

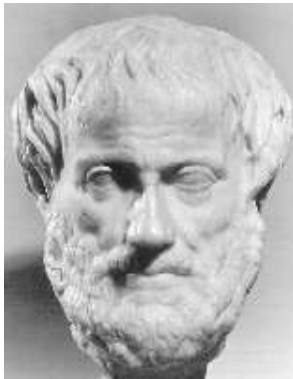
A Brief History of Cognitive Psychology

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Empiricism

vs

Nativism

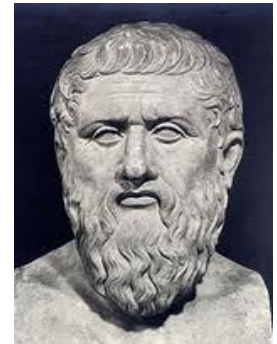


Aristotle

philosophy

John Locke
“Blank slate”

Experience



Plato

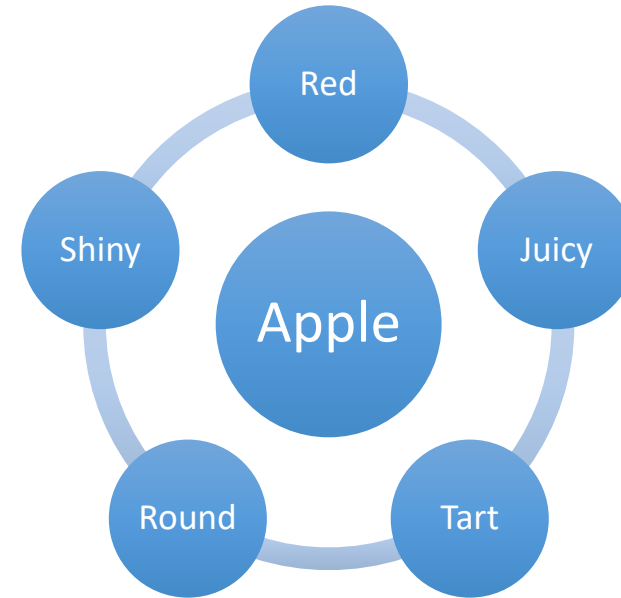
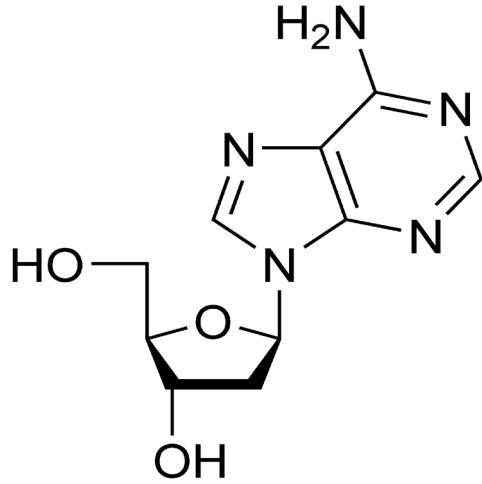
memories written on wax tablet



Descartes

Heredity & Biology

Structuralism (Wilhelm Wundt)



Wundt's school made at least two major contributions:

(1) They showed that mental activity can be broken down into more basic operations.

breaking things into parts and the connecting these feeling .

(2) They developed objective methods for assessing mental activity.

Functionalism (William James)

William James (1842–1910): focused not on the nature of mental activity, but rather on the *functions* of specific mental activities in the world.

