Cognitive Psychology

Xiaolin Zhou 周晓林

Department of Psychology
Peking University
Beijing, China

xz104@pku.edu.cn
http://www.psy.pku.edu.cn/

学习、工作简历

- 1978－1981　江苏省扬州中学
- 1981－1988　华东师范大学心理系，学士、硕士
- 1988－1992　英国剑桥大学实验心理学系，博士
- 1992－1998　伦敦大学Birkbeck学院心理学系，博士后、Research Associate
- 1998－2000　剑桥大学实验心理学系，Senior Research Associate（后期为兼职）
- 1999－现在　北京大学心理学系，教授
- 2008－现在　北京大学心理学系，系主任

学术奖励

- 2011　中国青年科技奖
- 2011　北京市“师德标兵”
- 2004　教育部“高等学校自然科学奖”一等奖
- 2008　所指导博士生获得“全国百篇优秀博士论文奖”
- 2013　教育部长江学者特聘教授

科研项目

- 2013－2017，国家社科基金重大项目，“基于多学科视域的认知研究”（12&ZD119，子课题负责人，总经费80万）
- 2013－2015，国家自然科学研究基金会重大研究计划培育项目，“感激（感恩）的神经生物学基础”（91232708，课题主持人，总经费70万）
- 2012－2015，国家自然科学研究基金会面上项目，“社会情境影响公平感知和社会决策的认知神经机制”（30110972，课题主持人，总经费75万）
- 2010－2014，科技部973计划，“人类攻击与亲和行为的发展心理学研究”（2010CB833904，课题主持人，总经费453万）
- 2010－2012，国家自然科学研究基金会面上项目，“不同层级句法结构中语义加工的认知神经机制”（30970889，课题主持人，总经费35万）
- 2008－2010年，国家自然科学研究基金会面上项目，“任务维度和任务无关维度特征一致性对视觉搜索的影响及神经机制”（30770712，课题主持人，总经费35万）

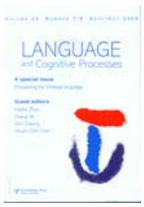
学术兼职

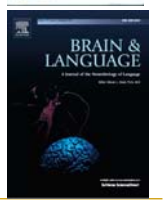
- 北京大学脑科学与认知科学中心主任
- 中国心理学会常务理事、普通心理与实验心理分会会长
- 中国残疾人事业发展研究会常务理事
- 罗丹科学院(Rodin Remediation Academy) Corresponding Fellow
- BMC Neuroscience 和 Scientific Reports 杂志副主编（执行编委）
- Language and Cognitive Processes，Frontiers in Child Health and Human Development，International Journal of Cognitive Informatics 杂志编委
- “心理科学”副主编，“心理学报”、“心理科学进展”、“心理与行为”编委

早期学术成绩

- 早期工作集中于视觉字词加工中字形、语音和语义信息的相互作用、汉字亚词汇加工的本质、多词素词的心理表征等问题
- 研究结果和理论观点具有开拓性，把汉语认知加工研究推上了国际舞台
  - 是最早以第一作者身份在国际刊物上发表相关论文的大陆籍心理学家
- 应邀为 Language and Cognitive Processes 杂志主编“Processing East Asian Languages”论文专辑 (1999)
- 应邀为 Dyslexia 杂志主编有关发展性阅读障碍论文专辑 (2005)

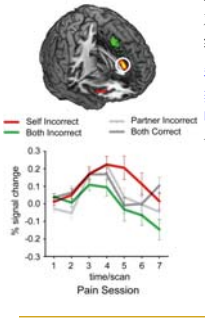
近期学术成绩





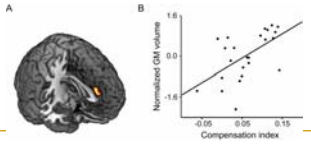
- 近年来，申请人的研究工作集中于语言理解、社会认知、社会情绪与社会决策、注意选择与执行控制这三个方向
  - 力图以多种研究手段、从行为和神经机制两个层面上阐述人类认知和社会活动的本质
  - 当前的研究手段包括计算机行为实验，神经心理学测验，脑电和核磁共振（fMRI）脑功能成像、基因个体差异研究
- 应邀为 Language and Cognitive Processes 杂志（2009）和 Brain and Language 杂志（2011）主编论文专辑
- 2008年至今，共在SCI、SSCI杂志上发表论文74篇

