A Little History of Psychology

Thus far, we have seen a very few issues which occupy **Philosophers of Mind**

But philosophers do not work in splendid isolation.

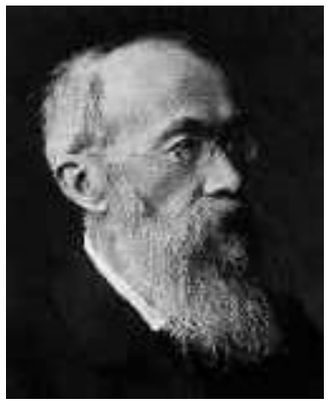
The scientific study of all things mental constitutes the discipline of **Psychology**

The field of Psychology is a large field. Some parts of it adopt the scientific method. Some parts of it provide pastoral care. The borders between these parts are not as clear as they ought to be.

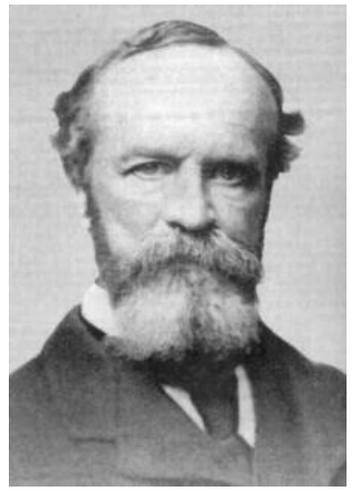
Origins

- Term coined: 1590

- Experimental foundation: 1879, Wilhelm Wundt, Leipzig

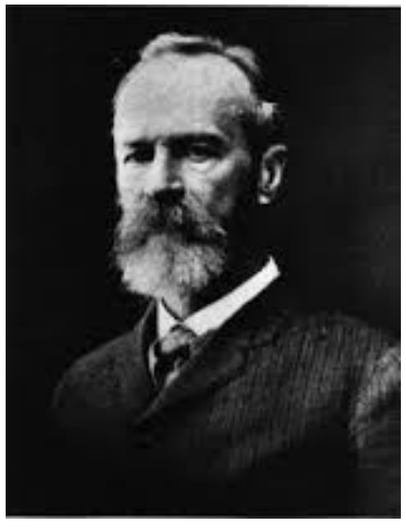


- William James: 1890: “Principles of Psychology”



Beards are now optional

Massive advances in physics, chemistry, engineering in late 19th C. suggested that the scientific method could be applied to anything . . .

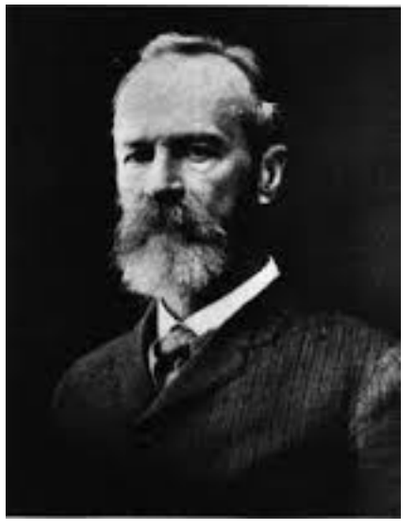


William James (USA, 1842 - 1910)

Brother of Henry James (novelist)

In a famous passage he says "Consciousness … does not appear to itself chopped up in bits. … it flows. A 'river' or a 'stream' are the metaphors by which it is most naturally described. In talking of it hereafter, let us call it the stream of thought, of consciousness, or of subjective life." (James, 1890, i, 239). He referred to the stream of consciousness as "... the ultimate fact for psychology." (James 1890, i, p 360).

The “stream of consciousness” idea has been more influential in literature (Joyce, Wolff, etc) than in science, though recent theories of consciousness may refer to it as a starting point.



William James (USA, 1842 - 1910)

Principles of Psychology
Varieties of Religious Experience

Strong interest in subjective experience
Influenced by Buddhist and Hindu philosophy as well as Western Science

Philosophically a *pragmatist*: rather than arguing for ever, let's see if a given idea or position can actually help us. (The start of the tradition of "self-help" in popular psychology)

Early Approaches

Q: How do you found a science of the mental?
A: Any way you can . . .

- Analysis (reason)
- Psychophysics
- Experiments (e.g. hypnosis)
- Introspection

