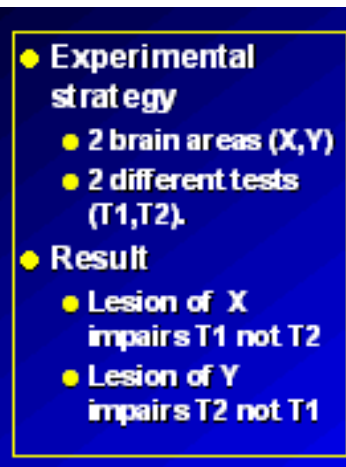
“Wernicke – Lichtheim’s House Model”



O Esquema Conexionista

Dissociação Dupla

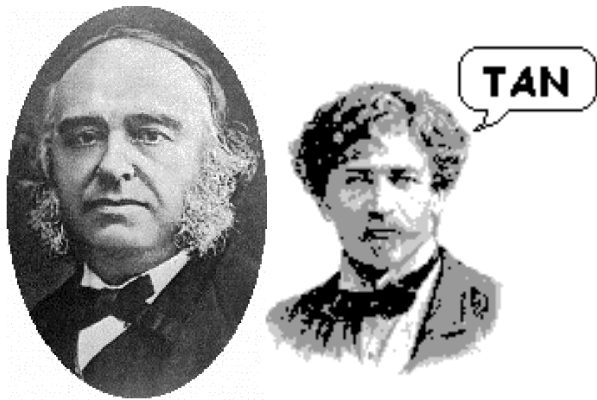
- Dois grupos diferem em formas diferentes em duas tarefas comportamentais;
- Normalmente os dois grupos têm lesões cerebrais diferentes:
- Por exemplo: dois pacientes, um tem a área de Broca lesionada e o outro tem a área de wernicke lesionada.
O primeiro paciente tem dificuldade de produzir fala mas entende bem
O segundo tem dificuldade de compreender, mas fala fluente
- A dissociação dupla mostra que cada área é responsável por uma cognição



Como conectar a substância no cérebro com as cognições?

Pierre Broca (1824-1880)

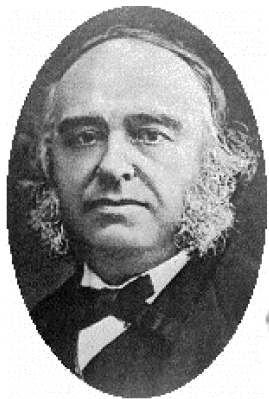
Carl Wernicke (1848-1905)
Esquema conexcionista



*A linguagem ficam na
3ª circunvolução do
lobo frontal anterior*

Como conectar a substância no cérebro com as cognições?

Pierre Broca (1824-1880)



Dissociação simples

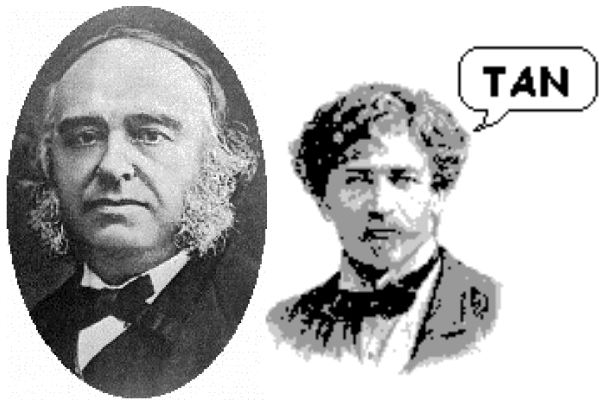
Dissociação Dupla

Estimulação
direta

Como conectar a substância no cérebro com as cognições?

Pierre Broca (1824-1880)

Carl Wernicke (1848-1905)
Esquema conexcionista



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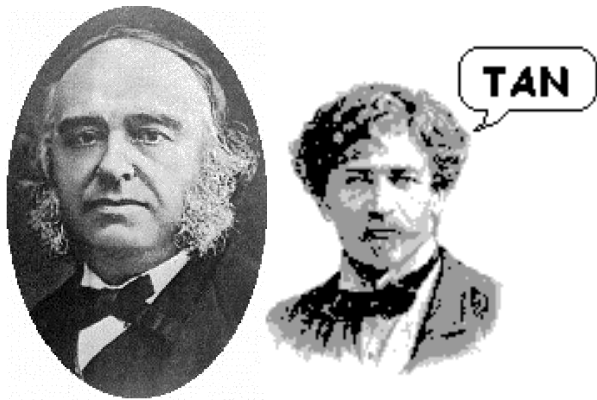
*Meus pacientes não
entendem a fala*

Dissociação simples

Dissociação Dupla

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Pierre Broca (1824-1880)



A linguagem ficam na 3ª circunvolução do lobo frontal anterior

Dissociação simples

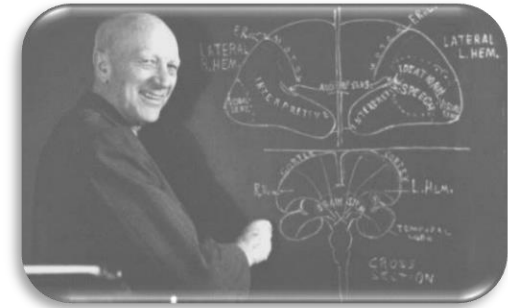
Carl Wernicke (1848-1905)
Esquema conexcionista



Meus pacientes não entendem a fala

Dissociação Dupla

Wilder Penfield (1891-1976)