创新成果之一：真实人际互动中的**社会情绪**和社会行为



心理学对情绪已有广泛的研究，但囿于方法的限制，对高级社会情绪（如感激、嫉妒、内疚、宽恕）的神经基础知之甚少，也很少把情绪与行为直接挂钩。

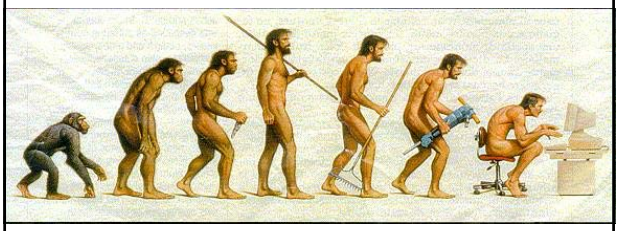
我们发明了新的范式，得以在真实人际互动情形下考察这些社会情绪的产生、情绪对随之社会行为的影响。另一些研究则把某些基因（如DBH）的变异与社会情绪（如共情）和行为（如捐赠）关联了起来。

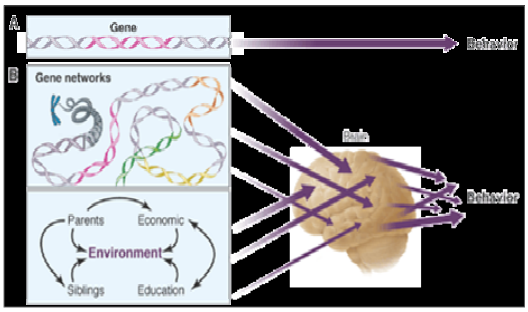


Yuan et al, 2012; Gong et al., in press; Yu et al., 2013, submitted

8

- 人类进化的重要成果：
  - 复杂的心理过程和行为模式
  - 复杂的语言、社会交流系统





- **重新审视基因、环境对行为的影响**
- Science,Volume 298, Number 5591, Issue of 4 Oct 2002, pp. 71-

为什么要学习、研究心理学？

- 人类面临的4大难题
  - 宇宙的起源、人类的起源、意识的产生、智力的本质
- 了解自我、了解他人、了解社会
- 了解自我如何影响他人、他人如何影响自己
- 一种思维方式、生活习惯

11

什么是科学？

- 科学是在科学精神指导下的一套成体系的方法论
  - 科学精神是一种看待世界的方式或态度，具体地说，是关于人能否以及如何认识世界、认识自我的方式或态度
  - 现象界的事物，不论是外在的还是内在的，不论是物质的还是心灵的，都是可以被认识的。
  - 科学方法是在科学精神指导下的一套成体系的认识世界的方法，有三个核心特征：

系统的实证主义

- 实证主义是科学的核心。
  - 它是基于观察的实践活动：通过实际的观察世界（而不是单纯的冥想和思辨）来认识世界。
- 科学的观察≠记流水账，它是系统的、理论驱动的。
  - 要认识一个现象背后的因果规律，首先提出一个假设，再从这个假设推导出一些可以通过实证观察的方法检验的预言，然后设计实验检验这个预言。
  - 提出理论-> 检验理论 ->修正理论.

公开、可重复

- 科学知识不能是仅仅存在于某个或某些特定的人的头脑中，不能基于个别的经验。它必须是公开给整个科学界的，可以由另外一些人重复出来的。
- 公开性保证了个别人的发现和认识可以被任何其他人重复、批判和扩展。只有通过这种方式，个人的认识才能为整个科学知识体系增添牢固的一砖一瓦。

实证的方法

- 科学家只研究那些可以通过现有的实验观察手段来解决的问题。
  - 科学家在开始研究前，一定先要把他的问题转化成一个可以用现有实验观察手段检验的问题。
  - 如果一个问题不可通过实验检验，那么科学作为一个理论检验过程就无法进行。
- 不可用实验观察手段解决的问题，一般都是过于宽泛的，如“人生的意义是什么？”或“上帝是否存在？”。
  - 这些问题可以作为形而上学思辨的对象，但不能作为科学研究的对象。

心理学实验的逻辑：操作化

- 像任何科学一样，心理学要探究的是因果规律。科学中，因果规律就是一种函数关系，它给出了自变量（因）的变化如何决定因变量（果）的变化。
- 在心理学实验中，研究者操作自变量，控制无关变量，检验因变量是否按照假设的规律变化。
- 那么，心理学中的自变量和因变量指的是什么呢？