A little illustration of psychophysics

100 Hz

200 Hz

300 Hz

400 Hz

800 Hz

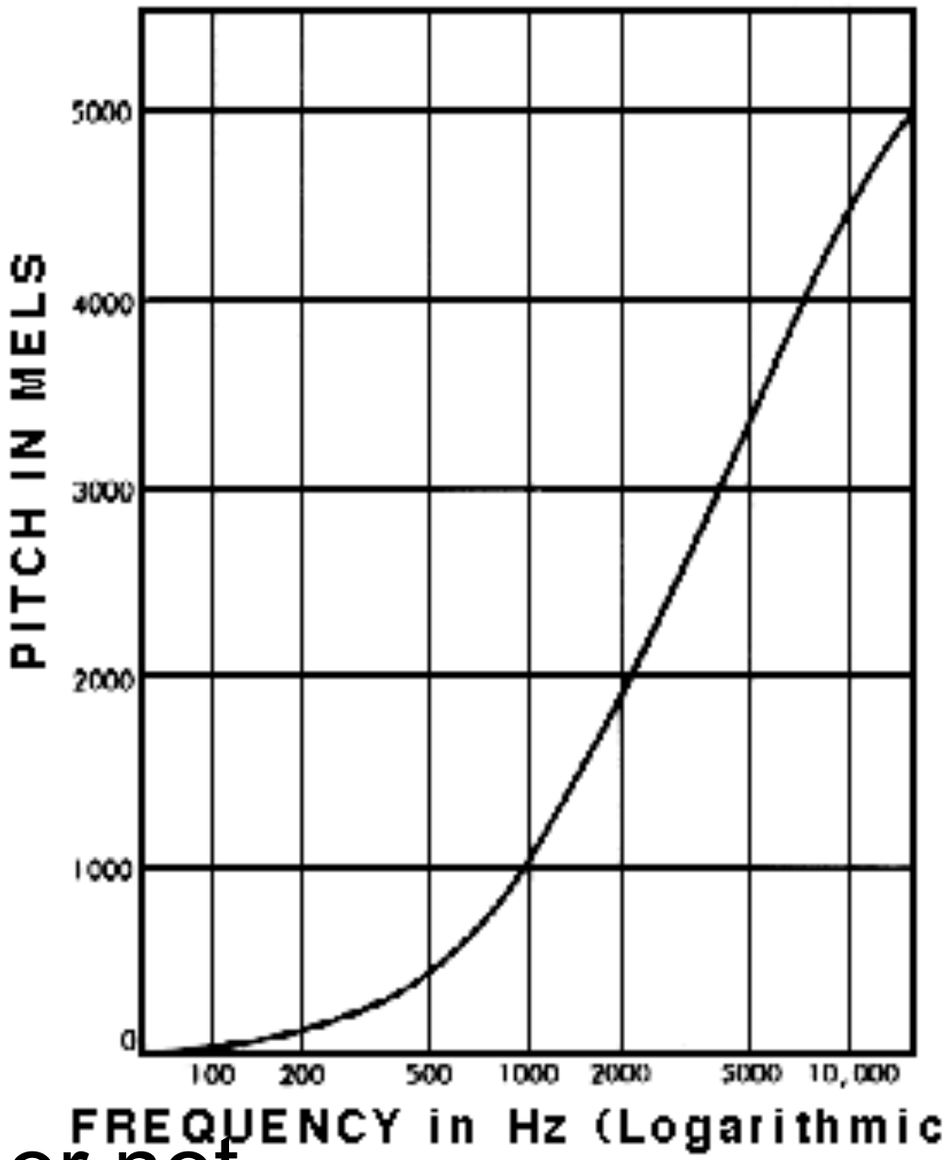
1600 Hz

We know how to measure the physical properties of things like sounds and light. But more work is required to understand how the physical properties relate to our perception. For example, we know that sounds of different frequencies are heard as different pitches, but we need to do experiments to find the relation between measured frequency and perceived pitch

We seek to establish the lawful relation between measurable properties such as frequency and perceived properties such as pitch.

How do you find out what someone perceives?

* ask them
* judge if 2 stimuli are identical or not
* find just noticeable differences
* adjust two stimuli until they appear to be equal
* etc.



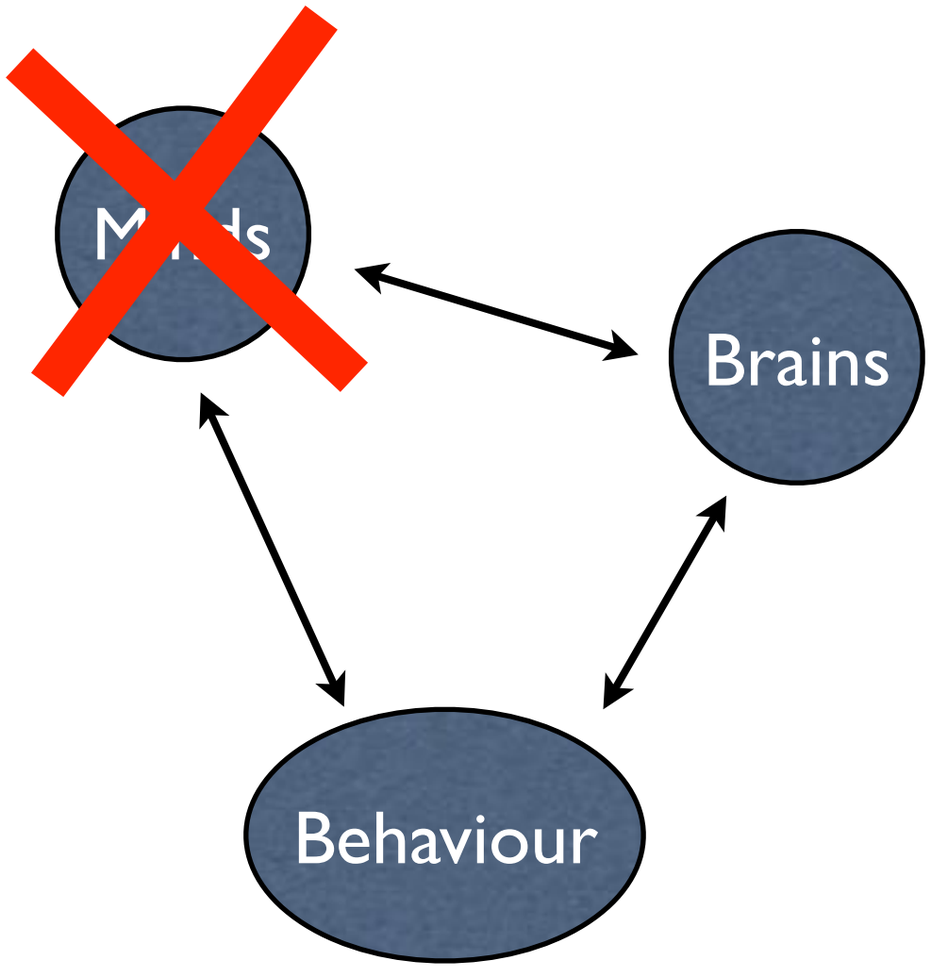
Measured Physical Property	Perceived Property
Frequency	Pitch
Amplitude	Loundess
Luminosity	Brightness
Chemical composition	Scent/Taste
Pressure	Perceived pressure

