

PSYC 10004-6 – FOUNDATIONS OF PSYCHOLOGY
Introduction to Cognitive Psychology

Lecture 1 – Introduction

Prof Markus Damian

Welcome!



Prof Jeff Bowers
Unit coordinator
j.bowers@bristol.ac.uk



Prof Markus Damian
m.damian@bristol.ac.uk

Organisation of Year 1 Psychology units

PSYC10004 Foundations of Psychology (40 cps) – is all of the following:

PSYC10006 Introduction to Cognitive Psychology (10 cps)

Broad review of key issues in the field, starting with how visual and auditory information is perceived and attended, followed by a review of memory processes (both short and long-term memory), language processing, and finally a discussion of higher levels of cognition (including high-level cognitive breakdown)

PSYC10007 Introduction to Social Psychology (10 cps)

Introduction to the field of experimental social psychology, focusing on behaviour in the context of social interactions. Covers topics such as interpersonal judgment and perception, aggression, prejudice and social influence (including attitude formation and persuasion) in adulthood

PSYC10008 Introduction to Developmental Psychology (10 cps)

Overview of the development of children from birth through to middle childhood, focusing primarily on the development of perceptual, cognitive, linguistic and social skills

PSYC10009 Introduction to Biological Psychology (10 cps)

Biological approach to behaviour with particular reference to the importance of neurophysiological processes. Unit outlines how the brain is organised and how neurons work. The unit then considers how neural systems can process information, allowing decisions to be made, as well as how these systems allow associative learning

General organisation of unit and assessment

- 12 lectures, plus
- “Essay writing for Psychology students”
- Unit review
- For the *Foundation course (PSYC10004)* there is one essay (due on Nov 2), and one MCQ examination (January exam period). Final Grade: based on 50% coursework and 50% examination. Exam questions are multiple choice, and will be based on lectures as well as relevant passages from the Schacter textbook.
- For *Introduction to Cognitive Psychology (PSYC10006)* there is one MCQ examination (January exam period). Final Grade: 100% examination. The MCQ exam is the same for the Foundation and Introduction courses

Resources

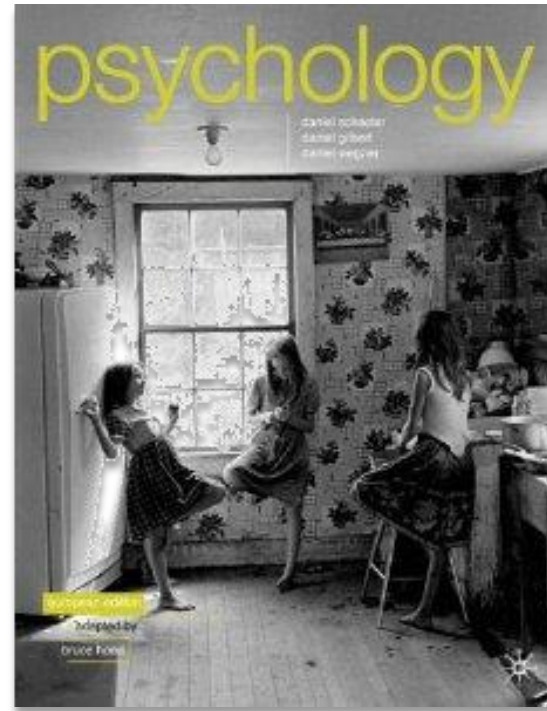
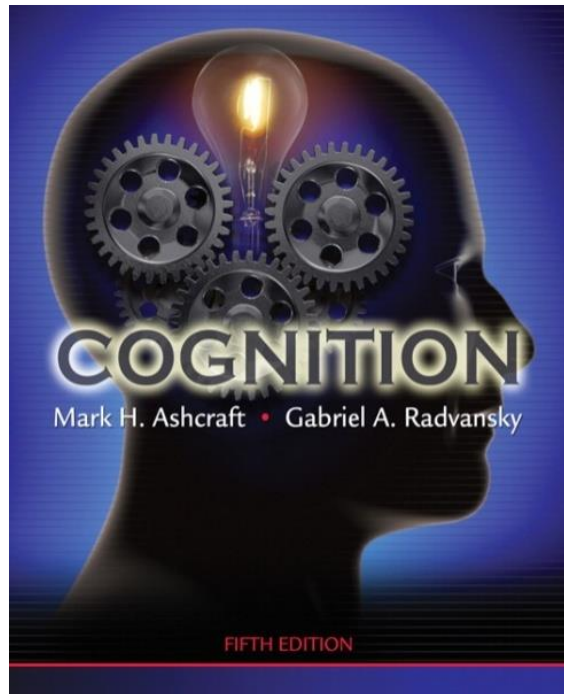
- Electronic resources available on Blackboard (<http://www.ole.bris.ac.uk>) - if you can't login, let us know!
- Check out mobile version for iPhone, Android, Blackberry etc.