心理学实验的逻辑：操作化

- 科学心理学的研究对象是人的心理过程，而心理过程本身很难被直接操作和观察。
- 为了对它们进行科学的研究，心理学家必须找到一些与心理过程相对应的、同时又可以被直接操作和观察的对象。这个过程就是操作化定义。
- 心理学中常用人的行为（如反应时，正确率）和生理指标（如皮肤电阻，脑电波）作为某种心理过程或状态的标志，即因变量。

心理学实验的逻辑：操作化

- 自变量通常是研究者操纵的变量，这些变量与我们假定的心理过程有着直接的、大家公论的对应关系。
- 例如：给一群被试看一组情绪图片，给另一群被试看中性图片，就造成了高、低情绪唤醒两个自变量水平；
  - 之后再让他们做同样的记忆任务，
  - 从两组记忆成绩的差异中就可以看出，情绪唤醒这个自变量对记忆成绩这个因变量的影响。

确然还是概然？

- 既然科学的认识是基于观察的，那么我们如何证明一项科学规律是绝对正确的？
- 没有任何办法，因为人类无法穷尽所有可能的观察。
- 但这并不意味着科学的探究没有意义。因为无论是从认识角度还是从实践角度，一条足够好的规律就可以被认为是一条正确的规律。
- 由于心理学研究对象的复杂多变性，规律的概率性就显得更为突出。

科学方法

- 确定要研究的问题
- 设计实验、操纵感兴趣的因素
- 收集、分析数据
- 进行推论、得出结论
- 发表你的发现

- 积累数据、提出理论和假设、进行进一步的研究

使用科学方法的目的

- 理解 (understanding)
  - 描述 (description)
  - 预测 (prediction)
  - 解释 (explanation)
  - 控制 (control)
- 数据库 (database)
  - 事实与概念 (fact and concept)
  - 原则 (principle)
  - 理论 (theory)
  - 法律 (law)

心理学的研究方法

- 自我报告、个案研究、自然状态下的观察

particularly useful for the formation of hypotheses

Ecological validity

心理学的研究方法

- 实验室实验
  - 控制、平衡无关变量
  - 操纵感兴趣的自变量、观察因变量上的效应
  - 建立自变量与因变量之间的因果关系
  - **实验设计！！！**

科学研究的基本素质

- 批判性思维（critical thinking）
  - The process of objectively evaluating claims, propositions, or conclusions to determine whether they follow logically from the evidence presented
  - Critical thinking is the disciplined mental activity of evaluating arguments or propositions and making judgments that can guide the development of beliefs and taking action.
  - The foundation of the scientific method

科学研究的基本素质

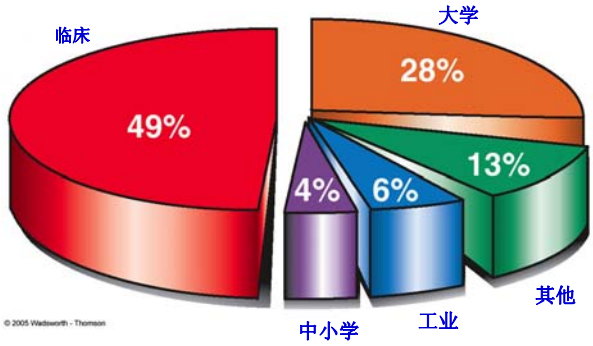
- 创造性思维（creative thinking）
  - Producing new ideas or thoughts.
  - Imaginative thinking that is aimed at producing outcomes that involve synthesis of ideas or lateral thinking
  - thinking that is more synthetical than analytical, sometimes referred to as divergent thinking.

美国大学的心理学

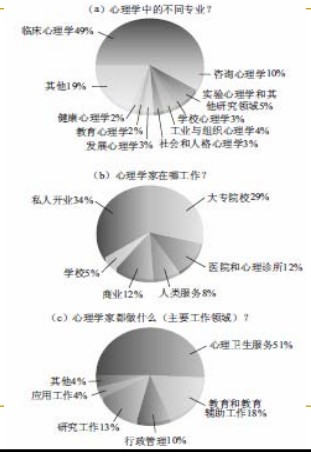
- 授予博士学位最多的学科
- 大学里选学课程人数最多的学科
- 书店里相关书籍最多的学科（仅以学科书籍计算，小说等不计）
- 每十万人口中所含比例最高的科学家/学者（非学者类如律师、医生不计）
- 大学必设心理学系、且师资人数较多
  - 密西根大学、MIT