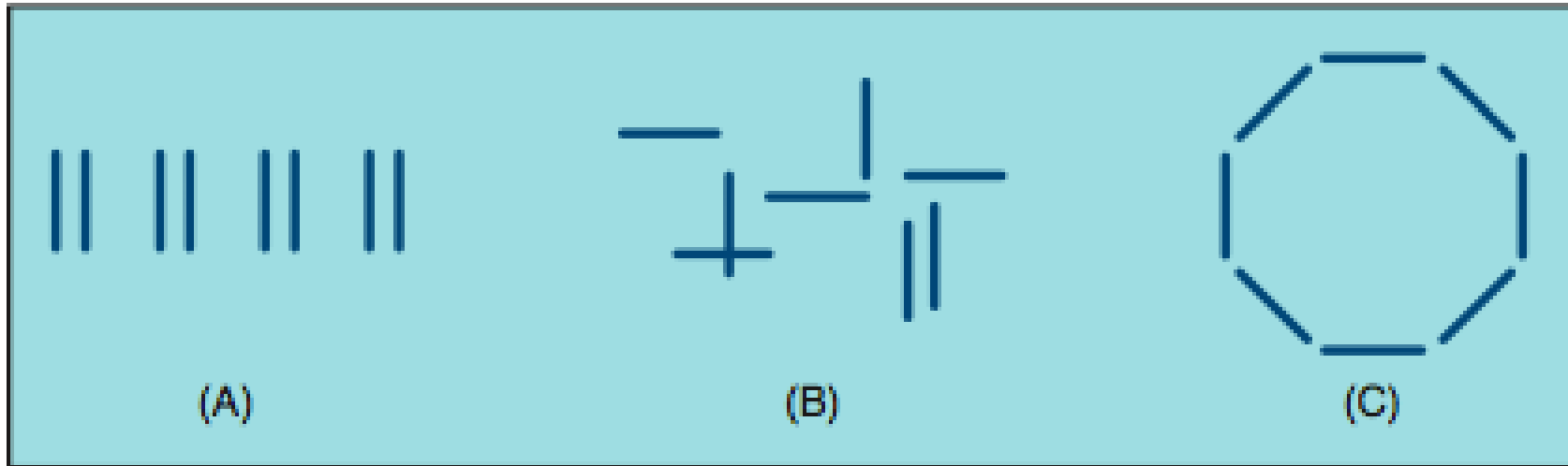
The *functionalist* perspective: certain practices or approaches are better suited than others to accomplishing certain tasks, and that we should change our thoughts and behavior as we discover those that are increasingly “better adapted” to our environment.

It relied in large part on ideas about evolution proposed by **Charles Darwin**.

Preferred to study behavior in the real world rather than a sterile laboratory

says break down in parts and study them

Gestalt Psychology



The whole is greater than the sum of the parts.

says opposite that whole has different impact than its subparts

Behaviorism

Clark L. Hull (1884–1952): proposed that internal events that are inferred directly from behavior such as motivation, even though these events were not themselves immediately observable.

B. F. Skinner (1904–1990): went so far as to reject absolutely all discussion of internal events.

Behaviorists limits:

It simply could not explain the most interesting human behaviors, notably language (Chomsky, 1957, 1959). (*p. 7*)

Failed to provide insights into the nature of perception,

The Cognitive Revolution

This new approach, developed in the late 1950s and early 1960s, was directly tied to the development of the computer (Gardner, 1985).

Researchers seized on the computer as a model for the way in which human mental activity takes place; the computer was a tool that allowed researchers to specify the internal mechanisms that produce behavior.

Herbert A. Simon and **Alan Newell** and linguist **Noam Chomsky** played a central role in this revolution, providing examples of how progress could be achieved by **comparing the mind to a computing machine.**

Understanding the Mind

The cognitive revolution led formulation of a theory of mental activities but comparing mental activities with computer programs are not very correct.

The hardware that runs these programs (mental activities vs. computer programs) are made up of different materials.

Also computer OS can run on several machines in the same way, but the same is not true for mental activities

Mind and Brain

It is not wholly correct to state the mind and brain as comparable to ***hardware and computer programs***. Some times repetitive programs are converted into electrical circuits (hardware) which perform the same functions as software program but the same cannot be done with brain and mind.

The **true distinction between brain and mind can only be understood by** examining it through various **levels of analysis**. For e.g., Computer can both be described in terms of its physics (electrical circuits) and OS (software). Similarly for decoding any mental process we need information about its functions as well as the structures that lead to this process. For e.g., Emotions

Mental Representations

All mental activities are about something – a job choice, a friend's face, thoughts about your summer holidays etc. Cognitive psychologists try to understand how information is stored and internally represented.


a *representation* is a physical state (marks on page, neural connection in the brain, magnetic fields in computers) that conveys information specifying an object, event or category or its characteristics. They have 2 important facets –

(a) form – the format of conveying information

(b) content – the meaning conveyed by the representation

we can express in two ways, one gives the full description, one is pictorial representation

Mental Representation

"A BALL IS ON A BOX"	
Description (Propositional Representation)	Depiction (Quasi-Pictorial Representation)
ON (BALL, BOX)	
<ol style="list-style-type: none">1. Relation (e.g., ON)2. Argument(s) (e.g., BALL, BOX)3. Syntax (rules for combining symbols)4. Abstract5. Does not occur in spatial medium6. Arbitrarily related to represented object	<ol style="list-style-type: none">1. No distinct relation2. No distinct arguments3. No clear syntax4. Concrete5. Occurs in spatial medium6. Resemblance used to convey information

The same content can be represented either by descriptions (abstract, language-like propositional representations) or depictions (picture-like representations). Some of the differences between the two types of formats are listed. A “relation” specifies how entities are combined, and an “argument” is an entity that is affected by a relation.