A screenshot of a web browser displaying the Blackboard Learn interface. The browser tabs show 'Blackboard - psmfed@br...', 'The University of Bristol', 'Tasks', 'Blackboard Learn', and 'Bristol University | School...'. The address bar shows the URL 'https://www.ole.bris.ac.uk/webapps/portal/frameset.jsp?tab_tab_group_id=_2_1&url=%2Fwebapps%2Fblac...'. The page header includes the University of Bristol logo and the word 'Blackboard'. Below the header is a navigation bar with links: Home, Help, Courses, eReserves, Content, and Personal Learning Space. The main content area is titled 'Unit Description & Overview' and contains information for 'PSYC10006 Introduction to Cognitive Psychology'. The unit director is Prof Jeffrey Bowers. The page lists the aims, learning points, and assessment information for the course. A sidebar on the left contains links for 'Introduction to Cognitive Psychology 2013 (PSYC10006_2013)', 'Unit Announcements', 'Unit Description & Overview', 'Academic Contacts', 'Core & Recommended Reading', 'Discussion & Feedback Forum', and 'Control Panel'.

Resources

- Core reading for all first year
Psychology units: Schacter, Gilbert,
Wegner & Hood (2012), *Psychology*.
Palgrave Macmillan. European Edition.
BF121 SCH



- For this unit, any textbook on
Cognitive Psychology will provide
much more detailed information
- E.g., Ashcraft & Radvansky (2010),
Cognition. Pearson Education.
BF371ASH

Required readings in Schacter al. (2012)

- Chapter 4 – Sensation and perception (pp. 121-151 only)
- Chapter 5 – Memory (pp. 168-211)
- Chapter 7 – Language and thought (pp. 266-293 only)
- Chapter 8 – Consciousness (pp. 294-318 only)
- Materials for exam will come both from lectures, and from these core chapters!

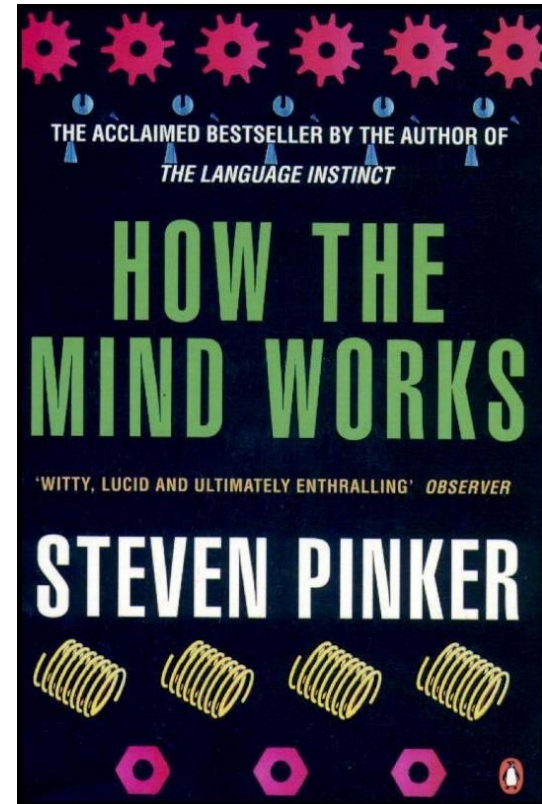
Recommended additional books

Schacter, D. L. (1997). *Searching for memory: The brain, the mind, and the past*. Basic Books. (especially Chapters 2, 4, & 5)

Pinker, S. (1997). *How the mind works*. Penguin Books (especially Chapters 1-4).

Recommended reading... if you are really interested!