26

美国心理学家的就业



27



28

Purpose of the Course

- What are the main issues and various fields of study in cognitive psychology
- What methods and techniques do cognitive psychologists use
- How should experimental research be conducted
- Practical training in research
  - searching and reading papers
  - planning experiments
  - writing up research report

Plan and Requirements of the Course

- Attending lectures (10%)
- Reading papers, and writing essays (60%)
- Oral or poster presentations (10%)
- Final examination (20%)

Preface to Students （Goldstein)

- **Principle 1: It is important to know what you know**
  - it is important to test yourself on the material you have read by writing or saying the answers to the Test Yourself questions in the chapter and also by taking advantage of the sample test questions that are available on the Book Companion Website.
  - To access these questions and other valuable learning aids, go to www.cengage.com/psychology/goldstein.
- **Principle 2: Don't mistake ease and familiarity for knowing**
  - *Generating* material is a more effective way of getting information into memory than simply *reviewing* it.

Organization and Arrangement

- Course Coordinator
  - a bridge between the lecturer and students
  - responsible for a variety of matters such as buying reference books and creating a mailing list
- Two supervisors
  - 熊威 (emoryfx@gmail.com)
  - 冯望舒 (vermouth1888@126.com)

Schedule of the Course

- Introduction (1 lecture)
- Cognitive Neuroscience (1 lecture)
- Perception (3 lectures)
- Attention and Consciousness (2－3 lectures)
- Short-term Memory and Working Memory (1 lecture)
- Long-term Memory (2 lectures)
- Everyday Memory and Memory Errors (1 lecture)
- Knowledge Representation (1 lecture)
- Imagery (1 lecture)
- language Processing (3 lectures)
- Problem Solving (1 lecture)
- Reasoning and Decision Making (2 lectures)

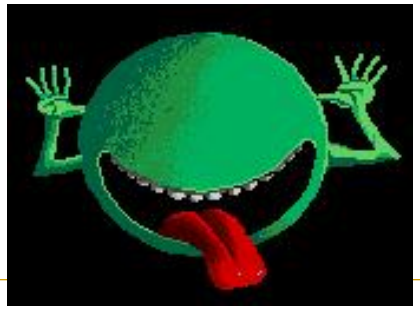
Main Reference Books

- E. Bruce Goldstein, Cognitive Psychology
- 索尔所，邵志芳等译，《认知心理学》第7版，上海人民出版社， 2008
- Eysenck & Keane, 高定国译，《认知心理学》第五版，华东师大出版社， 2009
- Stanovich，《与"众"不同的心理学》，中国轻工业出版社

Main Journals

- 心理科学进展
- Trends in Cognitive Science
- Nature Review Neuroscience
- Many Other Journals on the internet

Don't Panic!!!



What is Cognitive Psychology

- Cognition (mental activity)
  - involves the acquisition, storage, transformation, and use of knowledge
- Cognitive Psychology
  - a synonym for the word *cognition*
  - OR a particular theoretical approach to psychology
- Cognitive Approach
  - a theoretical orientation that emphasizes mental structure and processes
  - 信息加工

认知的结构、过程与功能

认知结构——组成认知的各种成分及它们之间的相互关系。

认知过程——接收、解释、组织和提取信息的活动或操作。

认知功能——不同认知成分或过程在知识获得与应用中的作用。

38

Why Study Cognitive Psychology (1)

- Cognition occupies a major portion of the study of human psychology
- Cognitive approach has widespread influence on other areas of psychology
- Cognitive psychology has also influenced interdisciplinary areas
- Cognitive psychology is related to your own personal life

Why Study Cognitive Psychology (2)

- The study of cognition has become essential not only for those interested in Cognitive Science, in general, and Cognitive Psychology, in particular, but for almost all those with an interest in the MIND.
- *The **mind** creates and controls mental functions such as perception, attention, memory, emotions, language, deciding, thinking, and reasoning.*
- *The **mind** is a system that creates representations of the world so that we can act within it to achieve our goals.*

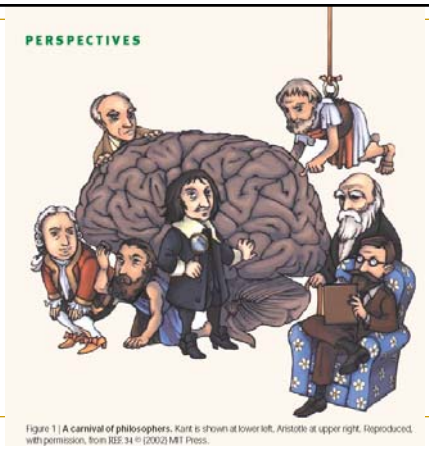


Figure 1 | **A carnival of philosophers.** Kant is shown at lower left, Aristotle at upper right. Reproduced, with permission, from IEE 34 © (2002) MIT Press.

