

# Brains in the Lab

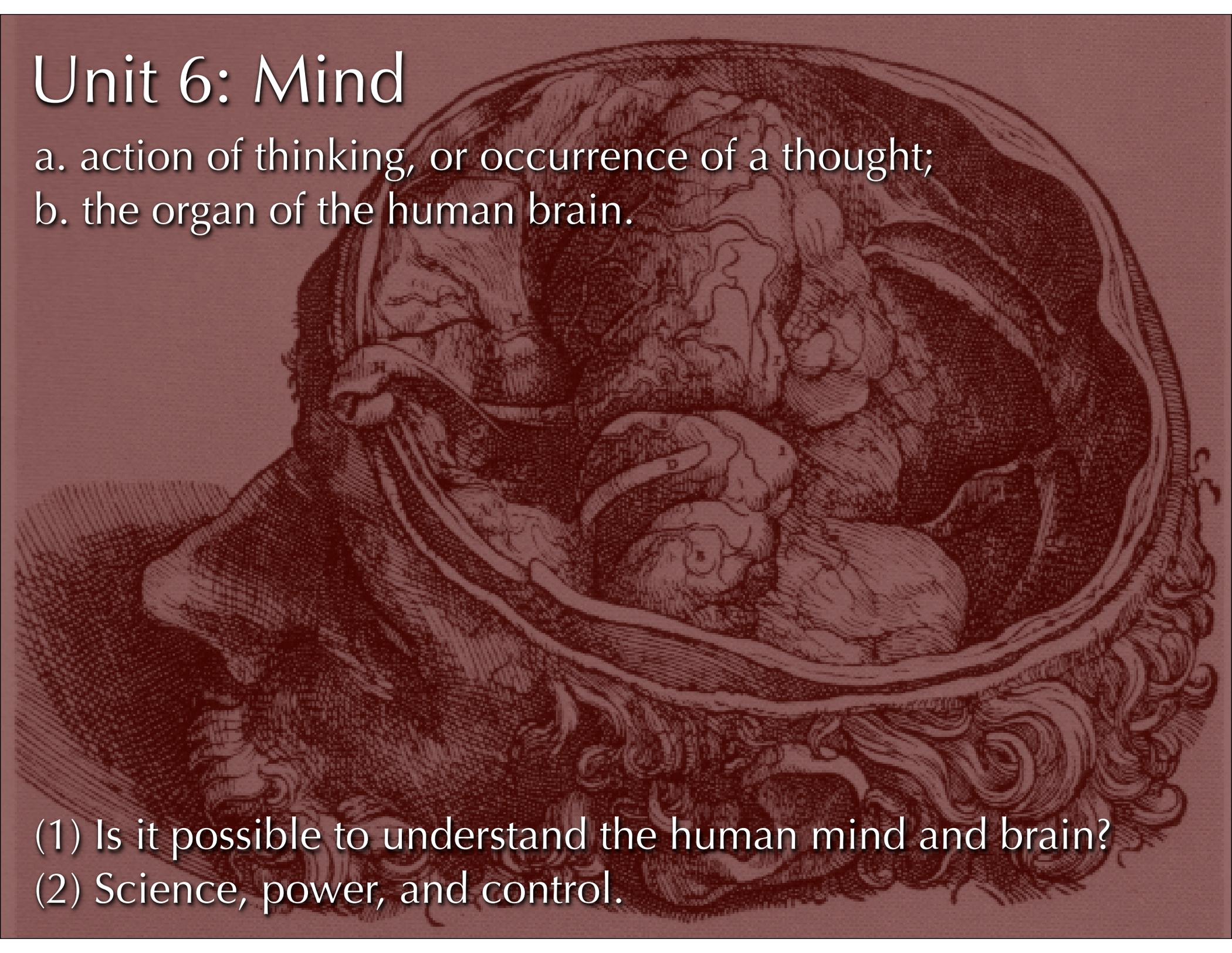
STS.003

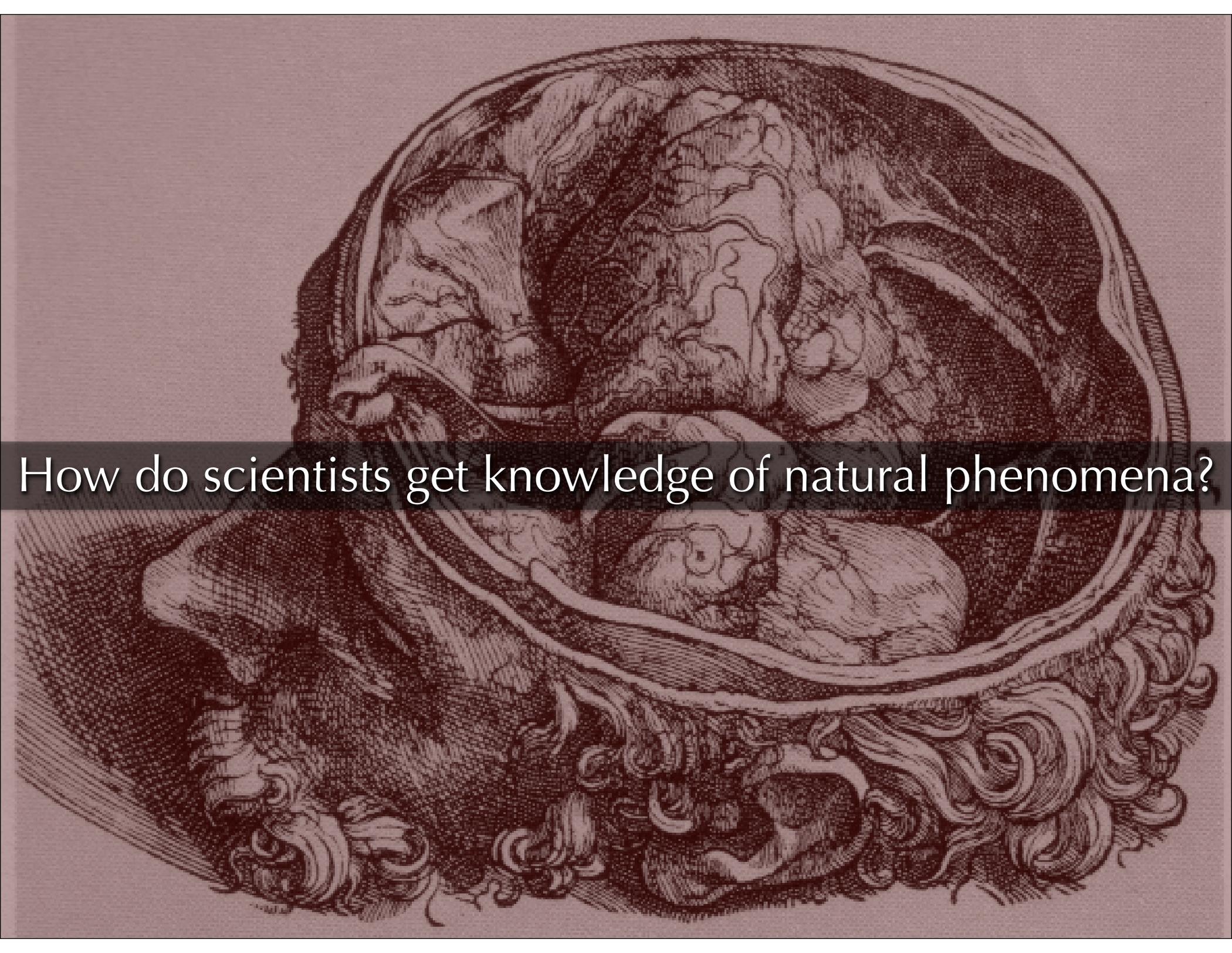
Fall 2010

# Unit 6: Mind

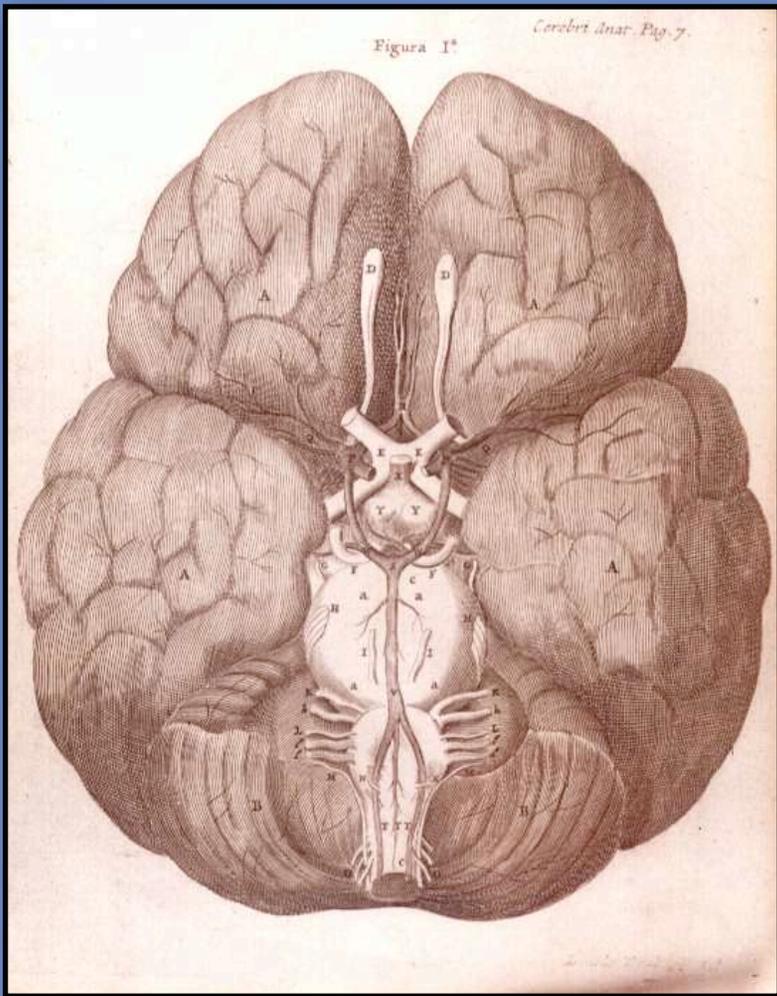
- a. action of thinking, or occurrence of a thought;