- Steven Pinker – Harvard psychologist
- stevenpinker.com



Recommended additional articles

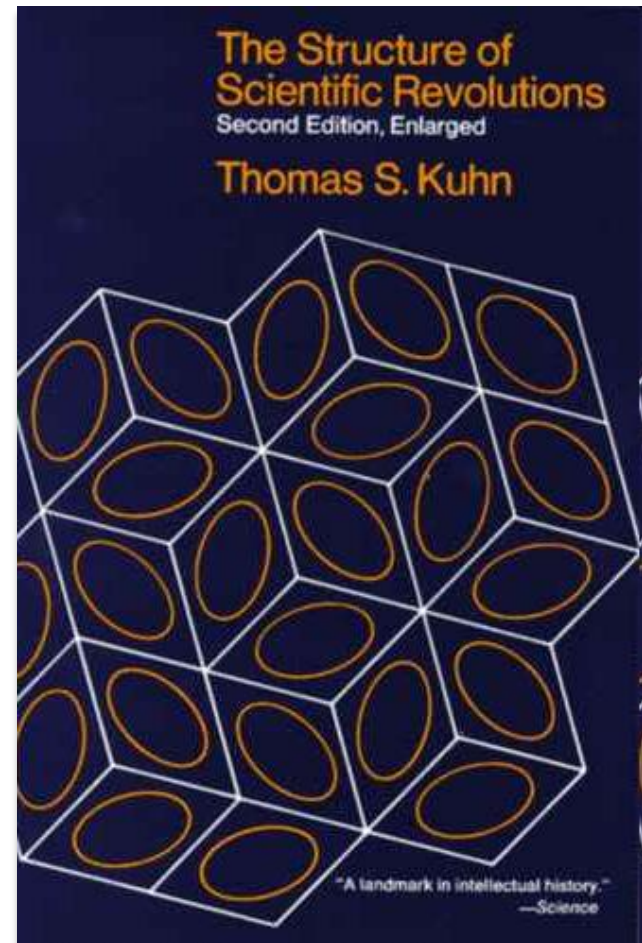
- Miller, G. A. (2003). The cognitive revolution: a historical perspective. *Trends in Cognitive Sciences*, 7(3), 141-144. *see Lecture 1
- Riesenhuber, M., & Poggio, T. (2000). Models of object recognition. *Nature Neuroscience*, 3, 1199-1204. *see Lecture 4
- Moray, N. P. (1959). Attention in dichotic listening: Affective cues and the influence of instructions. *Quarterly Journal of Experimental Psychology*, 11, 56–60. *see Lecture 5
- Driver, J. (2001). A selective review of selective attention research from the past century. *British Journal of Psychology*, 92(1), 53-78. *see Lecture 5
- Baddeley, A. D. (2002). Is working memory still working? *European Psychologist*, 7(2), 85-97. *see Lecture 6
- Coltheart, M. (2004). Are there lexicons? *The Quarterly Journal of Experimental Psychology Section A*, 57(7), 1153-1171 *see Lecture 7
- Corkin, S. (2002). What's new with the amnesic patient HM? *Nature Reviews Neuroscience*, 3(2), 153-160. *see Lecture 8
- Karipke, J. D., & Roediger, H. L. (2008). The critical importance of retrieval for learning. *Science*, 319(5865), 966-968. *see Lecture 9
- Bowers, J.S., Mattys, S.L., & Gage, S.H. (2009). Preserved implicit knowledge of a forgotten childhood language. *Psychological Science*, 20, 1064-1069. *see Lecture 10
- Coltheart, M. (2006). Dual route and connectionist models of reading: An overview. *London Review of Education*, 4(1), 5-17. *see Lecture 11
- Bloom, P., & Keil, F. C. (2001). Thinking through language. *Mind & Language*, 16(4), 351-367. *see Lecture 12

Aims of lecture

- characterise Cognitive Psychology in a historical context
- What are its roots?
- Why is it done the way it is?
- What are major issues?
- Where is the field heading?