etc

Introspection

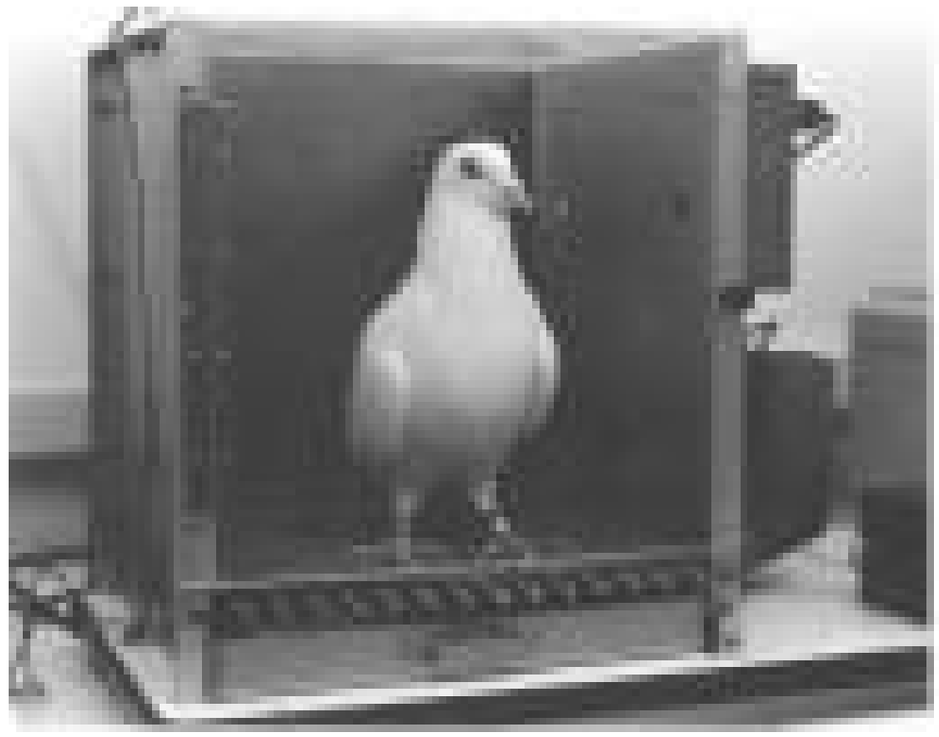
Behaviorism

- Outlawed appeal to unobservable mental states
- Attempted to be rigorous and scientific
- Comes in a variety of forms and extremes
- Most famous: B. F. Skinner