- b. the organ of the human brain.

- (1) Is it possible to understand the human mind and brain?
- (2) Science, power, and control.





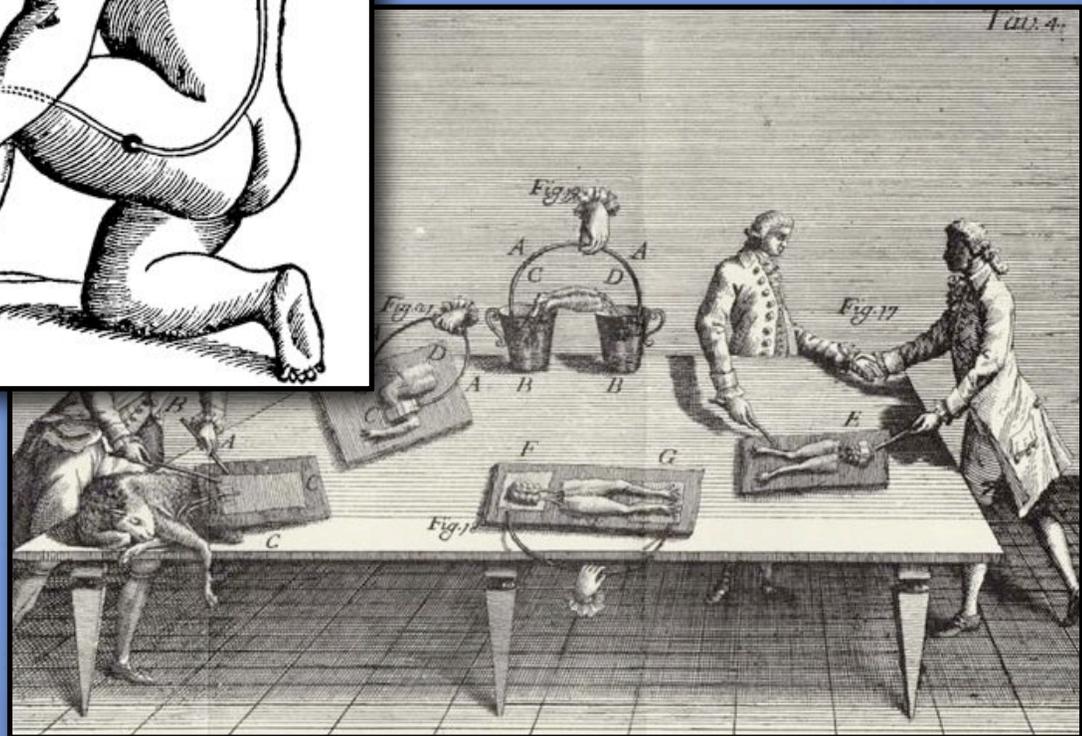
How do scientists get knowledge of natural phenomena?