Mental Processing

In order to understand how representations work we need to understand the process that operate on them.

A ***process*** is a transformation of information that obeys well-defined principles to produce a specific output when given a specific input. perception

A ***processing system*** is a set of processes that work together to accomplish a type of task, using and producing representations as appropriate. combine multiple stuff which are related

An ***algorithm*** is a step-by-step procedure that guarantees that a certain input will produce a certain output.

finally understand the stuff

Why study the Brain?

Turning to the brain helps us to grapple with the challenge of identifiability.

Identifiability refers to the ability to specify the correct combination of representations and processes used to accomplish a task.

Facts about the brain can help us test the ***adequacy*** of a theory, which lets us know whether a theory is—to that point—valid.

sternberg experiment to recognize the numbers in the list, if the list is shown before to them
people form a mental image and then verify them with it. serial search

towsend said same thing can be thought of balls in a plate and we can do parallel processing

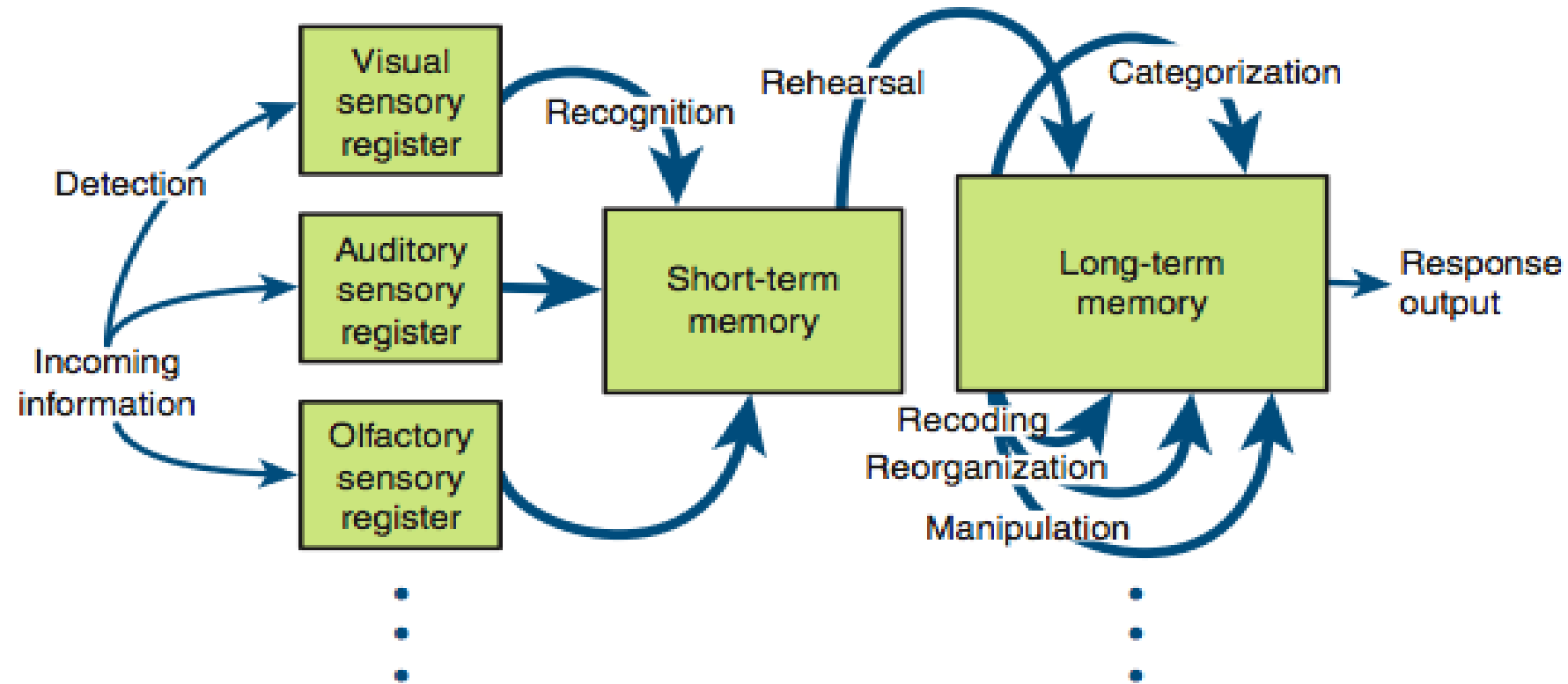
so identification can be done in multiple ways