Minds
Brains
Behaviour

Superstitious Pigeons

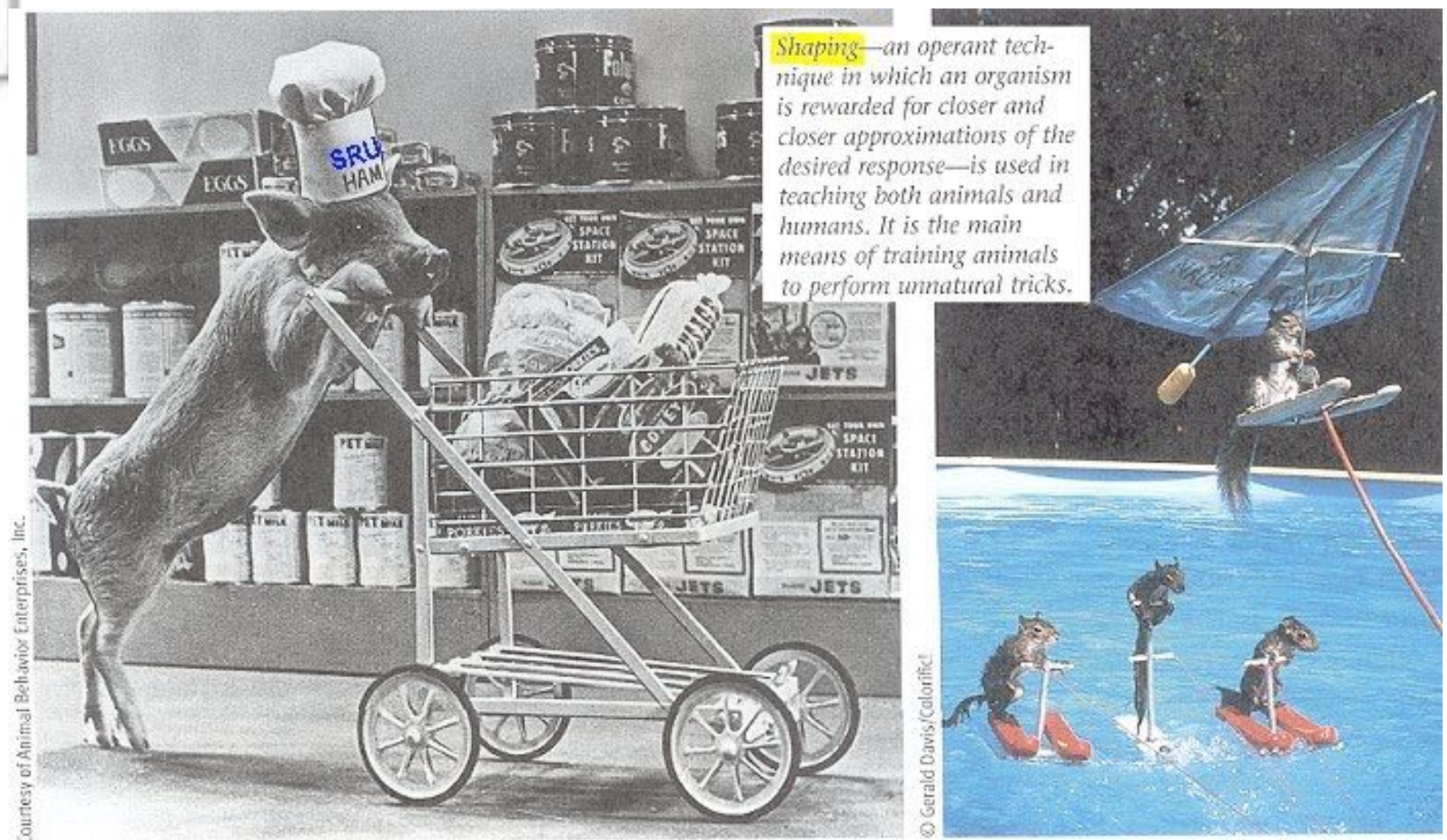
- Skinner introduced “Operant Conditioning”
- Behaviour is modified as a result of its consequences (reward/punishment)
- You burn yourself: you avoid fire
- By providing food at unpredictable times, pigeons preferentially reproduced the behavior that ‘seemed’ to produce food.



One bird was conditioned to turn counter-clockwise about the cage, making two or three turns between reinforcements. Another repeatedly thrust its head into one of the upper corners of the cage. A third developed a 'tossing' response, as if placing its head beneath an invisible bar and lifting it repeatedly. Two birds developed a pendulum motion of the head and body, in which the head was extended forward and swung from right to left with a sharp movement followed by a somewhat slower return. (see readings...)

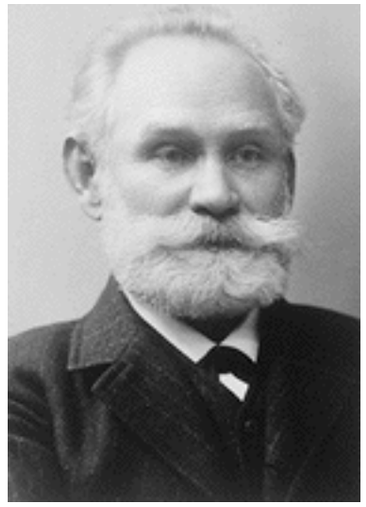
Behavioural shaping is widely used by animal trainers

. . . and marketers.



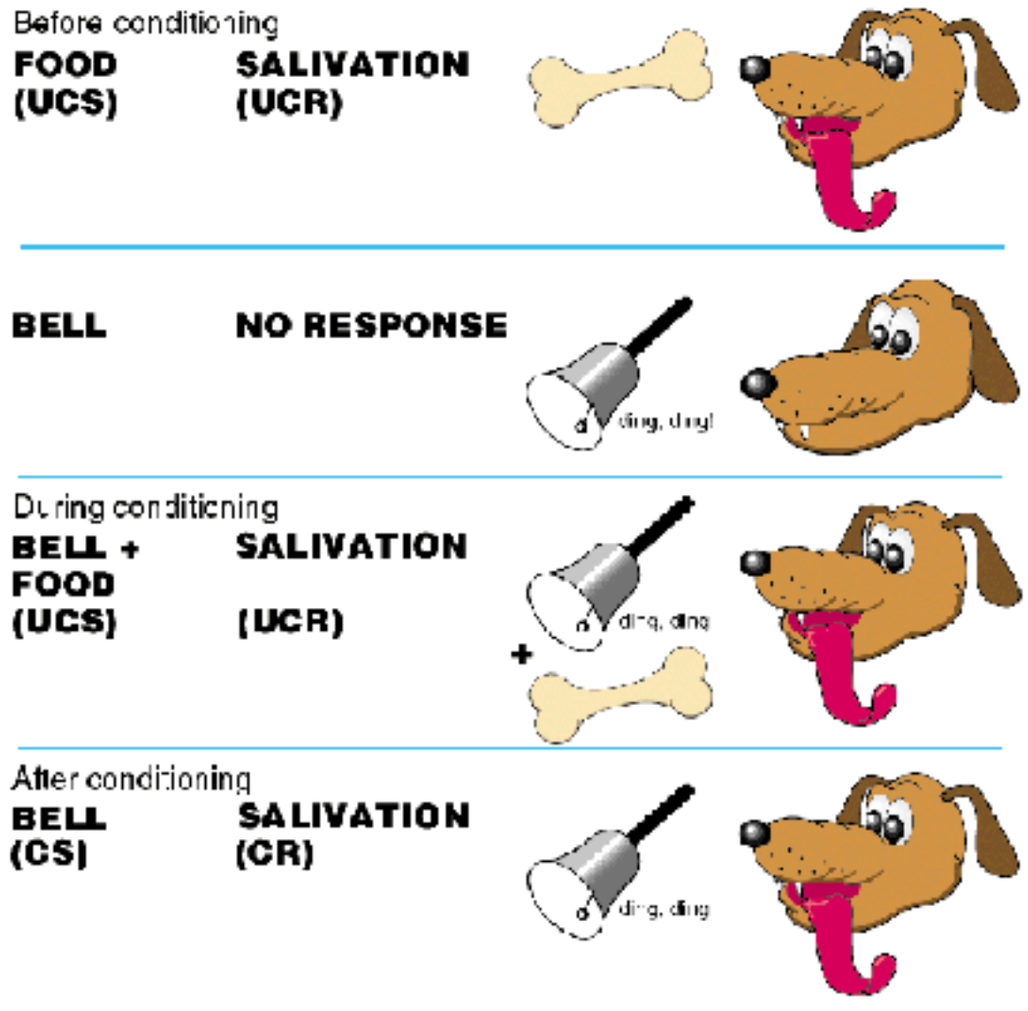
Shaping—an operant technique in which an organism is rewarded for closer and closer approximations of the desired response—is used in teaching both animals and humans. It is the main means of training animals to perform unnatural tricks.