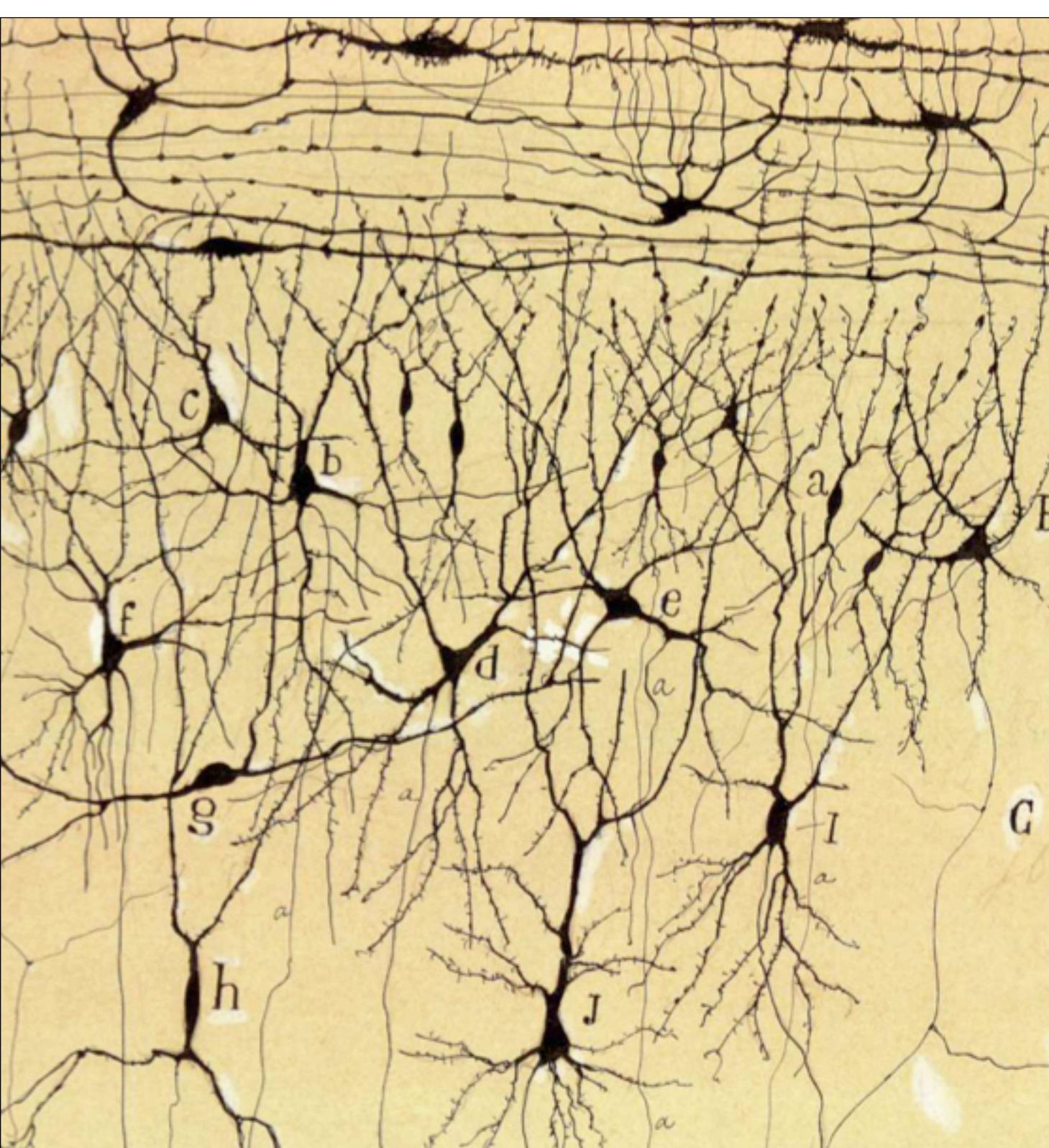


# How does the brain work?



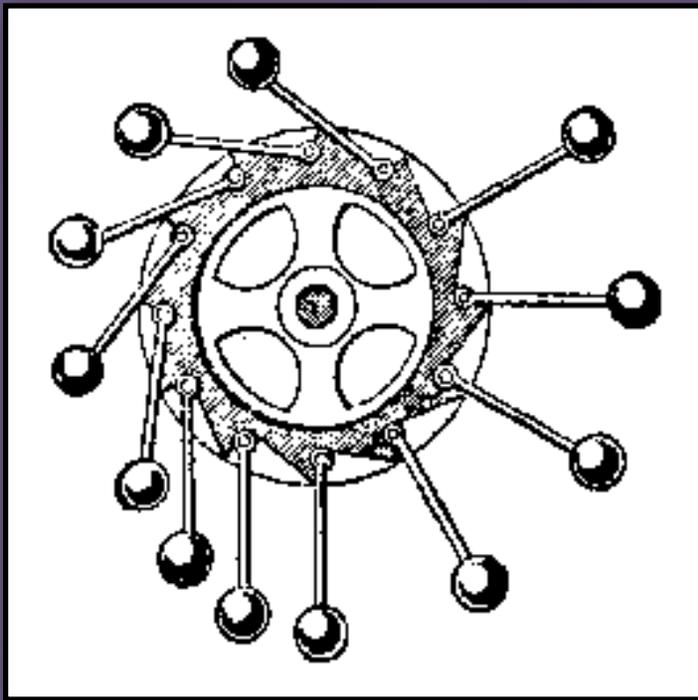
Hydraulics  
Vibrations  
Electricity





Neuron Theory:

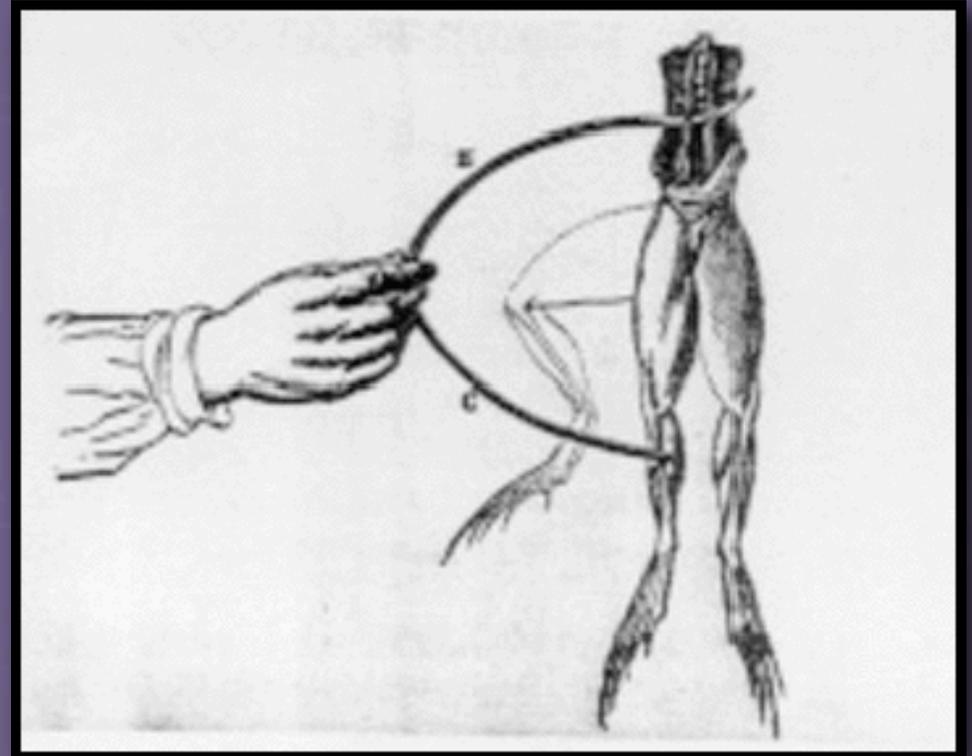
Brain as a  
Network of  
Cells



# Hermann Helmholtz

Animal Heat, Vitalism,  
and Perpetual Motion

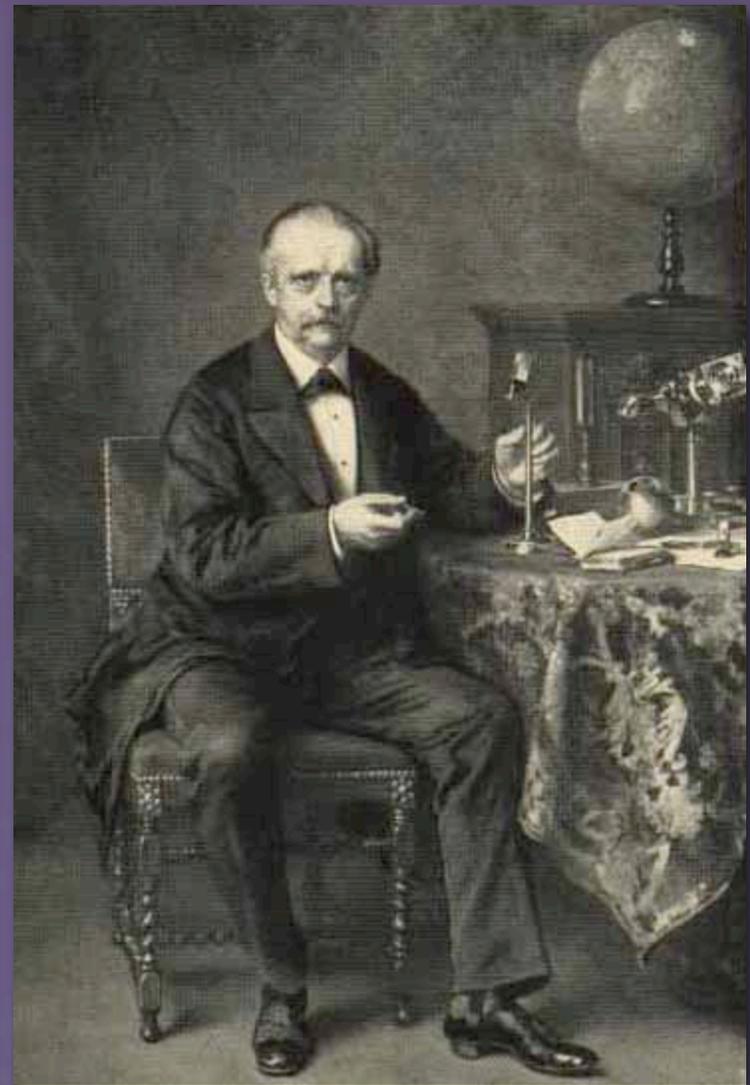
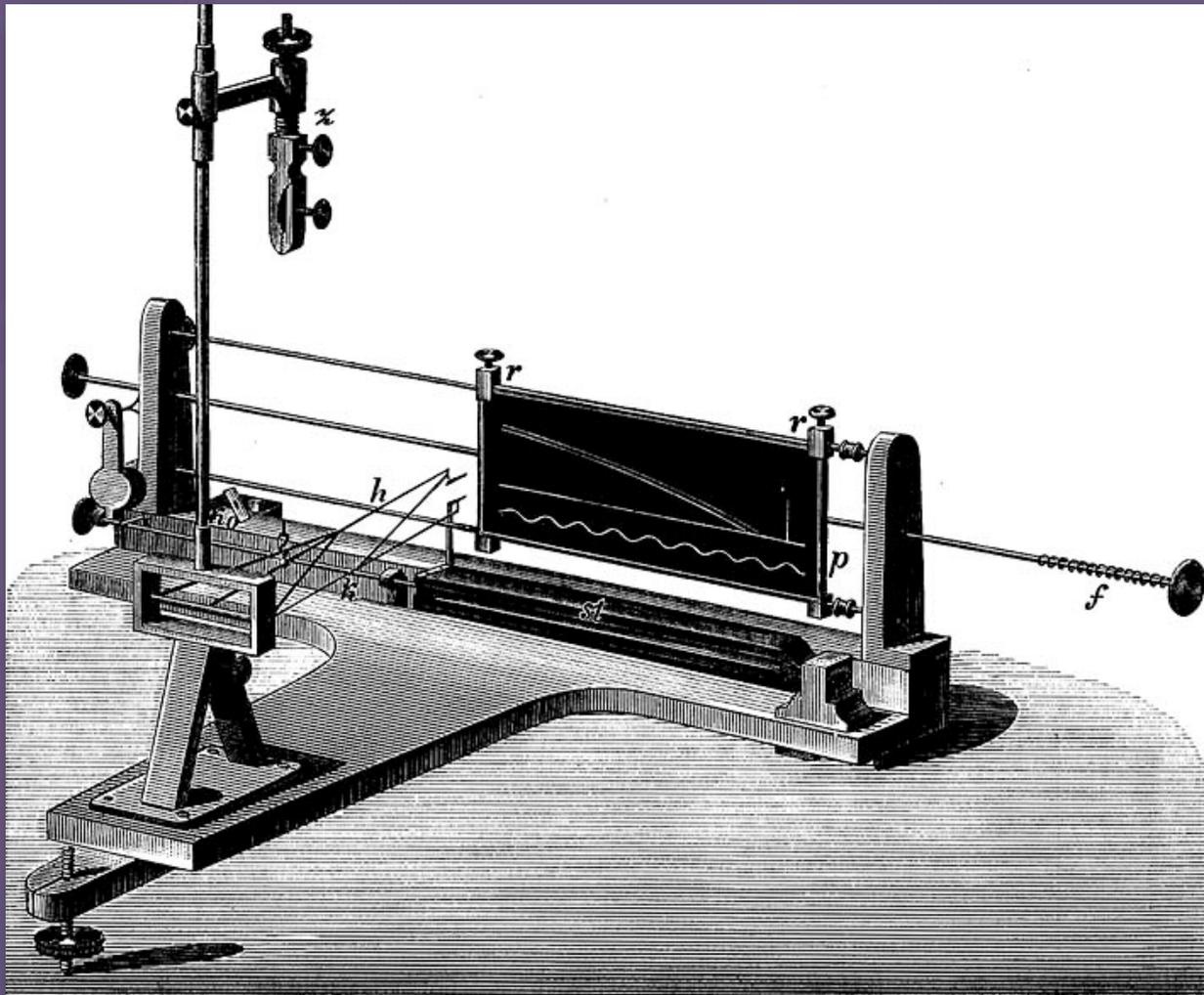
“The animal body therefore does not differ from the steam-engine as regards the manner in which it obtains heat and force”