Thomas Kuhn (1922-1996) – Paradigm shifts

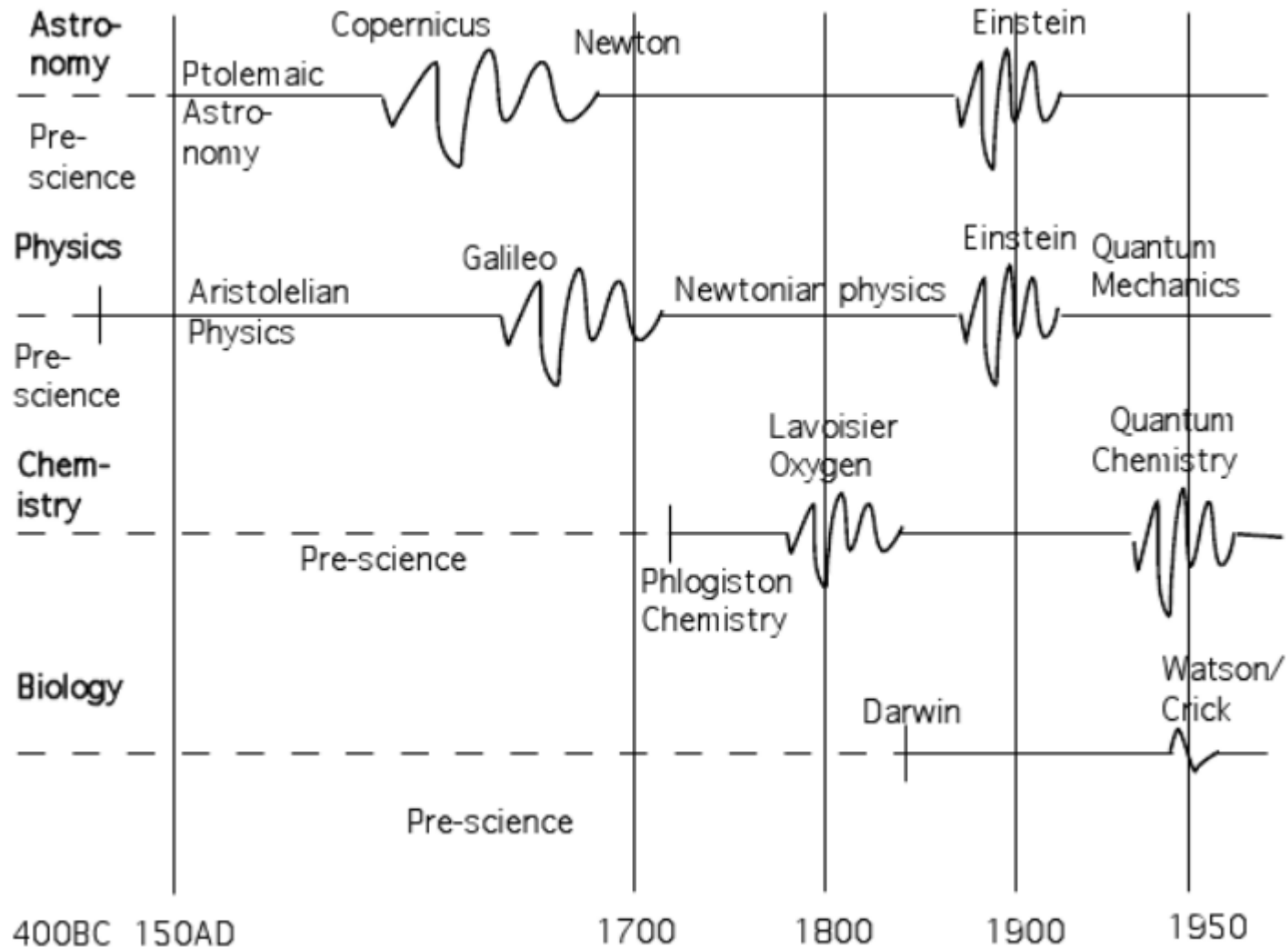
- Traditional view: scientific progress comes about via gradual accumulation of knowledge
- Kuhn (1962) – science undergoes periodic revolutions
- “Paradigm shifts” - nature of scientific inquiry within a particular field occasionally undergoes abrupt transformation



Progress in science

- Progress in a scientific domain undergoes three distinct stages:
 - “Pre-science” – lacking a central paradigm
 - “Normal science” – scientists trying to flesh out a central system with cumulative knowledge
 - “Revolutionary science” – anomalous findings (which don’t fit the current paradigm) build up, eventually causing a *crisis* which opens way for a novel paradigm