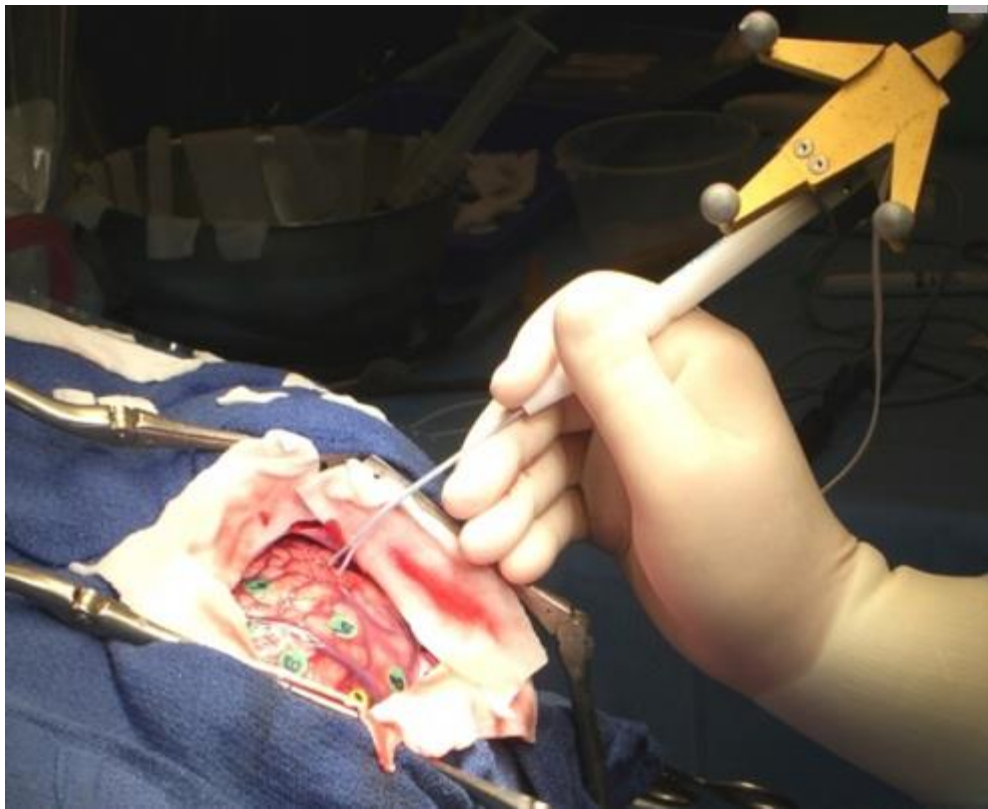


Quando eu disser vai, você conta até 19

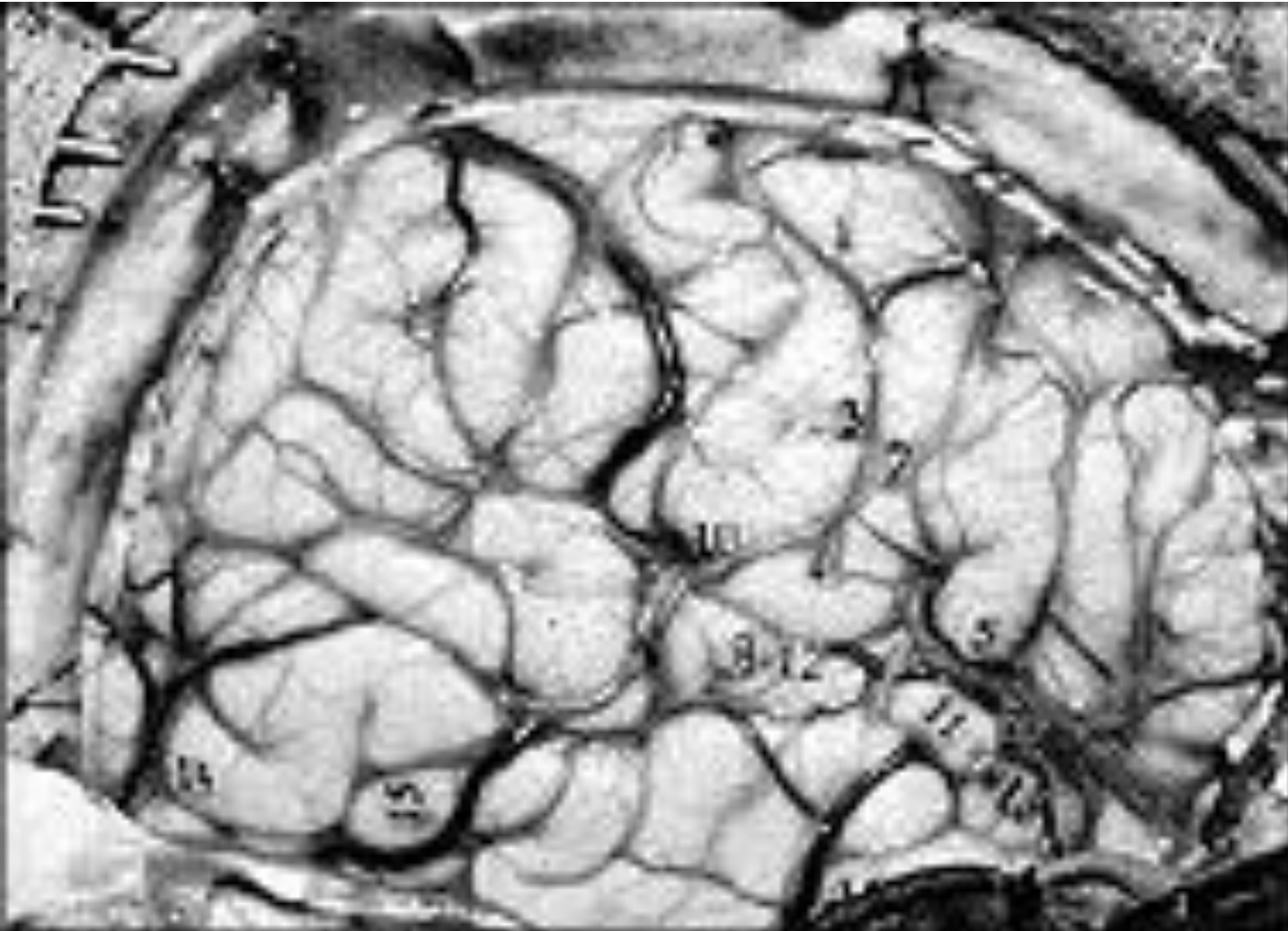
Estimulação direta

Estimulação elétrica

- Early insights to cortical organisation were made by directly stimulating the cortex of awake humans undergoing neurosurgery
- Pioneers, Penfield & jaspers (1954) explored the effect of small electrical currents applied to the cortical surface