Classical Conditioning



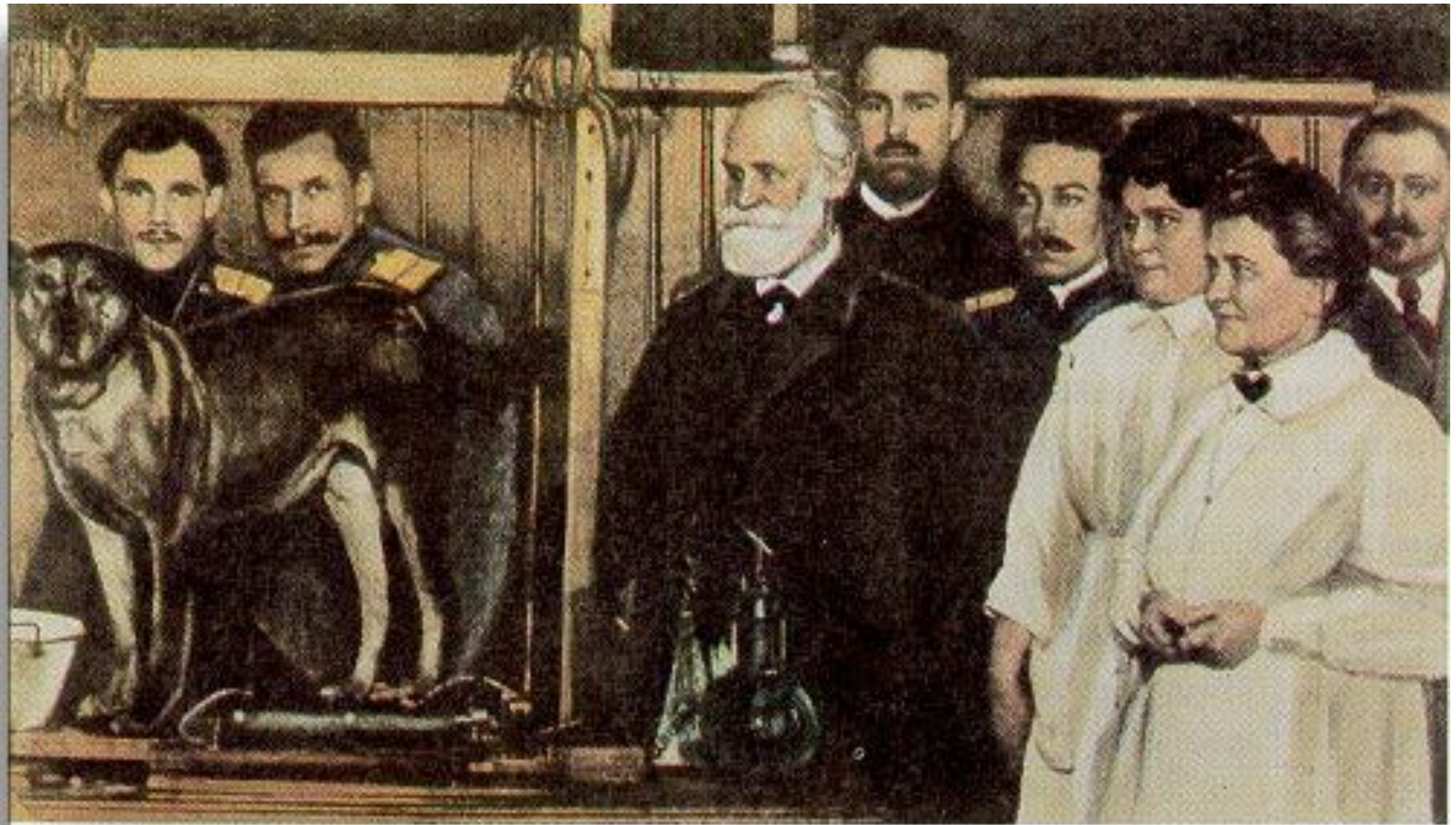
Ivan Pavlov

Stimulus.....Response
Involuntary learning



This illustration shows the steps of classical conditioning.