A Brief History of the Cognitive Approach (1)

- Philosophical Antecedents
  - Rationalism vs. Empiricism
  - Knowledge and experience
- Plato: Reality resides not in the concrete objects we perceive through our body's senses, but in the abstract forms that these objects represent, i.e., in the abstract *ideas* of the objects that exist in our mind.
- Aristotle: Reality lies only in the concrete world of objects that our bodies sense.

A Brief History of the Cognitive Approach (2)

- Plato and Aristotle disagreed not only about what is truth but also about how to find truth
  - To Plato, observations of imperfect, concrete objects and actions would mislead us and take us away from truth. The route to knowledge is through logical analysis
  - To Aristotle, observations of the external world were only the means to arrive at truth

A Brief History of the Cognitive Approach (3)

- Seventeenth century
  - Rene Descartes vs. John Locke
  - whether knowledge is innate or is passively acquired through experience
- Eighteenth century
  - Immanuel Kant
  - both rationalism and empiricism have their places and must work together in the quest for truth

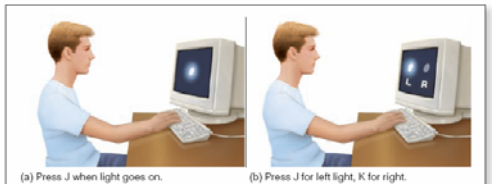
A Brief History of the Cognitive Approach (4)

- Psychological Antecedents
  - should we gain an understanding of the human mind by studying its *structure* or by studying *its functions?*
- Structuralism
  - to understand the structure of the mind and its perceptions through analyzing those perceptions into their constituent components
    - Mind = machine?
  - Wilhelm Wundt, Titchener: the optimal method was to study sensory experience though introspection

A Brief History of the Cognitive Approach (5)

- Functionalism
  - to study the processes of how and why the mind works as it does, rather than to study the structural contents and elements of the mind
  - to use whichever methods best answering given questions.
    - This leads to pragmatism
    - William James, John Dewey

Donders' Pioneering Experiment: How Long Does It Take to Make a Decision?



(a) Press J when light goes on. (b) Press J for left light, K for right.

FIGURE 1.2 A modern version of Donders' (1868) reaction time experiment: (a) the simple reaction time task; and (b) the choice reaction time task. In the simple reaction time task, the participant pushes the J key when the light goes on. In the choice reaction time task, the participant pushes the J key if the left light goes on and the K key if the right light goes on. The purpose of Donders' experiment was to determine the time it took to decide which key to press for the choice reaction time task.

Donders' Pioneering Experiment: How Long Does It Take to Make a Decision?

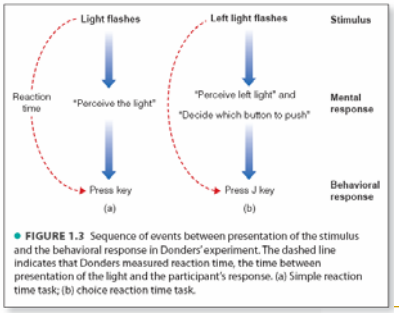


FIGURE 1.3 Sequence of events between presentation of the stimulus and the behavioral response in Donders' experiment. The dashed line indicates that Donders measured reaction time, the time between presentation of the light and the participant's response. (a) Simple reaction time task; (b) choice reaction time task.

A Brief History of the Cognitive Approach (6)

- Associationism
  - to study how events or ideas can become associated with one another in the mind, to result in a form of learning
  - Hermann Ebbinghaus, Edward Thorndike
  - *law of effect* (1905): A stimulus will tend to produce a certain response over time if an organism is rewarded for that response.

Ebbinghaus's Memory Experiment: What Is the Time-Course of Forgetting?