Berlin Physical Society, 1845

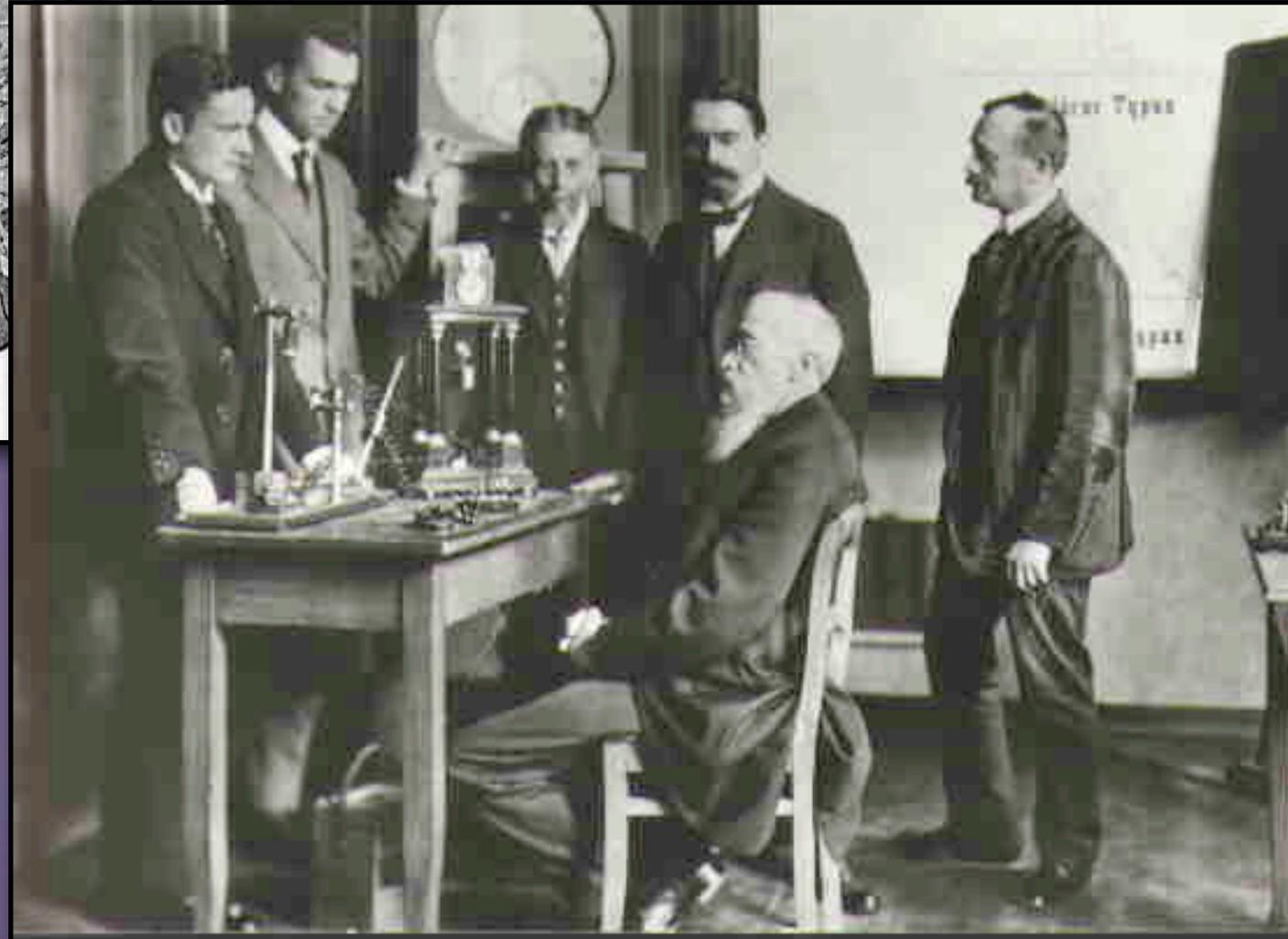
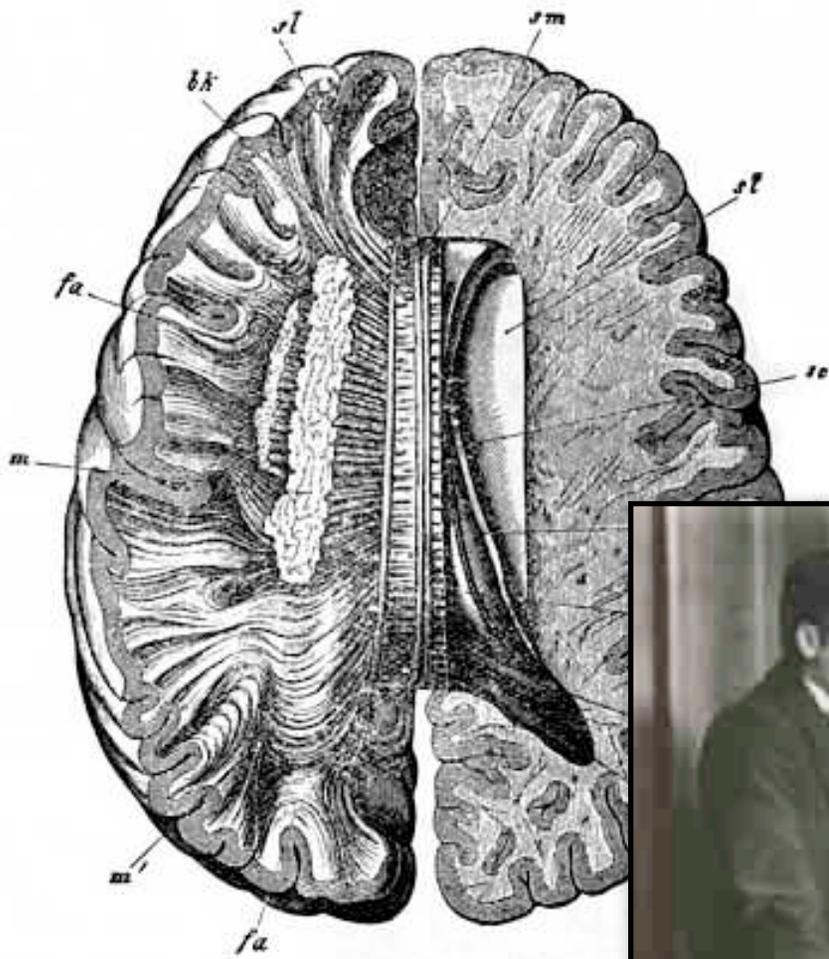
“there are no force in organisms other than physicochemical forces”

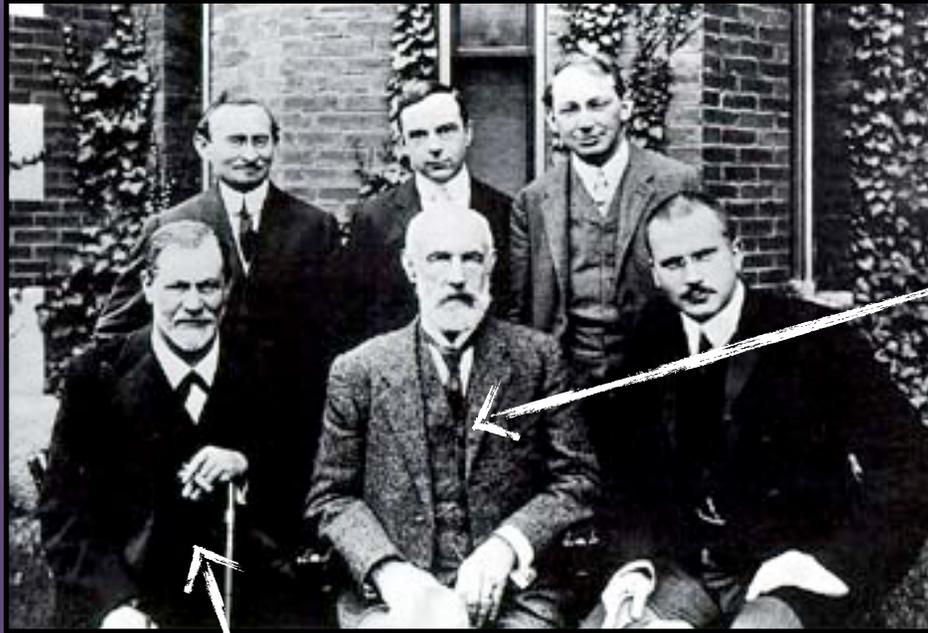
Helmholtz, 1850s:  
Organic Physics  
Experimental Neurophysiology



e.g. Nerve impulse:  
 $27 \text{ m / sec}$

Wilhelm Wundt  
(Studied with Helmholtz)  
Psychology Laboratory  
Leipzig, 1878





Wundt trained:

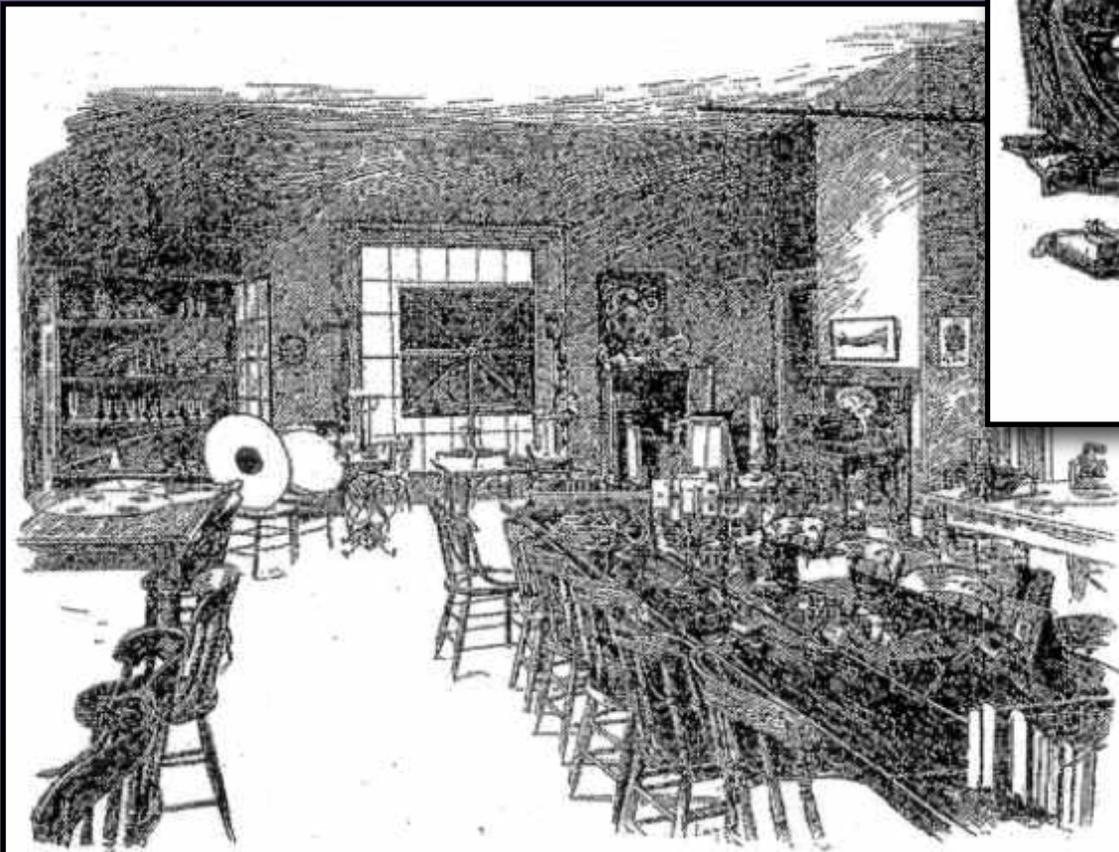
G. Stanley Hall  
(Hopkins 1883, Clark 1889)