1. Food= salivation
2. Food + Stimulus = salivation (conditioned stimulus)
3. Bell alone produces salivation (conditioned response)



Pavlov(center) shown demonstrating classical conditioning to students at the Military Academy in Russia. © The Granger Collection

Heinz von Förster tells a story

http://www.youtube.com/watch?v=KM85u4AZpOU

An Ointment Full of Flies?

- Mechanistic view of the human spirit
- Denied much of the mental richness we all know
- Impoverished theory of learning
- Has nothing to say about *experience*

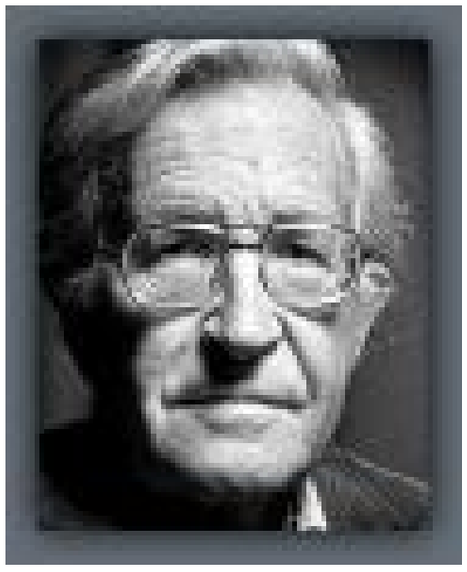
The book: Verbal Behavior

To speak English is to have a set of behaviors which allow you to respond appropriately during an English conversation.

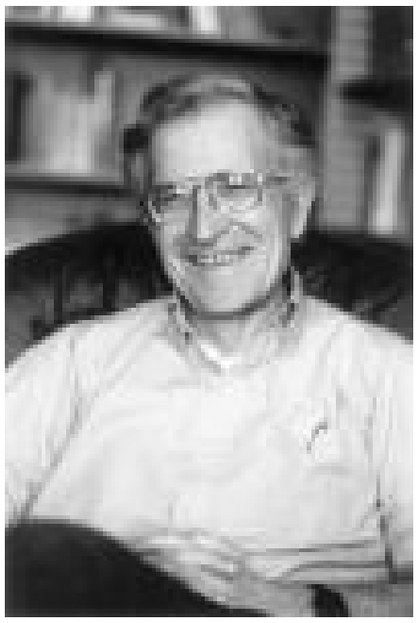
Skinner the Empiricist

Chomsky the Rationalist

Behaviorist theories can never account for how children learn language. Language is used creatively, not parroted.



The Cognitive Revolution (post 1959)



Noam Chomsky:
Language use and acquisition tells us that we are born with an *innate* readiness to learn and use language.

All humans possess a *Universal Grammar*. This dictates what the space of possible languages is. A learner simply selects among possible languages.

Jerry Fodor 1:
The Modularity of Mind

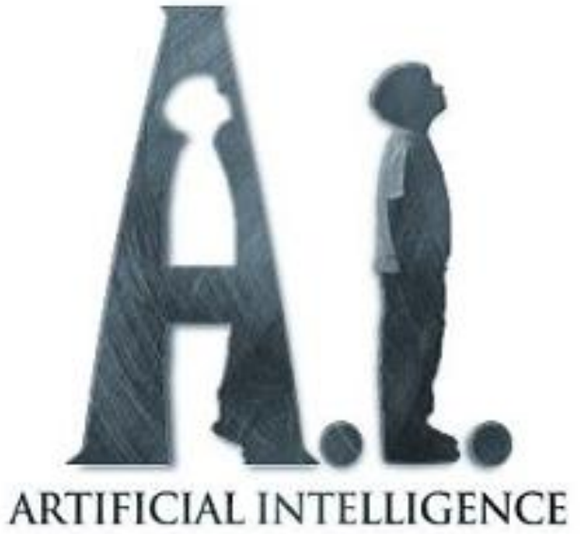
To describe the architecture of a mind, we should refer to its diverse functions. Different functions are done by separate modules.

Modules devoted to individual functions (language, reasoning, ...) are *informationally encapsulated* and *domain specific*.

Jerry Fodor 1I: The Language of Thought

Taking a lot of concepts from the theory of language, Fodor argued that *thought* is structured much like *language*, or that thought *is* language

The thought “I would like a pie” has structure much like the sentence “I would like a pie”.



Physical Symbol System Hypothesis (1963):

A physical symbol system has the necessary and sufficient means of general intelligent action.

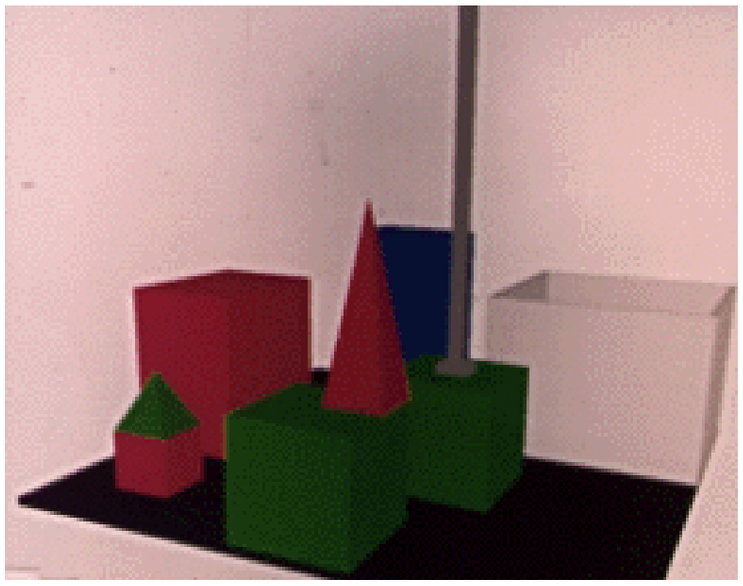
(Alan Newell and Herb Simon)

Symbols are like words. They can only be combined in certain, regular, meaningful, ways. Moving symbols around changes their meaning.