Wilder Penfield

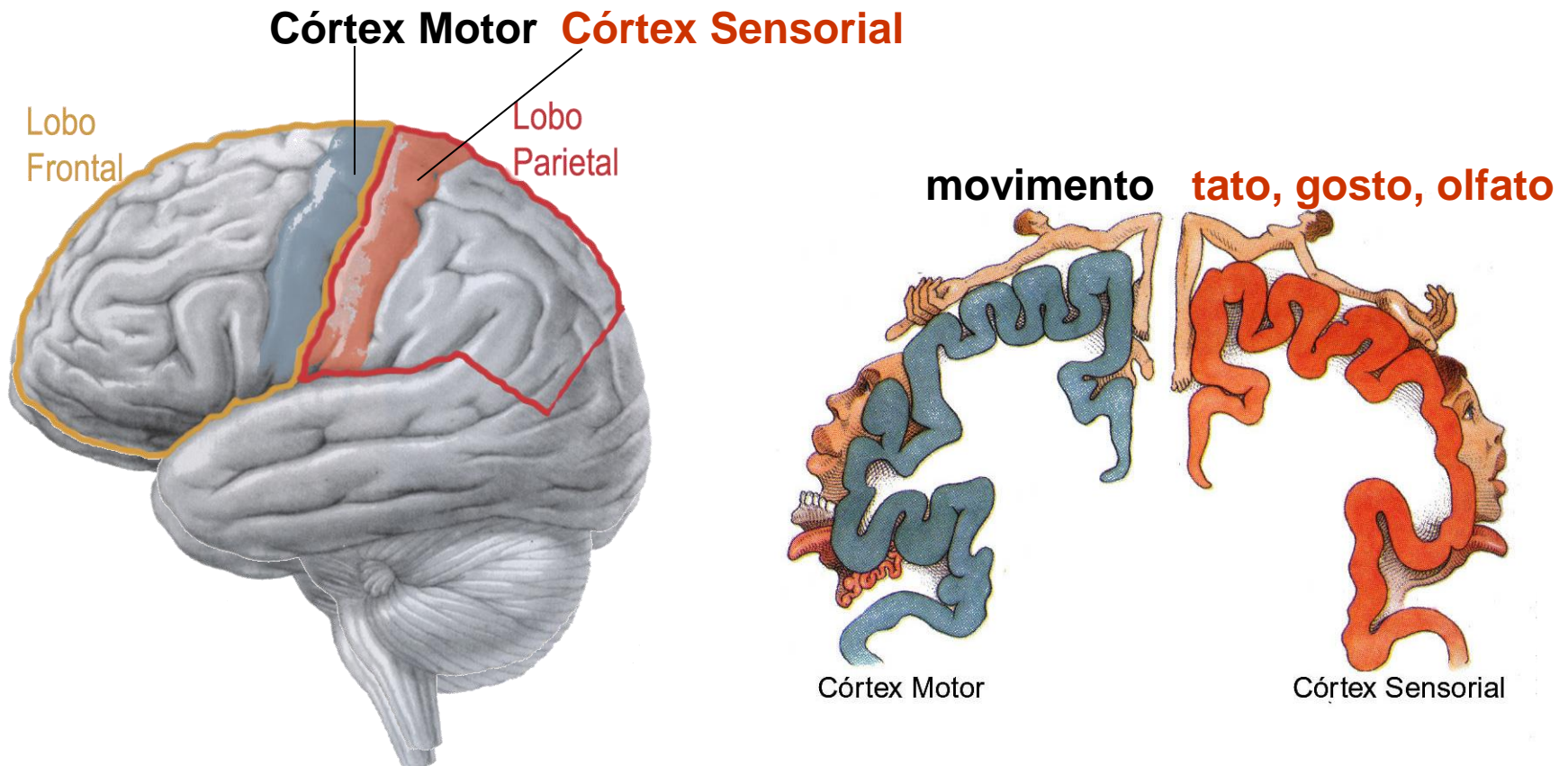




Wilder Penfield

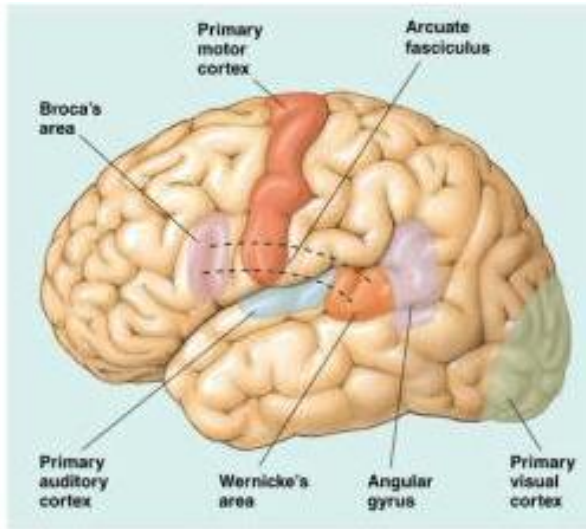


Durante o curso de sua carreira, Penfield operou cerca de 400 pacientes, e acabou resumindo suas descobertas em um livro de 1950 chamado *The Cerebral Cortex*. O livro, que foi escrito com seu colega Theodore Rasmussen, é um documento notável das explorações elétricas de Penfield no cérebro humano.