Hugo Munsterberg  
(Harvard 1893)

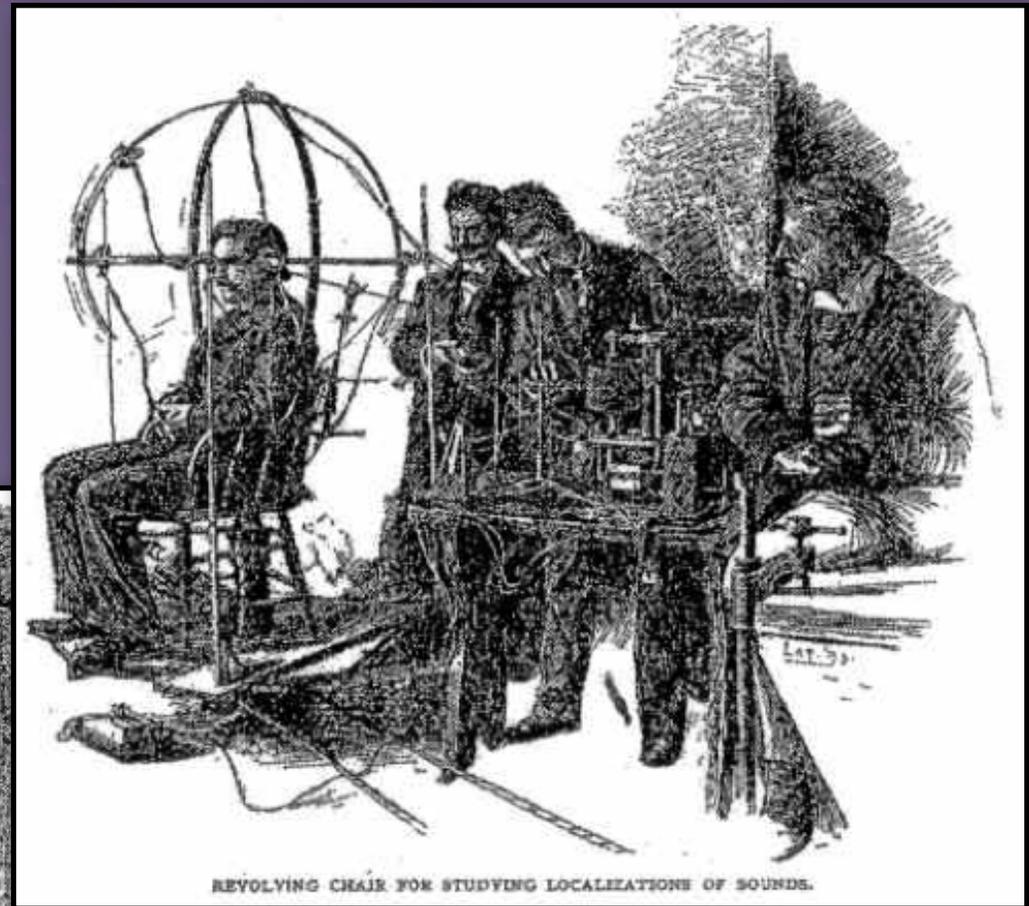


Freud, 1909, at  
Clark University

# Munsterberg, 1893: A “mental laboratory”



THE PSYCHOLOGICAL LABORATORY AT  
HARVARD.

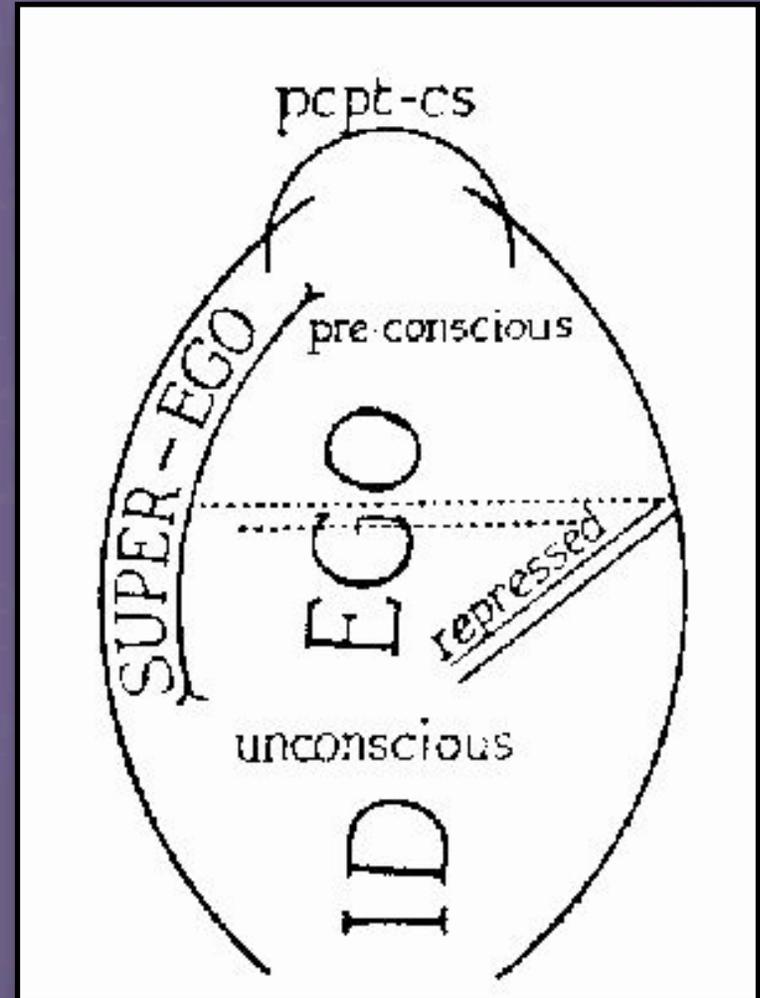
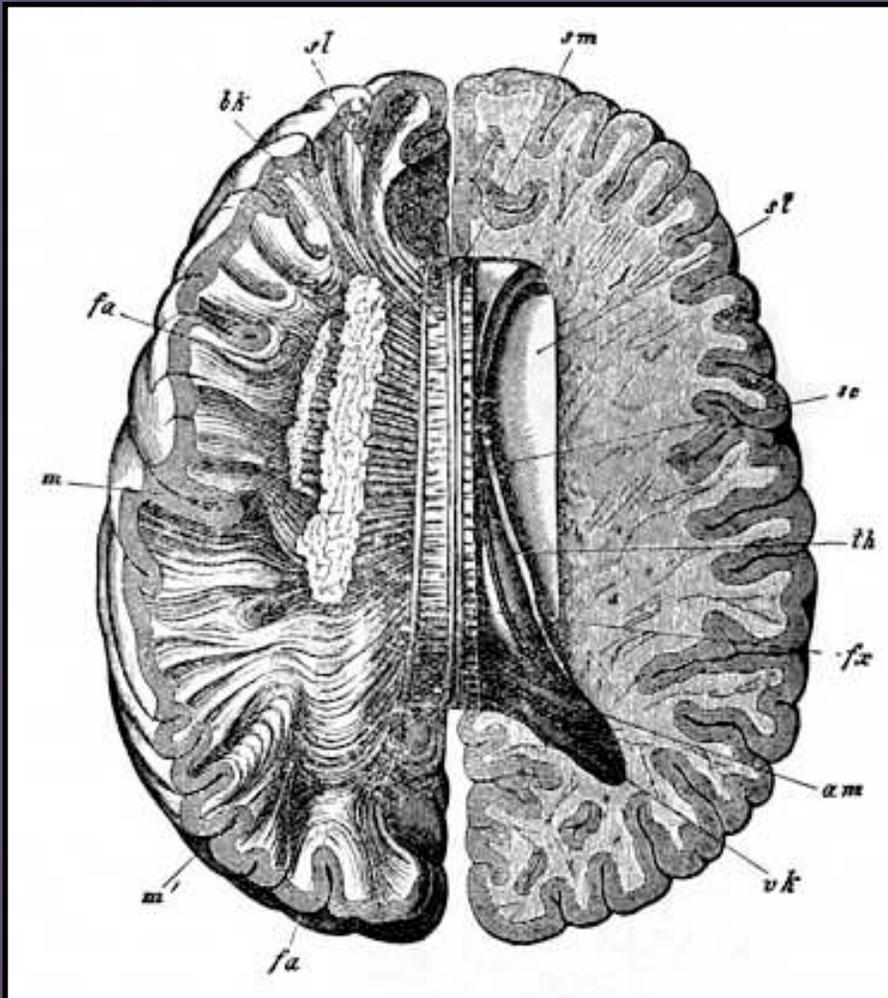