Towers of Hanoi

A classic logic puzzle readily solved by early AI architectures (General Problem Solver, etc)

SHRDLU



Terry Winograd
ca. 1970

Person: PICK UP A BIG RED BLOCK.
Computer: OK.
Person: GRASP THE PYRAMID.
Computer: I DON'T UNDERSTAND WHICH PYRAMID YOU MEAN.
Person (changing their mind): FIND A BLOCK WHICH IS TALLER THAN THE ONE YOU ARE HOLDING AND PUT IT INTO THE BOX.
Computer: BY "IT", I ASSUME YOU MEAN THE BLOCK WHICH IS TALLER THAN THE ONE I AM HOLDING.
Computer: OK.
Person: WHAT DOES THE BOX CONTAIN?
Computer: THE BLUE PYRAMID AND THE BLUE BLOCK.
Person: WHAT IS THE PYRAMID SUPPORTED BY?
Computer: THE BOX.
Person: HOW MANY BLOCKS ARE NOT IN THE BOX?
Computer: FOUR OF THEM.
Person: IS AT LEAST ONE OF THEM NARROWER THAN THE ONE WHICH I TOLD YOU TO PICK UP?
Computer: YES, THE RED CUBE.
etc.

Notice that Artificial Intelligence and much of cognitive science focusses on our ability to *reason*.

This has been a constant since Rene Descartes (at least).

Is *reasoning* the most important (salient, central) feature of your mental life?

What about “Cognitive Psychology”?

Some hallmarks:

[1] Uses the scientific method, without unqualified recourse to introspection

[2] Presupposes the reality of mental states, including beliefs, desires, and intentions

Much work in CP has accepted some version of the Information Processing paradigm

Information Processing Paradigm

Brain: hardware
Thoughts: software
Inputs: Perceptual processes
Outputs: Behaviour (and other mental states)

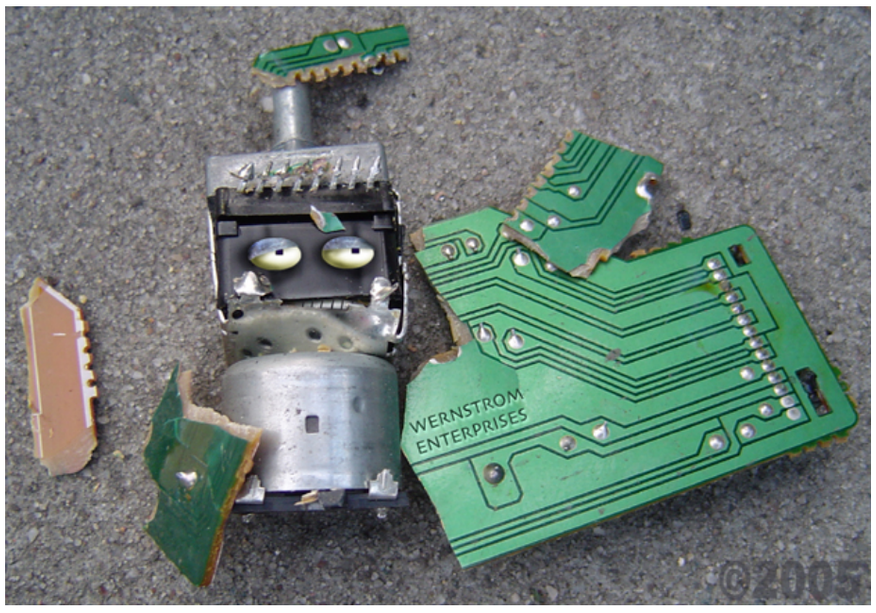
CAUTION: This is no longer a single, universally accepted orthodoxy! This view co-exists with MANY alternatives. Cognitive Science is still young!

Some relatively recent developments 1:

[1] Failure of Good Old Fashioned Artificial Intelligence (GOFAI) to scale up to deal with interestingly real world problems.

Add-More-Facts just won't work...

...but massively data-driven approaches are delivering results (c.f. Google. . .)