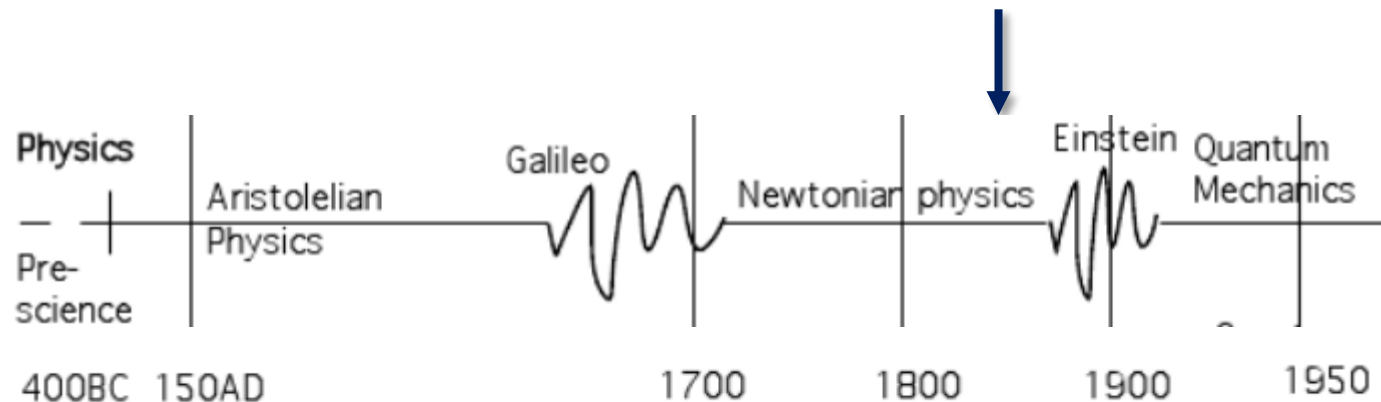
Paradigm shifts in science



Paradigm shifts in science

“There is nothing new to be discovered in physics now. All that remains is more and more precise measurement.”

Lord Kelvin (1824–1907)

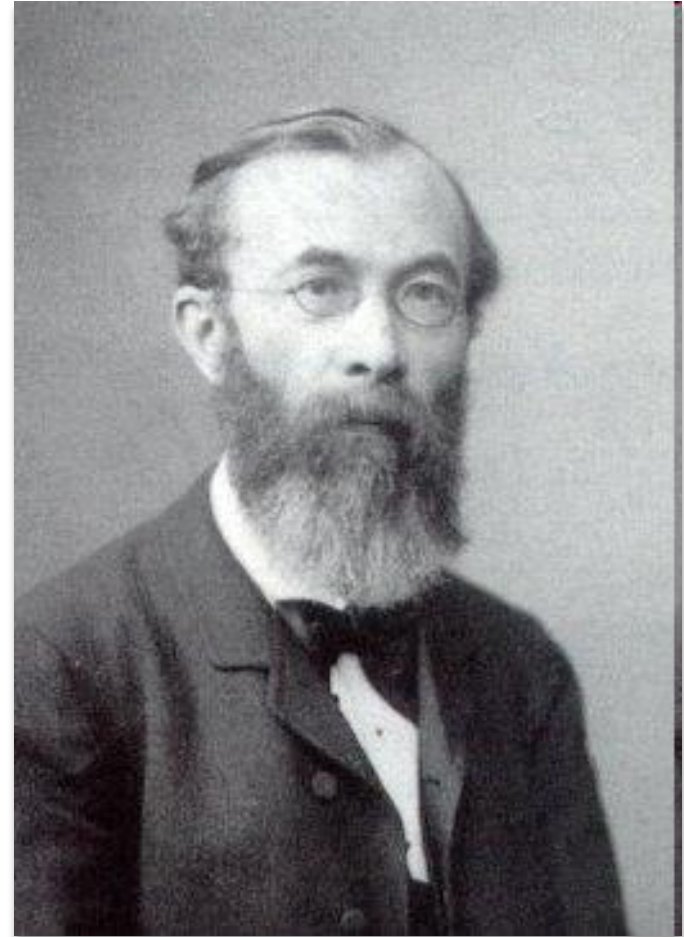


Progress in science

- Kuhn's most controversial claim: established and revolutionary paradigms are *incommensurable* (advocates of old and new paradigm don't quite speak the same language)

Wilhelm Wundt (1832-1920)

- one of the founding figures of modern (“scientific”) psychology - “father of experimental psychology”
- founded one of the first laboratories for psychological research at the University of Leipzig
- Idea: psychology can be studied as a science!



Wilhelm Wundt

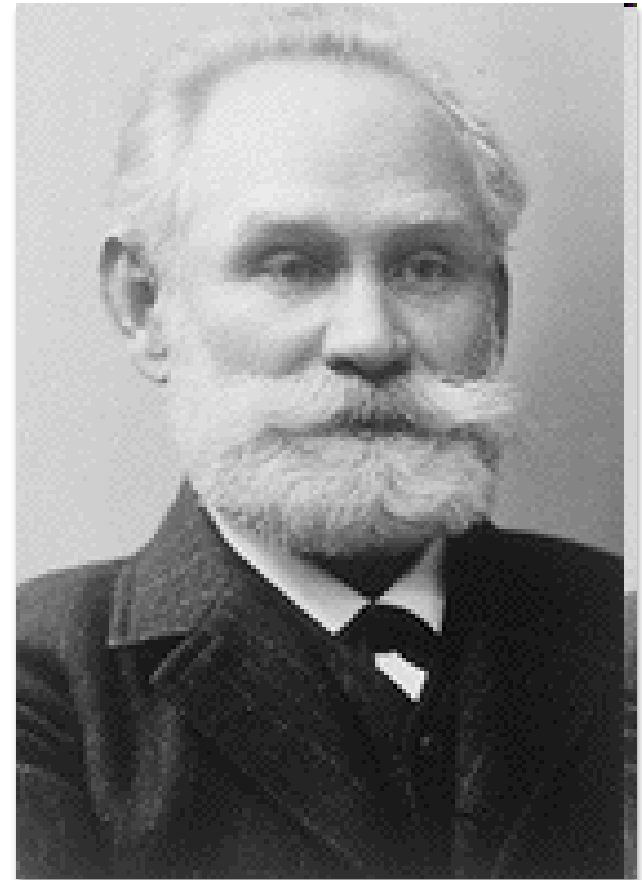
- By using *introspection* in a controlled environment (laboratory) one could gather information into how minds worked
- highly trained observers were presented with carefully controlled sensory events. These individuals were then asked to describe their mental experiences of these events
- Problems with introspective method:
 - possible biases and confabulations
 - many mental activities may not be transparent to introspection