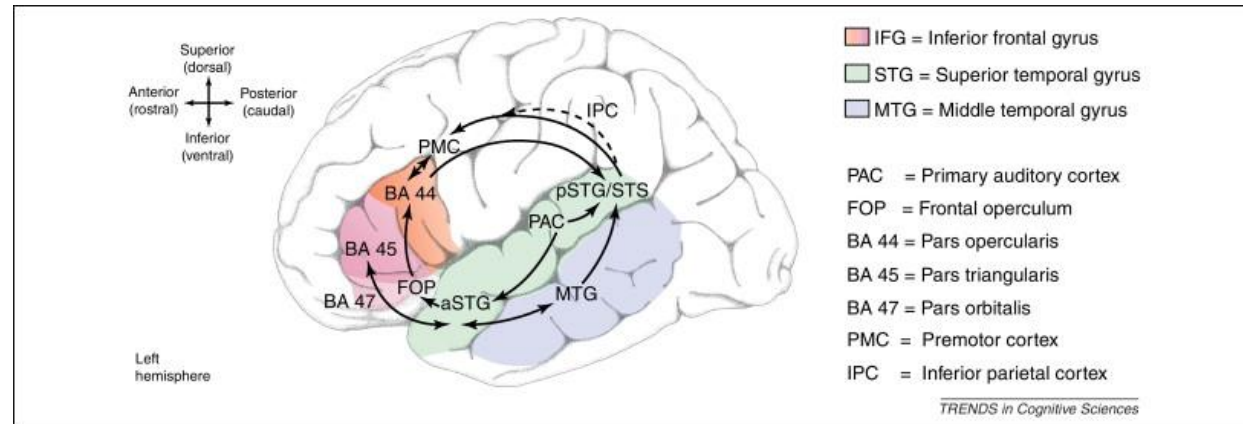
Como conectar a substância no cérebro com as cognições?

**Geschwind
(1926-1984)**



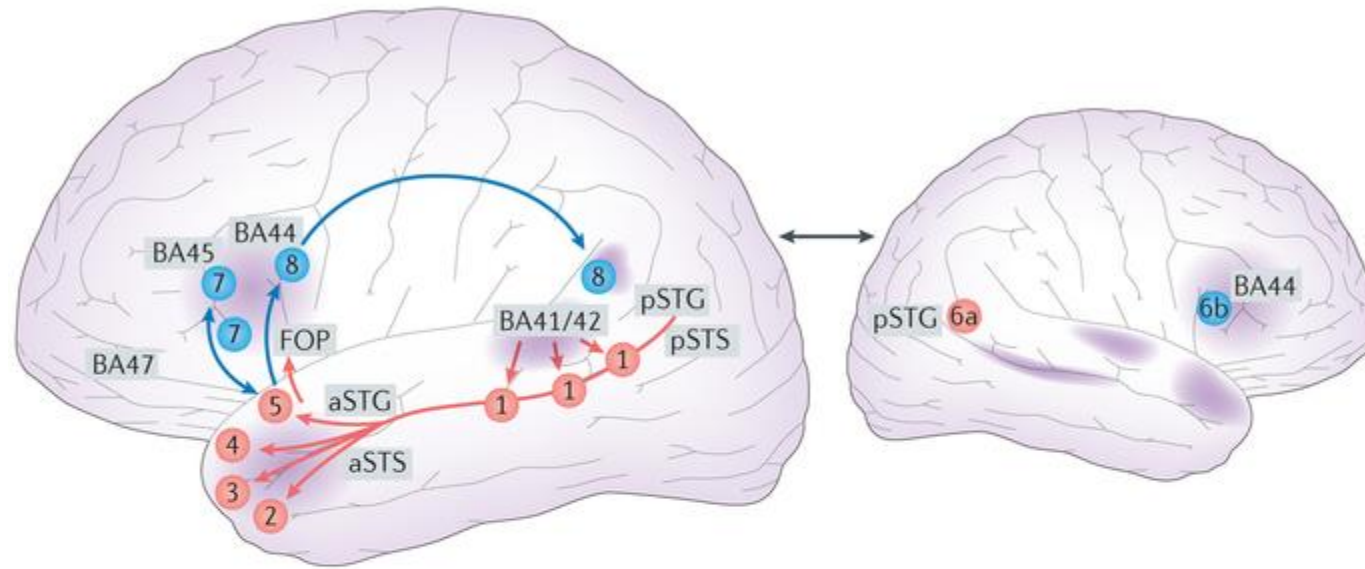
Dissociation Dupla
Estimulação elétrica
Adequação Anatómica