Paradigms of Cognitive Psychology

- What is a paradigm?
 - Body of knowledge structured according to what its proponents consider important and what they do not
 - Assumptions made by investigators
 - Appropriate types of research methods
 - Appropriate questions for the field
 - Appropriate analogies

systems , process , goals

The Information Processing Approach

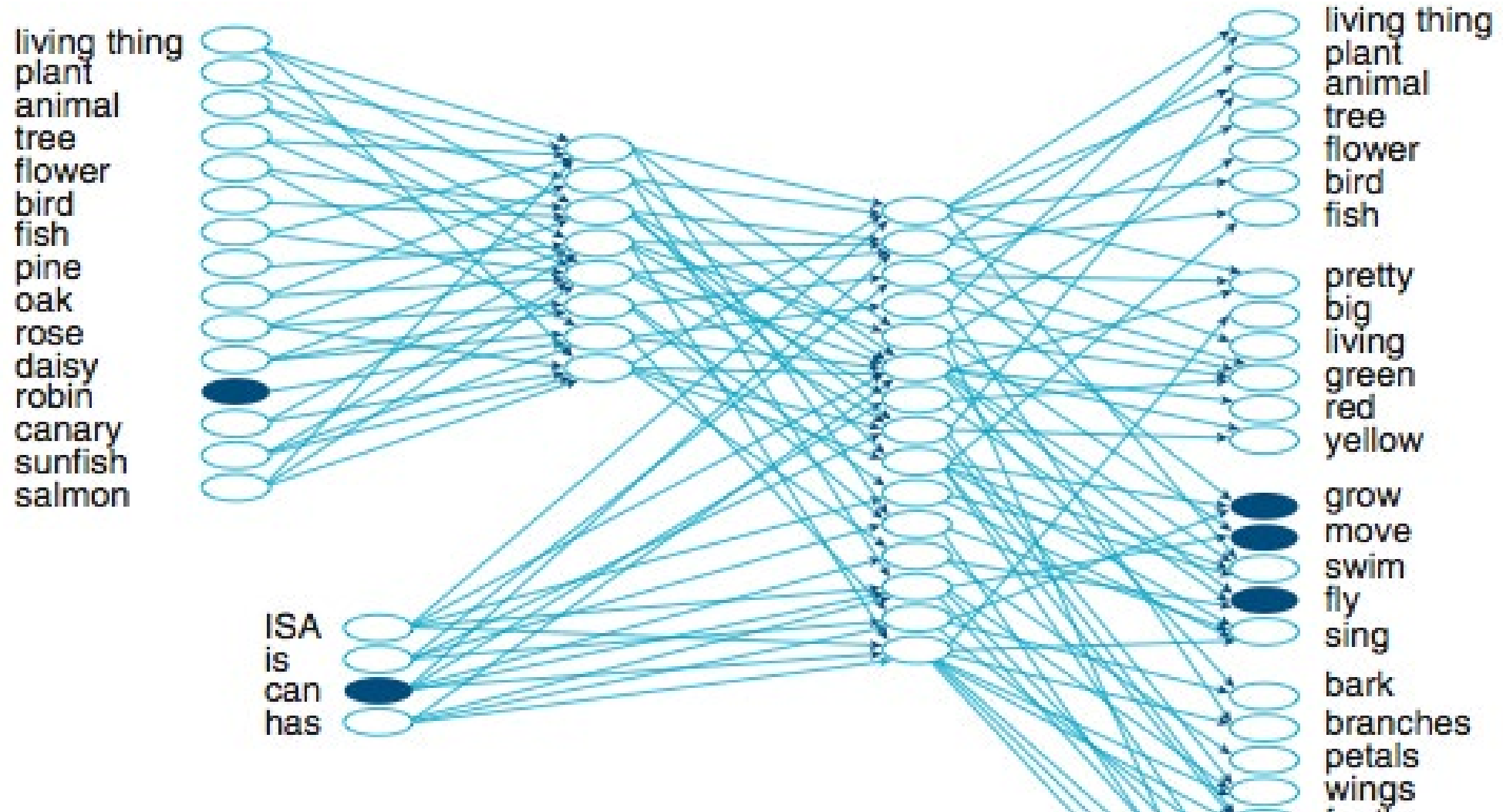


Connectionism

2nd paradigm.

nlp neural network

CFG



The Evolutionary Approach

3rd

- Human beings have specialized areas of competence produced by our evolutionary heritage
- The environment that shapes us is not only physical, but also ecological and social



The Ecological Approach

4th

- All cognitive activities are shaped by the culture and by the context in which they occur
- Focus on studying cognition in everyday contexts

perception attention memory
thinking etc etc