Behaviourism

- School of thought which dominated psychological thinking for much of 1st half of 20th Century
- partly a counter-movement to “introspectionist” schools of thought (e.g., Wundt)
- Central idea: everything that organisms do (including acting, thinking and feeling) can and should be regarded as behaviours
- If we want to have a science of mind, only overt behaviour can be scientifically studied
- Most types of behaviour are learned (not innate)
- just a working hypothesis, or a genuine theory of how the mind works?

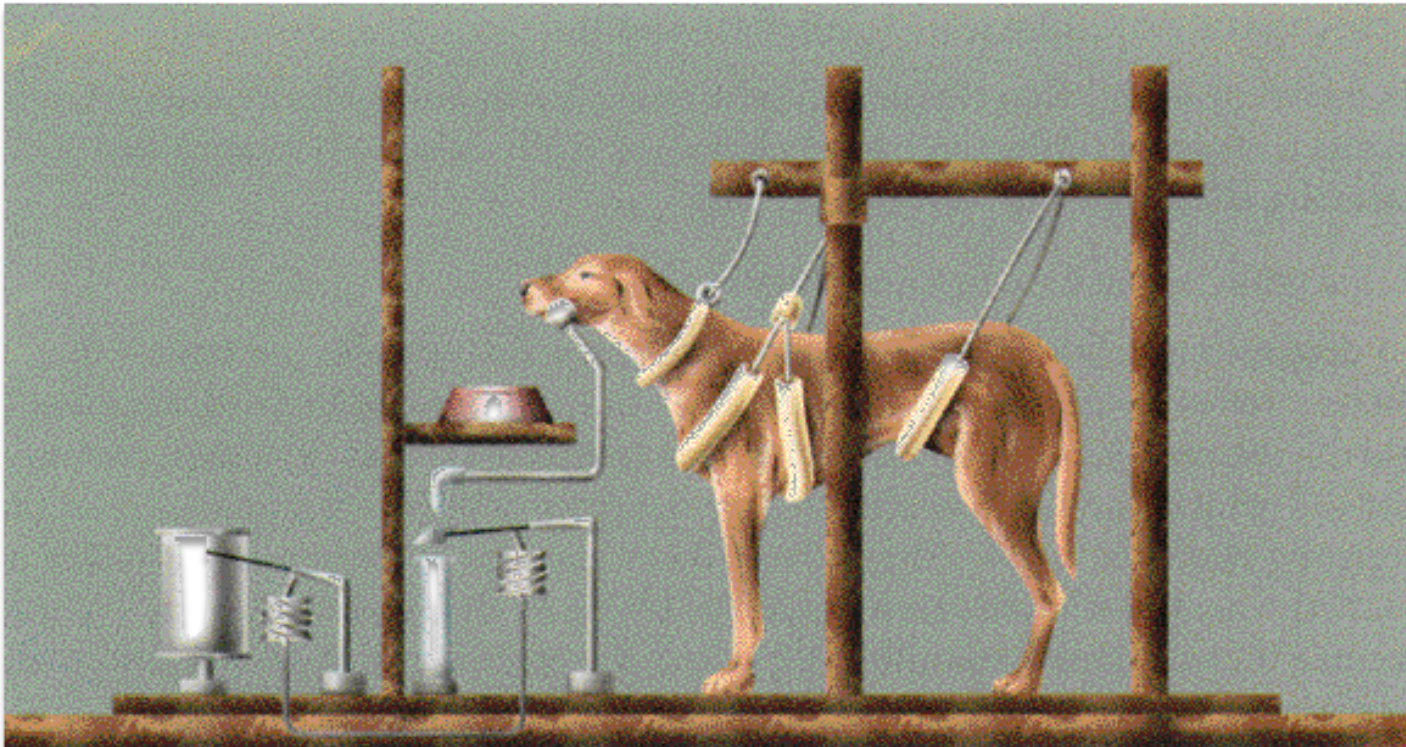
Ivan Pavlov (1849-1936) – Classical conditioning