**Angela Friederici
(1952 /**



Friederici's model (2015): Linguagem perisilviana

a Language comprehension in adults



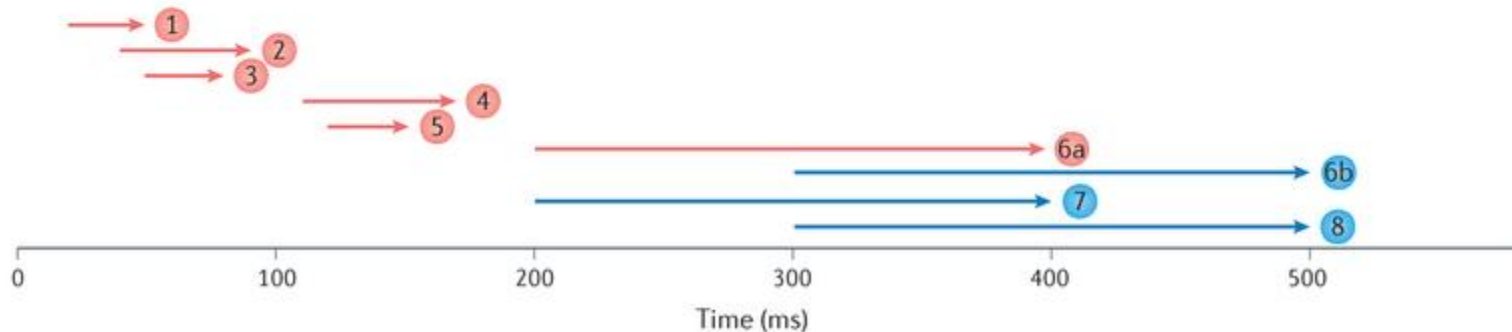
Bottom-up processes

- ① Phonological word form detection
- ② Morphosyntactic categorization
- ③ Lexical-semantic categorization
- ④ Lexical access and retrieval
- ⑤ Phrase structure reconstruction
- ⑥a Prosodic processing

Top-down processes

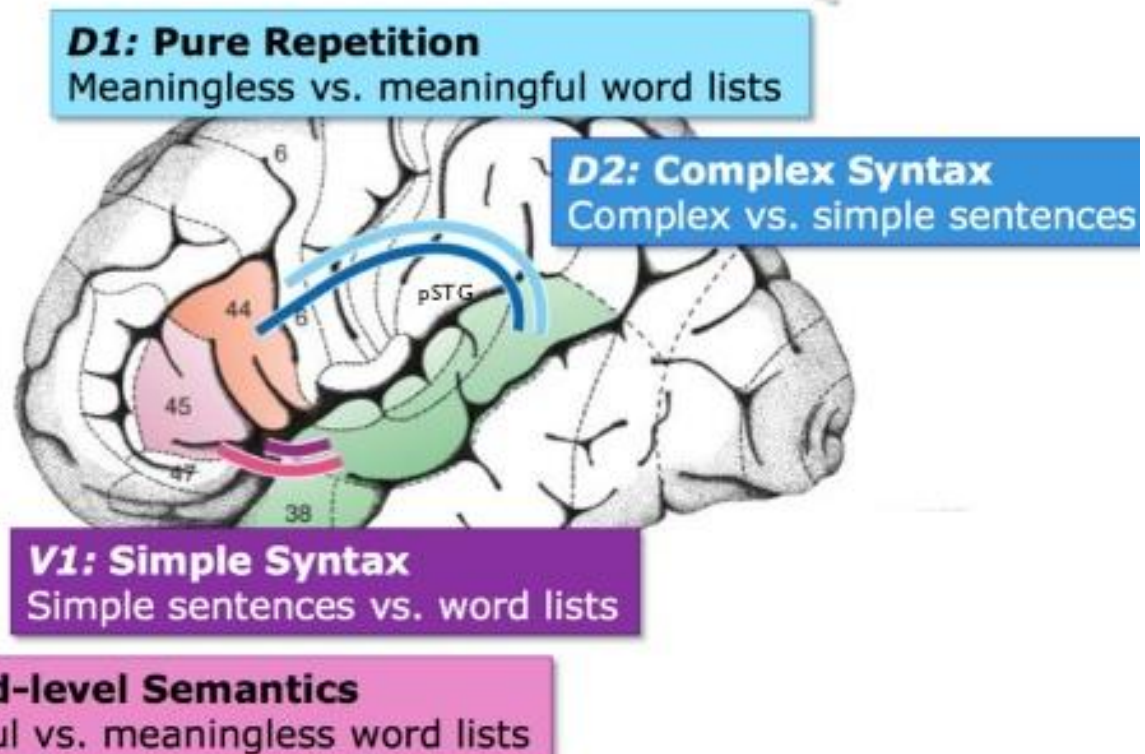
- ⑥b Prosodic processing
- ⑦ Analysis of semantic relations
- ⑧ Analysis of syntactic relations