REVOLVING CHAIR FOR STUDYING LOCALIZATIONS OF SOUNDS.

- Perception
- Reaction Time
- Memory
- Associations
- “Laws of Thought”

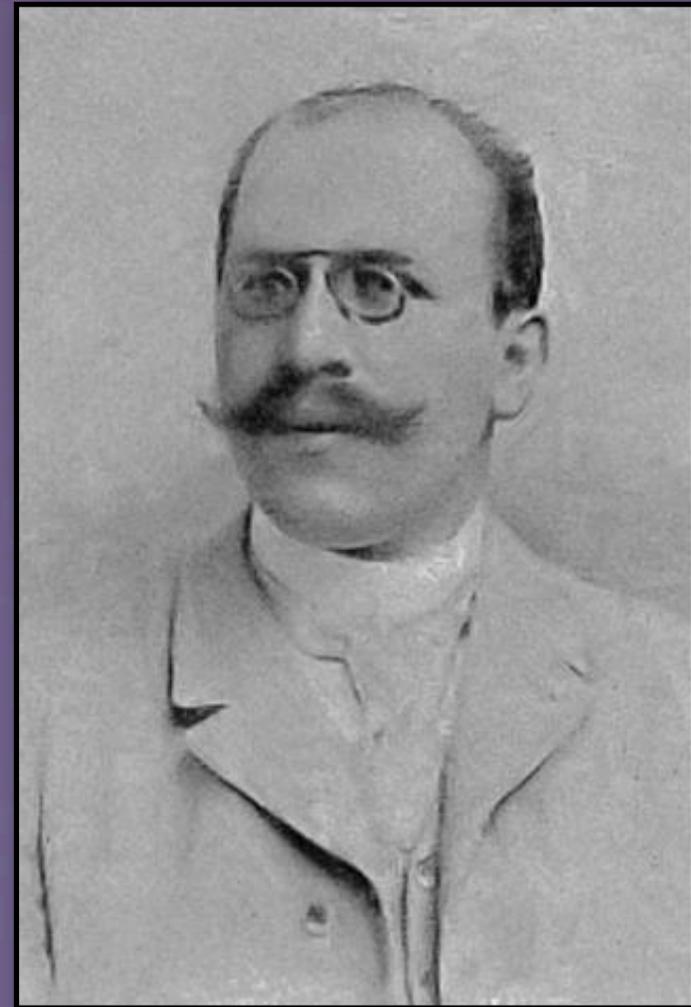
# Munsterberg and Freud

## Brain vs. the Unconscious



Munsterberg, 1893:

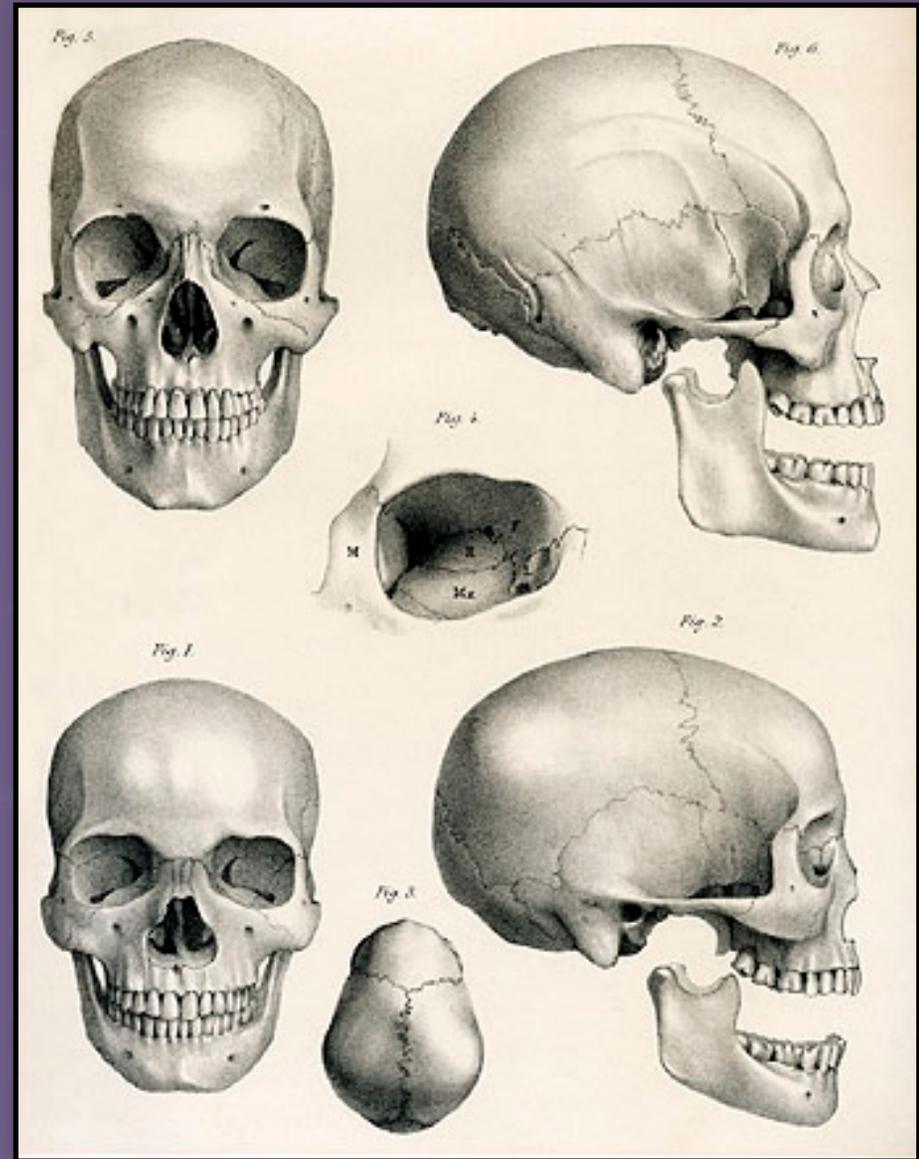
A science of the brain,  
a basis for social policy