- Russian physiologist, Nobel Prize winner in 1904
- developed concept of *classical conditioning*
- originally worked on gastric functions in dogs
- observed that dogs tended to salivate before food was delivered
- investigated such “psychic secretion” in series of studies which measured dogs’ salivary gland activity in response to various stimuli



Classical conditioning

- discovered basic laws for the establishment and extinction of "conditional reflexes" (e.g., salivation) that only occurred conditionally upon specific previous experiences of the animal (e.g., sound of a bell)
- learning of “stimulus-response associations”



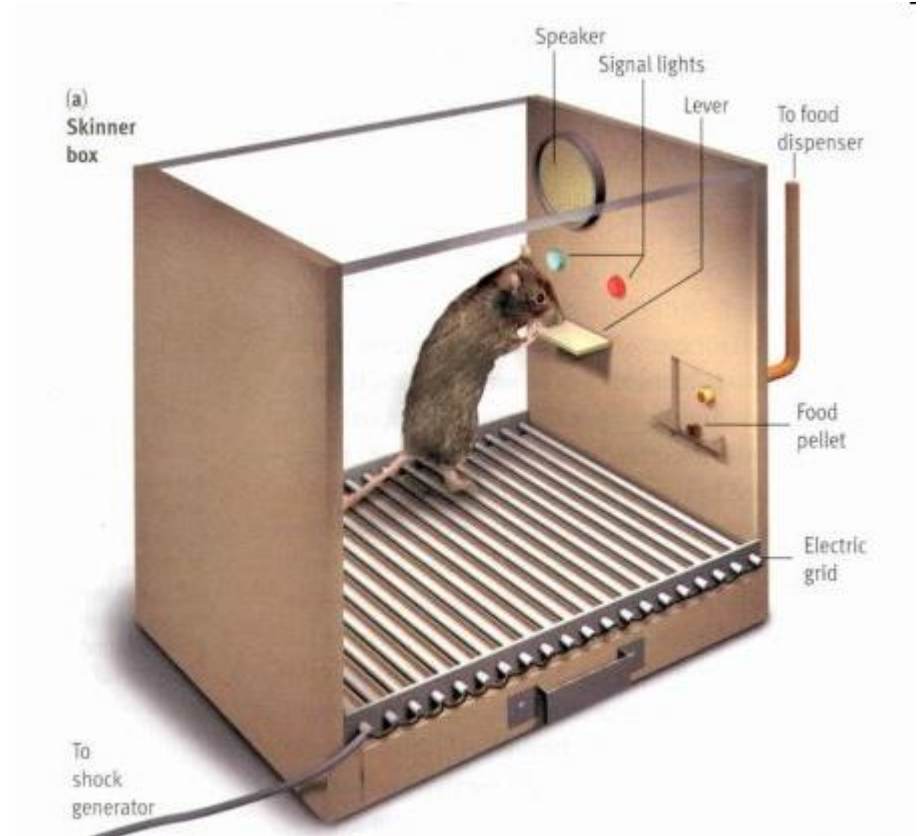
B. F. Skinner (1904-1990)

- towering figure of behaviourism
- established principles of “operant conditioning”: use of modification of “free” (self-initiated) behaviour:
 - *classical* conditioning deals with behaviour which is elicited by antecedent conditions (e.g., dog salivating in response to food)
 - *operant* conditioning deals with modification of “voluntary” behaviour



“Skinner box” (or “operant conditioning chamber”)

- controlled environment allows systematic study of how to modify behaviour – via *reinforcement* (food) or *punishment* (electric shock)
- For instance: is occasional (“partial”) negative or positive reinforcement more effective than constant reinforcement, or less?