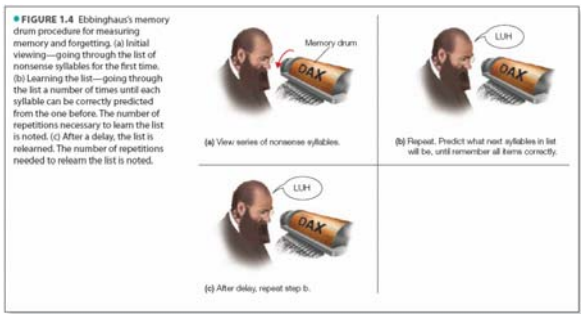


FIGURE 1.4 Ebbinghaus's memory drum procedure for measuring memory and forgetting. (a) Initial viewing—going through the list of nonsense syllables for the first time. (b) Learning the list—going through the list a number of times until each syllable can be correctly predicted from the one before. The number of repetitions necessary to learn the list is noted. (c) After a delay, the list is relearned. The number of repetitions needed to relearn the list is noted.

(a) View series of nonsense syllables.

(b) Repeat. Predict what next syllables in list will be, until remember all items correctly.

(c) After delay, repeat step b.

Ebbinghaus's Memory Experiment: What Is the Time-Course of Forgetting?

- Savings = [(Initial repetitions) − (Relearning repetitions)/ Initial repetitions] × 100

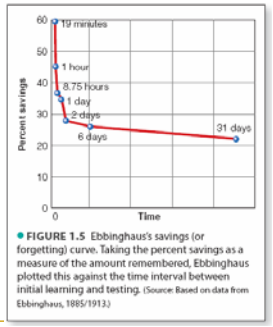
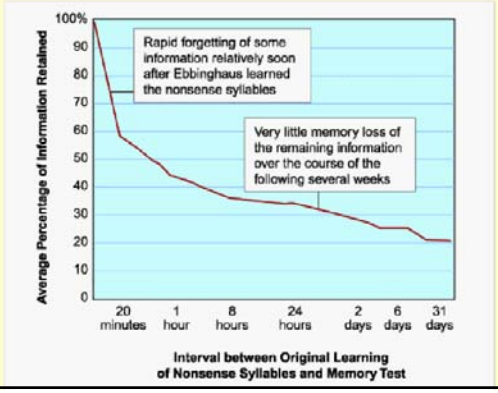


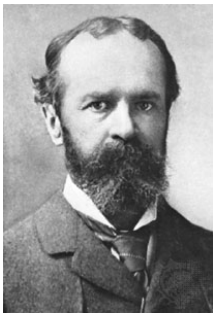
FIGURE 1.5 Ebbinghaus's savings (or forgetting) curve. Taking the percent savings as a measure of the amount remembered, Ebbinghaus plotted this against the time interval between initial learning and testing. (Source: Based on data from Ebbinghaus, 1885/1913.)

Ebbinghaus's Forgetting Curve



William James: *Principles of Psychology*

- *Principles of Psychology* (1890).
- James' observations were based not on the results of experiments, but on introspections about the operation of his own mind.
- many of his observations still ring true today, and his book is notable for the breadth of its coverage.



A Brief History of the Cognitive Approach (7)

- From Associationism to Behaviorism
  - Thorndike: voluntary responses to stimuli
  - Ivan Pavlov: involuntary responses (classically conditional learning)
- Behaviorism focuses entirely on the association between the environment and an observable behavior. It has no use for internal mental contents or mechanisms
  - John Watson, B. F. Skinner
  - Tolman (goal, plan), Bandura (social learning)

WATSON FOUNDS BEHAVIORISM

- Problems with Introspection
  - (1) it produced extremely variable results from person to person,
  - (2) these results were difficult to verify because they were interpreted in terms of invisible inner mental processes.
- One of Watson's papers, "Psychology As the Behaviorist Views It," set forth the goals of this approach to psychology:

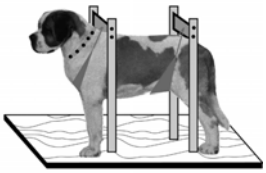
WATSON FOUNDS BEHAVIORISM

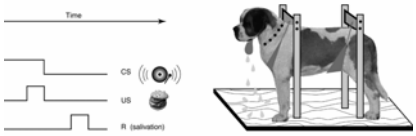
- Psychology as the Behaviorist sees it is a purely objective, experimental branch of natural science. Its theoretical goal is the prediction and control of behavior. *Introspection forms no essential part of its methods*, nor is the scientific value of its data dependent upon the readiness with which they lend themselves to interpretation in terms of consciousness. . . . What we need to do is to start work upon psychology *making behavior, not consciousness, the objective point of our attack.*
- (Watson, 1913, pp. 158, 176; emphasis added)