b



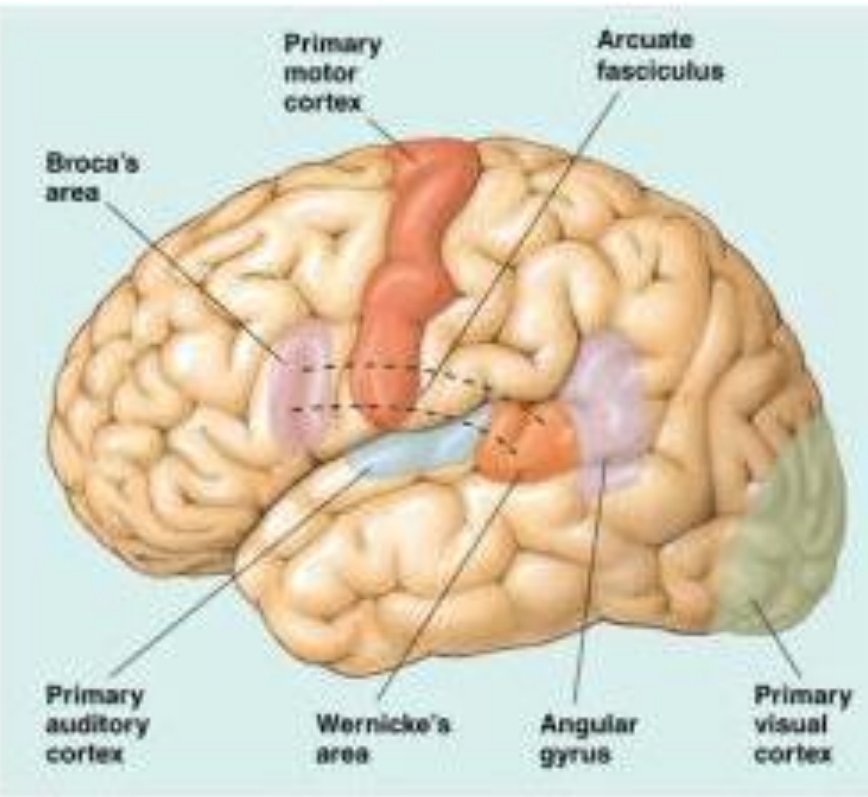
Resumo dos achados

Pathway functions

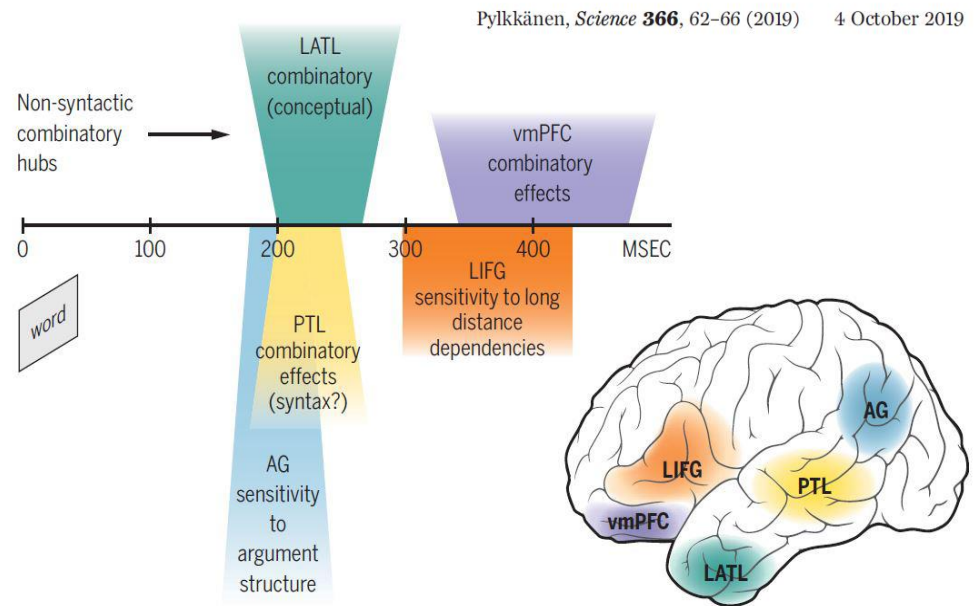


Objetivo do curso: Mapeamento último da linguagem no cérebro

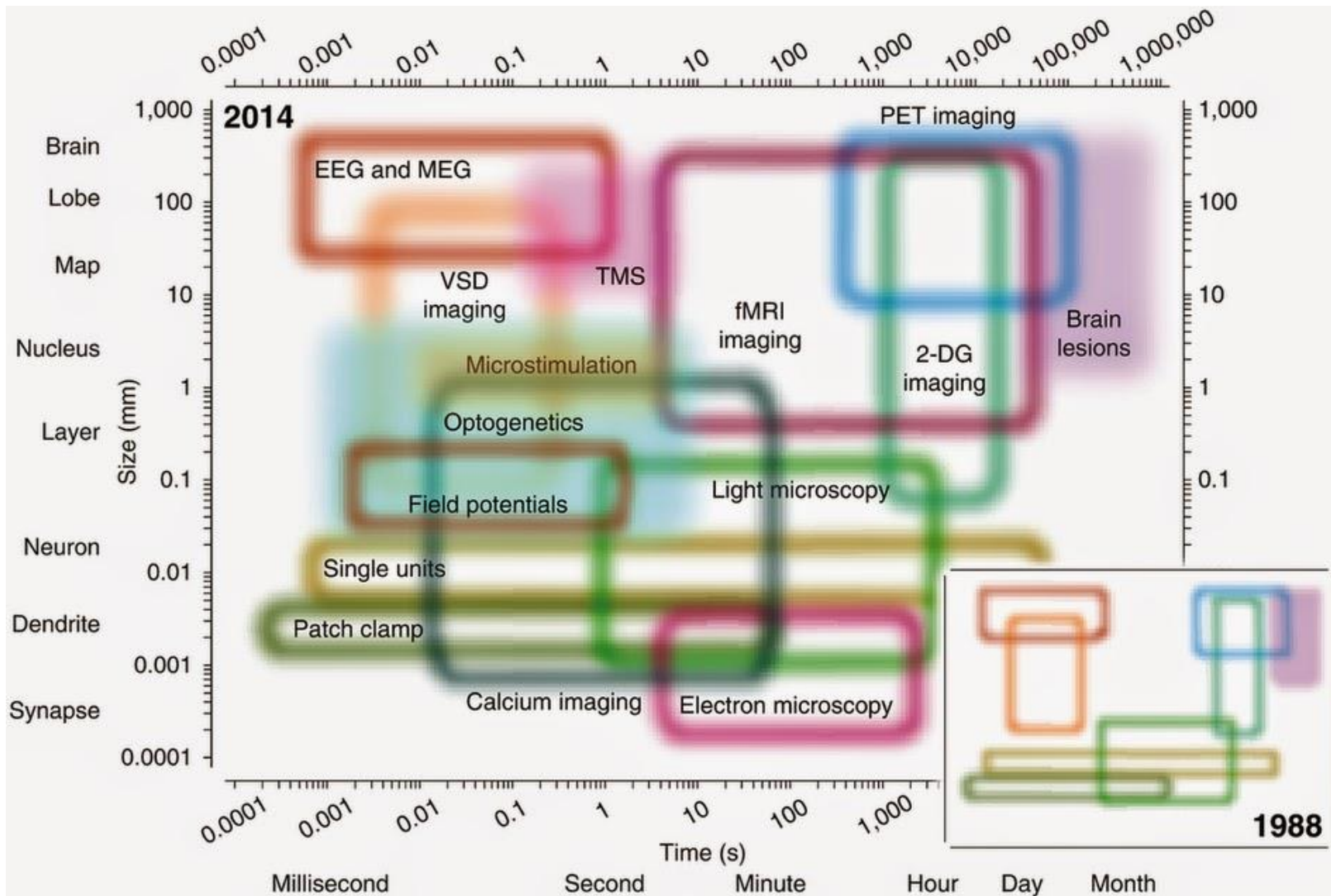
De 1800 até 2000



De 2015 até agora

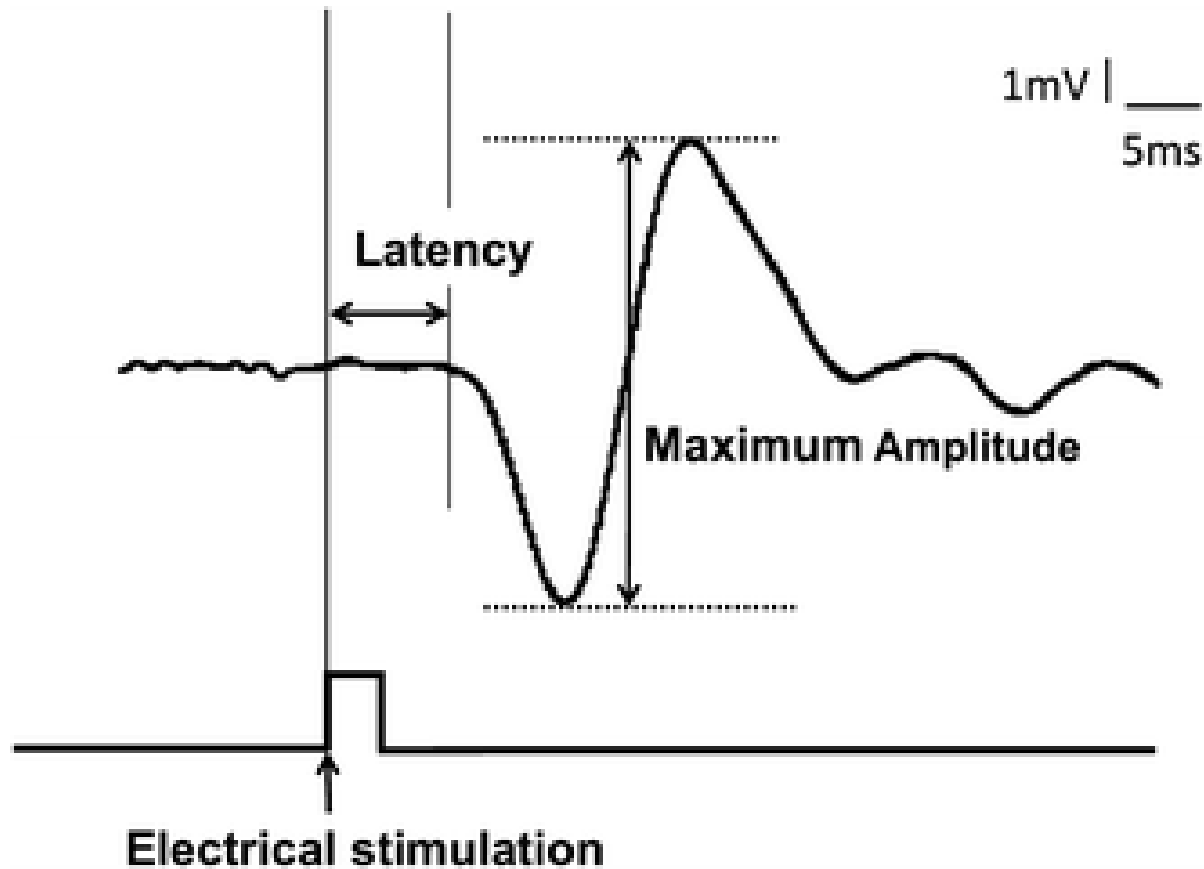


Métodos não invasivos