measurements of elementary acts. To-day we know scarcely a single realm of the mental life into which with rich success experiment does not dare to go. Who shall set the limit? To show the significance of the experimental method for the highest and most complicated phenomena of mental life, has come to be to-day exactly the goal of our labors. In the series of scientific investi-

# Cranium Size and Intelligence?

- Caucasian: 87
  - English 96
  - Greek 84
- Chinese, African: 82
- Australian: 75



Samuel Morton  
*Crania Americana*, 1839  
*Crania Aegyptica*, 1844



SCHEDULES AND APPARATUS  
FOR THE BINET TEST.

SCHEDULE OF TESTS:	APPARATUS:
<u>Mental Age 3 Years:</u>	
1. Points to nose, eyes, mouth, etc.	Three or more pictures showing:- 1. Familiar objects. 2. Decided action. 3. Emotion.
2. Repeats "It rains"; "I am hungry"	
3. Repeats 1 & 2	
4. Sees in pictures objects: 1. _____ 2. _____ 3. _____ 4. _____	
<u>Mental Age 4 Years:</u>	
1. Knows sex.	Key
2. Recognizes key, knife, penny.	Knife
3. Repeats 1 & 2	Penny
4. Compares lines.	Sets of lines.
<u>Mental Age 5 Years:</u>	
1. Compares 5 & 59 -- 6 & 159.	4 Weights 3a, 6a, 12a, 16a.
2. Copies square.	Square.
3. Repeats "His name is John; he is a very good boy".	4 Pennies.
4. Counts 4 pennies.	Visiting card cut diagonally.
5. "Patience"	
<u>Mental Age 6 Years:</u>	
1. Morning or afternoon?	Key
2. Defines: 1. Fork. 4. Horse. 2. Table 5. Mama. 3. Chair.	Box
3. Puts key on chair; shuts door; brings box.	6 pictures: 3 ugly or deformed. 3 not ugly or deformed.
4. Shows right hand; left ear.	
5. Chooses prettier: 1 & 2 _____ 3 & 4 _____ 5 & 6 _____	

Alfred Binet and the Binet-Simon Test

TEST 8

Notice the sample sentence:

People hear with the eyes ears nose mouth

The correct word is ears, because it makes the truest sentence.

In each of the sentences below you have four choices for the last word. Only one of them is correct. In each sentence draw a line under the one of these four words which makes the truest sentence. If you can not be sure, guess. The two samples are already marked as they should be.

SAMPLES	People hear with the eyes <u>ears</u> nose mouth	
	France is in <u>Europe</u> Asia Africa Australia	
1	America was discovered by Drake Hudson <u>Columbus</u> Cabot.....	1
2	Pinocle is played with rackets <u>cards</u> pins dice.....	2
3	The most prominent industry of Detroit is <u>automobiles</u> brewing flour packing.....	3
4	The Wyandotte is a kind of horse <u>fowl</u> cattle granite.....	4
5	The U. S. School for Army Officers is at Annapolis <u>West Point</u> New H.....	5
6	Food products are made by Smith & Wesson <u>Swift &amp; Co.</u> W. L. D.....	6
7	Bud Fisher is famous as an actor author <u>baseball player</u> c.....	7
8	The Guernsey is a kind of horse goat sheep <u>cow</u> .....	8
9	Marguerite Clark is known as a suffragist singer <u>.....</u>	9
10	"Hasn't scratched yet" is used in advertising a d..... <u>cleanser</u> .....	10
11	Salsify is a kind of snake fish lizard v.....	11
12	Coral is obtained from mines elephant.....	12
13	Rosa Bonheur is famous as a poet <u>sculptor</u> .....	13
14	The tuna is a kind of fish <u>bird</u> .....	14
15	Emeralds are usually red.....	15
16	Maize is a kind of co.....	16
17	Nabisco is a pat..... <u>food product</u> tooth paste.....	17
18	Velvet Joe..... of tooth powder dry goods <u>tobacco</u> soap.....	18
19	Cypress..... food <u>tree</u> fabric.....	19
20	Bon..... Egypt <u>India</u> Japan.....	20
21	..... kind of typewriter <u>multigraph</u> <u>phonograph</u> adding machine.....	21
22	..... in the <u>abdomen</u> head shoulder neck.....	22
23	..... the name of a <u>fabric</u> drink dance food.....	23
24	..... is a term used in <u>medicine</u> theology <u>law</u> pedagogy.....	24
25	The Battle of Gettysburg was fought in <u>1863</u> 1813 1778 1812.....	25
26	The bassoon is used in <u>music</u> stenography book-binding lithography.....	26
27	Turpentine comes from petroleum ore hides <u>trees</u> .....	27
28	The number of a Zulu's legs is <u>two</u> four six eight.....	28
29	The scimitar is a kind of <u>musket</u> cannon pistol <u>sword</u> .....	29
30	The Knight engine is used in the Packard Lozier <u>Stearns</u> Pierce Arrow.....	30
31	The author of "The Raven" is Stevenson Kipling Hawthorne <u>Poe</u> .....	31
32	Spare is a term used in <u>bowling</u> football tennis hockey.....	32
33	A six-sided figure is called a scholium parallelogram <u>hexagon</u> trapezium.....	33
34	Isaac Pitman was most famous in physics <u>shorthand</u> railroading electricity.....	34
35	The ampere is used in measuring wind power <u>electricity</u> water power rainfall.....	35
36	The Overland car is made in Buffalo Detroit Flint <u>Toledo</u> .....	36
37	Mauve is the name of a drink <u>color</u> fabric food.....	37
38	The stanchion is used in <u>fishing</u> hunting <u>farming</u> motoring.....	38
39	Mica is a vegetable <u>mineral</u> gas liquid.....	39
40	Scrooge appears in Vanity Fair <u>The Christmas Carol</u> Romola Henry IV.....	40

Fig. 25.—Group Examination Alpha, Form 5, Test 8, Information.



47.3% "feeble-minded"

"We must learn to measure skillfully every form and aspect of behavior which has psychological and sociological significance."  
 -- Robert Yerkes

# Electroencephalograms (1930s)

Image of EEG results removed due to copyright restrictions.

# Wilder Penfield (1940s), Intra-operative brain recording

Illustrations associating areas of the brain with different parts of the body removed due to copyright restrictions.

# Advances in Brain Imaging: CT and MRI (1970s-1990s)

Images from a CT and MRI removed due to copyright restrictions.

# Functional Neuroimaging

(1990s-2000s)

PET Scan  
fMRI

Image from an fMRI removed due to copyright restrictions.

Where is:  
Memory?  
Consciousness?  
Schizophrenia?  
Free Will?  
The Soul?

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STS.003 The Rise of Modern Science  
Fall 2010

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