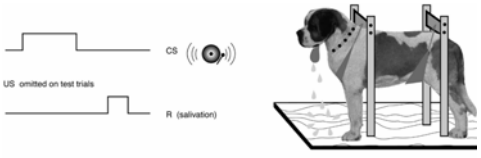
Classic conditioning

FIGURE 1.6 In Pavlov's famous experiment, he paired ringing a bell with presentation of food. Initially, only presentation of the food caused the dog to salivate, but after a number of pairings of bell and food, the bell alone caused salivation. This principle of learning by pairing, which came to be called classical conditioning, was the basis of Watson's "Little Albert" experiment.

巴普洛夫，经典条件反射







Instrumental Conditioning

- **E. L. Thorndike (1905)**
  - Described the learning that was governed by his "law of effect" as instrumental conditioning because responses are strengthened when they are instrumental in producing rewards
- **Law of Effect**
  - Responses that are rewarded are more likely to be repeated and responses that are produce discomfort are less likely to be repeated

B.F. Skinner (1904 -1990)

The organism learns a response by operating on the environment…

Operant Conditioning

- A type of learning in which **voluntary** behavior is strengthened if it is reinforced and weakened if it is punished (or not reinforced

Operant Conditioning

- Response (action) comes first and is voluntary, unlike classical where stimulus comes first and response is involuntary
  - **Classical:** S → R
  - **Operant:** S → R → S , that becomes R → S
- 后果决定行为
- Notes:
  - The terms *instrumental conditioning* and *operant conditioning* describe essentially the same learning process and are often used interchangeably
  - Basically, Skinner extended and formalized many of Thorndike's ideas

THE REEMERGENCE OF THE MIND IN PSYCHOLOGY

- Edward Chance Tolman
- Cognitive Map

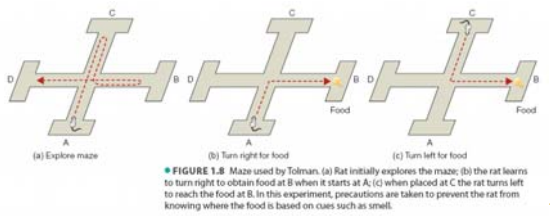


FIGURE 1.8 Maze used by Tolman. (a) Rat initially explores the maze; (b) the rat learns to turn right to obtain food at B when it starts at A; (c) when placed at C the rat turns left to reach the food at B. In this experiment, precautions are taken to prevent the rat from knowing where the food is based on cues such as smell.

A Brief History of the Cognitive Approach (8)

- Gestalt Psychology
  - psychological phenomena is best viewed as organized, structured wholes.
  - A reaction not only against the behaviorism, but also against structuralism
  - "the whole differs from the sum of its parts"
  - profound influence on the study of the perception of forms and the study of insight, an aspect of problem solving

The Emergence of Cognitive Psychology (1)

- Psychobiology
- Karl Lashley (a former student of Watson)
  - how the organization of the brain governs human activity
  - to consider the brain as an active, dynamic organizer of behavior
- Donald Hebb
  - how the structure of neural connections in the brain changes as a result of learning
  - a mental representation of some external event is represented by a hierarchical structure of multiple cell assemblies

The Emergence of Cognitive Psychology (2)

- Linguistics
- Noam Chomsky
  - the creative potential of language defies behaviorist notion that we learn language by reinforcement
  - language understanding is constrained not so much by what have heard, but by an innate language acquisition device (LAD)
  - it is the structure of the mind, rather than the structure of environmental contingencies, that guides language acquisition

The Emergence of Cognitive Psychology (3)

- Computer and Communication Sciences
  - Following many issues faced in computer information processing, psychologists began to talk about information codes, about limitation in processing capacity, and about the processing either serially or in parallel

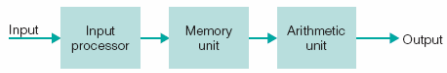


FIGURE 1.9 Flow diagram for an early computer.