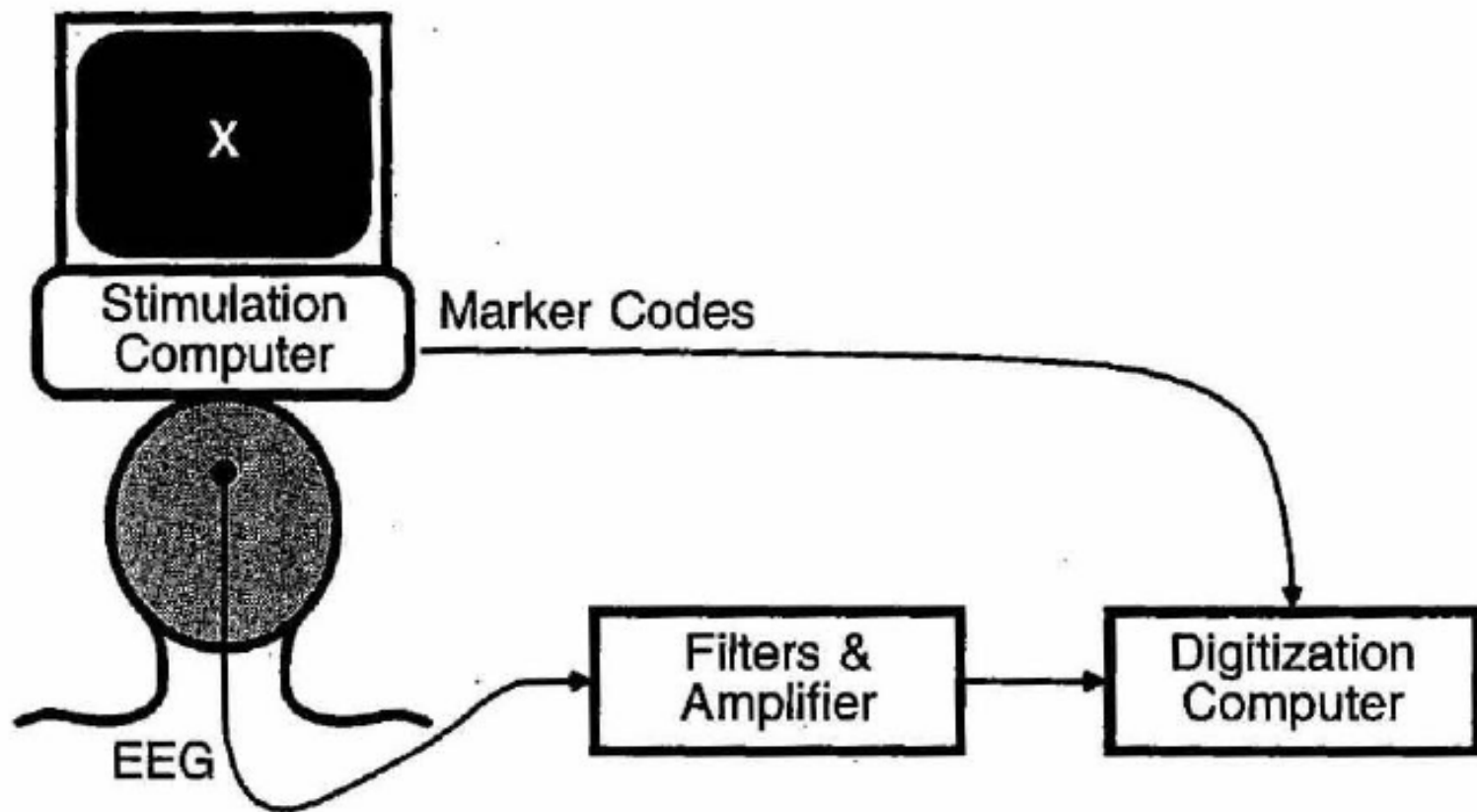


EEG/ERP

- EEG

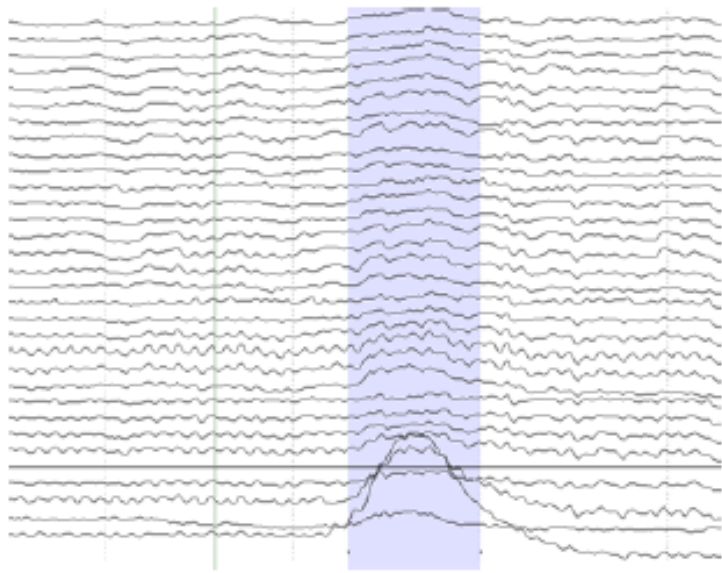


The General Set-Up

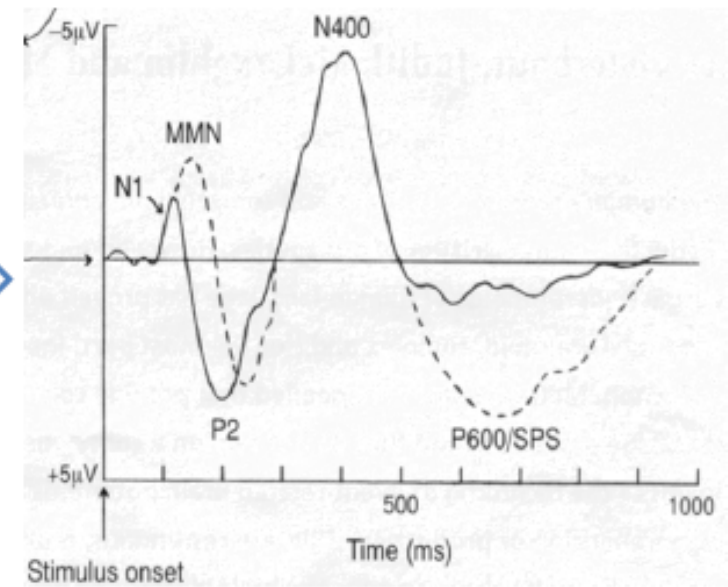


Das ondas brutas até o ERP

Raw Data (EEG)



End Products (ERP)



Nosso experimento: N400, P600

#	Condição	1 ^s	2 ^s	3 ^s	4 ^s	5 ^s
1	1CONT (Controle)	João	comprou	um livro	para mim	no mês passado.
2	1OINC (Obj incogruente)	João	comprou	um lixo	para mim	no mês passado
3	1AGRA (agramatical)	João	comprou	um livros	para mim	no mês passado

#	Condição	1 ^s	2 ^s	3 ^s	4 ^s	5 ^s
801	DISTR	Maio	vestiu-se	com	a roupa	do primo
802	DISTR	Nós	sentimos	muito	a falta	dela
803	DISTR	Pensamos	em	ir	ao soluço	de noite

Obrigada!