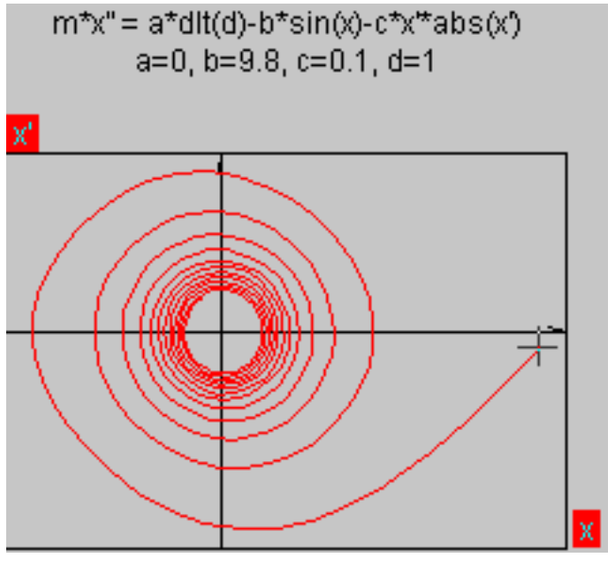


Some relatively recent developments 2:

[2] Development of some new modeling tools

Dynamical Systems Theory in Maths/ Physics is being increasingly applied to problems in Cognitive Science

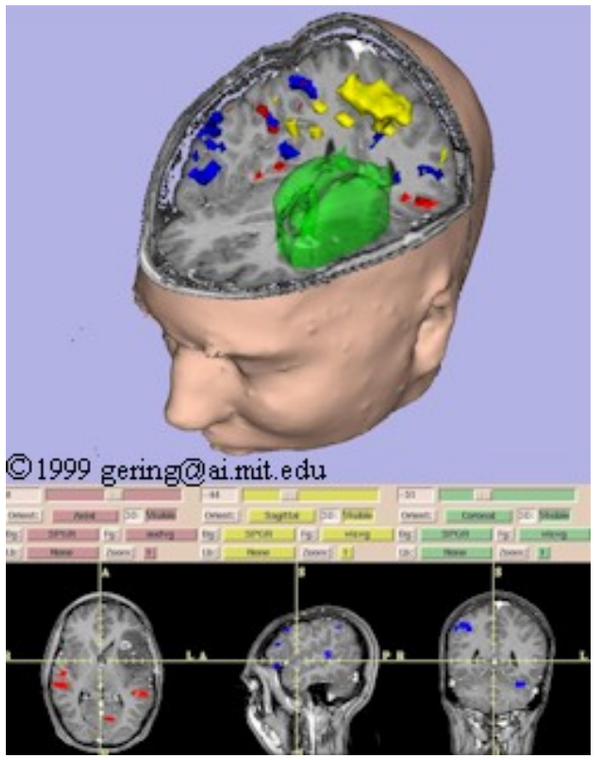
Good for describing most natural systems. Can they handle our mental lives?



Some relatively recent developments 3:

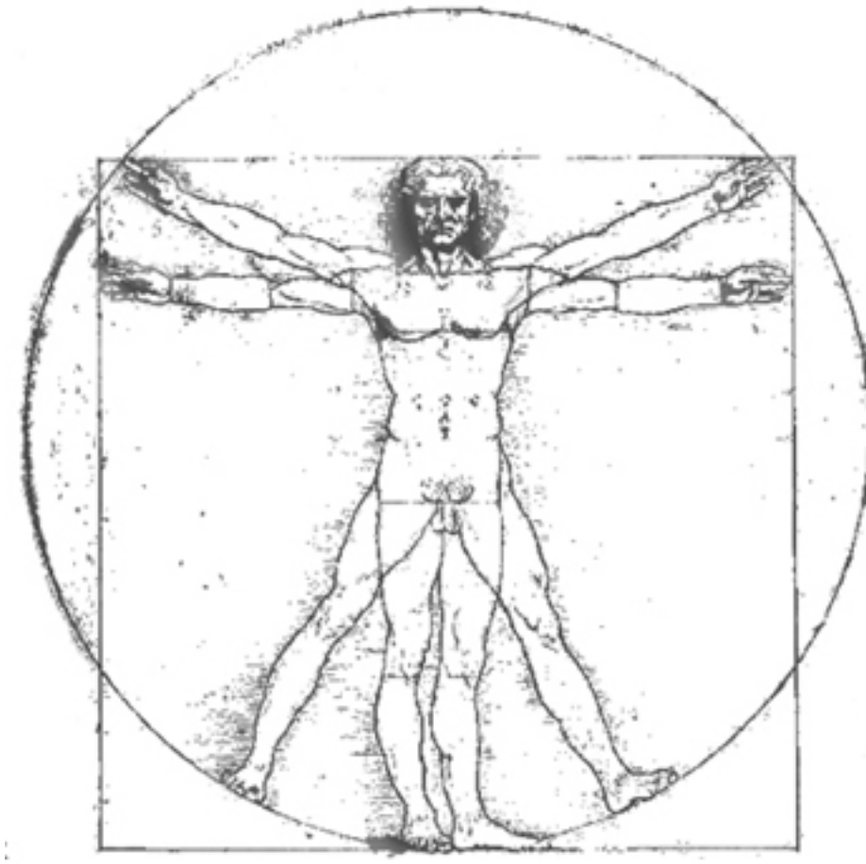
[3] Neuroscience has come a long way! High quality brain imaging is now a reality. Understanding of basic nervous function has increased tremendously. We know more about the real thing, so we don't have to make it up!!!

Important note: Neuroscience investigates brains directly. Not minds.



Some relatively recent developments 4:

Embodied Cognitive Science



Comes in many flavoured

Not just “relevance” of the body,
but the claim that knowing,
perceiving, thinking, are all
activities that involve brain,
body and world.

This is in strong opposition to the conventional notion that “it’s all in your head”

A crude distinction

Representational Cognitive Science

Distinguishes mental and physical

Locates mind in brain activity (in the head)

Model of interaction with the world: the button push

Embodied Cognitive Science

Locates experience in the activity of the body in the world (not in the head)

Model of interaction with the world: the handshake

Spare a thought for the alchemist!