Refers to the process by which information is initially recorded in a form usable to memory

The maintenance of material saved in the memory system

Material in memory storage is located, brought into awareness, and used

Flow Diagrams for the Mind

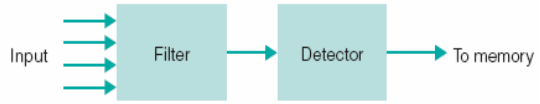


FIGURE 1.11 Flow diagram for Broadbent's filter model of attention. This diagram shows that many messages enter a "filter" that selects the message to which the person is attending for further processing by a detector and then storage in memory. We will describe this diagram more fully in Chapter 4.

The Emergence of Cognitive Psychology (4)

- Artificial Intelligence
  - to construct systems that show intelligence, and particularly, the intelligent processing of information
  - more interested in maximizing information processing efficiency, rather than in simulating human intelligence and how humans solve problems
  - *Herbert Simon and Allen Newell*

The Emergence of Cognitive Psychology (6)

- The Born of Cognitive Psychology in 1956 (11 September)
  - a symposium at MIT
  - many books and articles on a variety of mental processes were published
- Ulric Neisser
  - Cognitive Psychology (1967)

The Emergence of Cognitive Psychology (5)

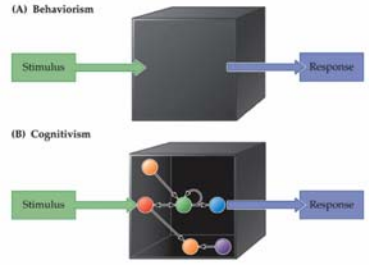
- Information-processing Approach
  - a mental process can best be understood by comparing it with the operation of a computer
  - a mental process can be interpreted as information processing through the system in a serious of stages, from stimuli to responses
  - a number of simple mental operations can be grouped together to produce complex cognitive behavior

Information Processing Approaches

- Human beings actively seek useful information about their world
- Human beings can handle only a limited amount of information at a given time
- Information that comes in through the senses is transformed by a series of mental processes into a form suitable for storage and later recall
- The *structure* of the memory system and the *processes* operating within that structure
  - Structure refers to the way in which the memory system is organized
  - Process refers to the activities occurring within the system

认知科学的历史

- 行为主义与认知主义：20世纪两大流派



行为主义：人的心理/大脑是黑匣子，内部构造无法研究，只能研究输入与输出的关系

认知主义：人的心理/大脑是黑匣子，但其内部的结构是可以通过研究输入与输出的关系而推断出来的。
信息加工过程

Fields Related to Cognitive Psychology (1)

- Cognitive Science
  - includes psychology, philosophy, linguistics, anthropology, artificial intelligence, and neuroscience
  - tries to answer questions about the mind.
  - examines the nature of knowledge, its components, its development, and its use.
  - No consensus yet about either its content or its methods
    - Computational models?

Fields Related to Cognitive Psychology (2)

- Cognitive Neuroscience
  - examines how the structure and function of the brain explain cognitive processes
  - began to flourish at the end of 1980s, when cognitive psychologists and neuroscientists began to use brain-imaging techniques to record brain activity during cognitive tasks
  - it is a challenge to build explanatory bridge between the level of the neuron and the level of cognitive concept

Key Themes of Cognitive Psychology (1)

- The cognitive processes are active, rather than passive
- The cognitive processes are remarkably efficient and accurate
- The cognitive processes handle positive information better than negative information
- The cognitive processes are interrelated with one other; they do not operate in isolation

Key Themes of Cognitive Psychology (2)

- Many cognitive process rely on both bottom-up and top-down processing
  - bottom-up processing stresses the importance of information from the stimuli
  - top-down processing stresses the influence of concepts, expectations, and memory upon the cognitive processes

测验题目

- 什么是认知？什么是认知心理学?
- 认知心理学的诞生有什么历史背景？
- Why are models important in cognitive psychology? Do the boxes in models like Broadbent's model of attention correspond to structures in the brain?
- Is it possible to read a person's mind by measuring the activity of the person's brain?
- What methods doe cognitive psychologists use in research?
- What are the current issues and various fields of study within cognitive psychology?

Reading List 作业

- 《21世纪的心理科学与脑科学》，北京大学出版社，2002。
- **The cognitive revolution: a historical perspective *Trends in Cognitive Sciences* Volume: 7, Issue: 3, March, 2003, pp. 141-144 Miller, George A.**

- 谈谈你所认识的认知心理学、认知科学、和认知神经科学
- （下个星期三之前交给助教）

Keep on Searching and REsearching