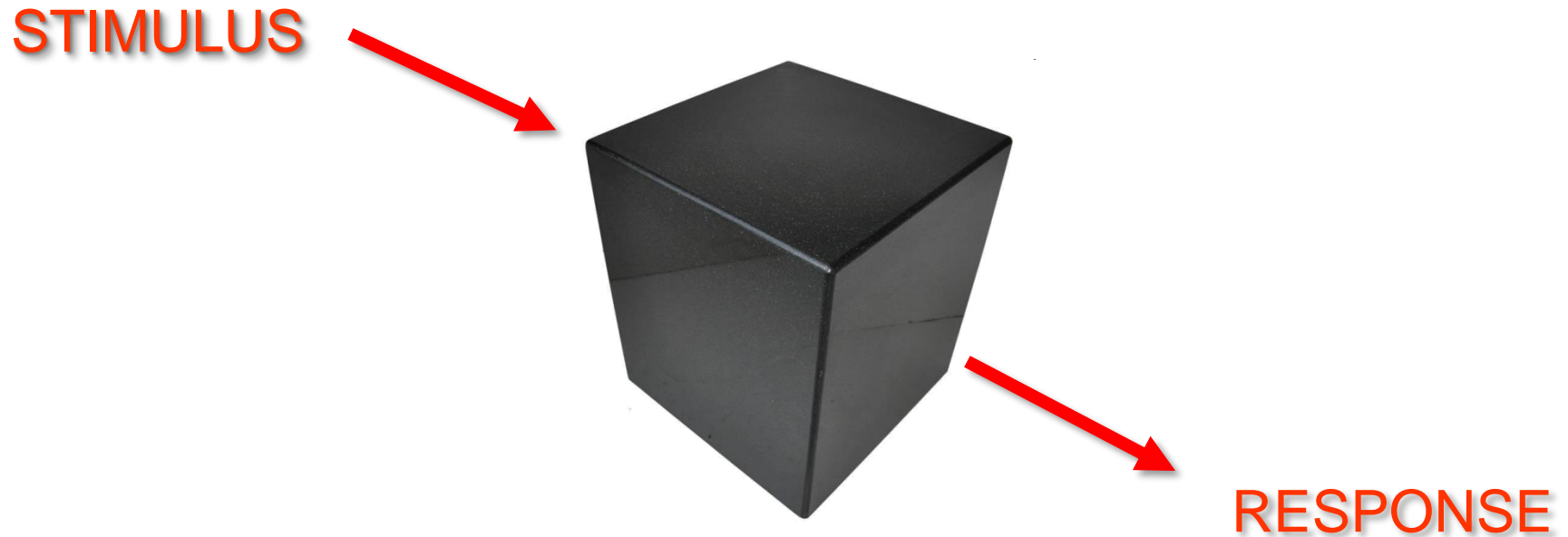
Not just in rats...

- behaviourism were keen to apply science of behaviour to the real world
- Social engineering
- Temperature-controlled “Skinner boxes” for infants:



The mind according to behaviourism

- “black box”: all we can do as scientists is to observe stimuli and responses – internal structure is opaque

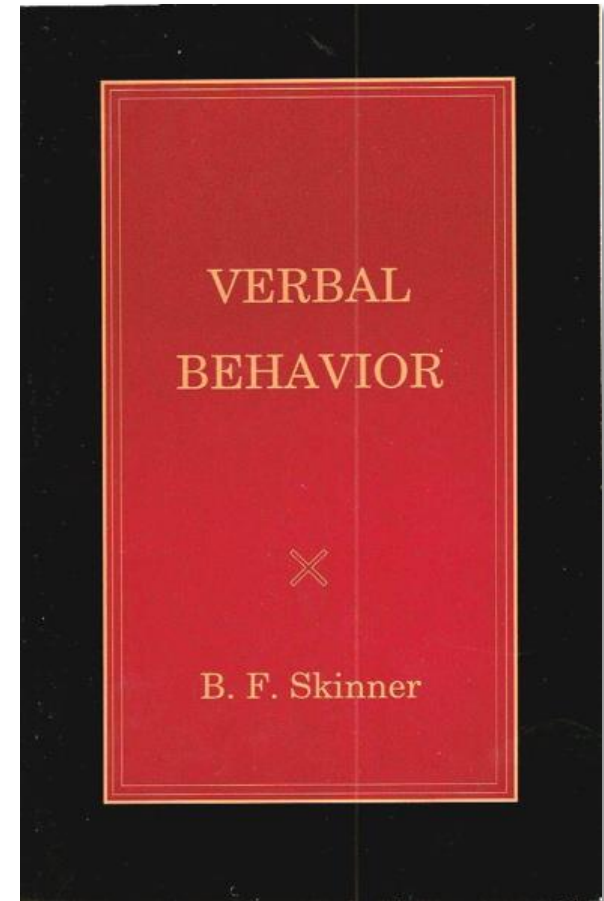


Behaviourism as a general theory of mind?

- studying stimulus-response associations works when explaining animal behaviour (and parts of human behaviour as well...)
- But, does it make sense to get rid of the mind altogether?
- Gilbert Ryle (British philosopher): “How do I know what I think until I hear what I have to say?”
- One behaviourist to another after love-making: "Darling, that was wonderful for you. How was it for me?"

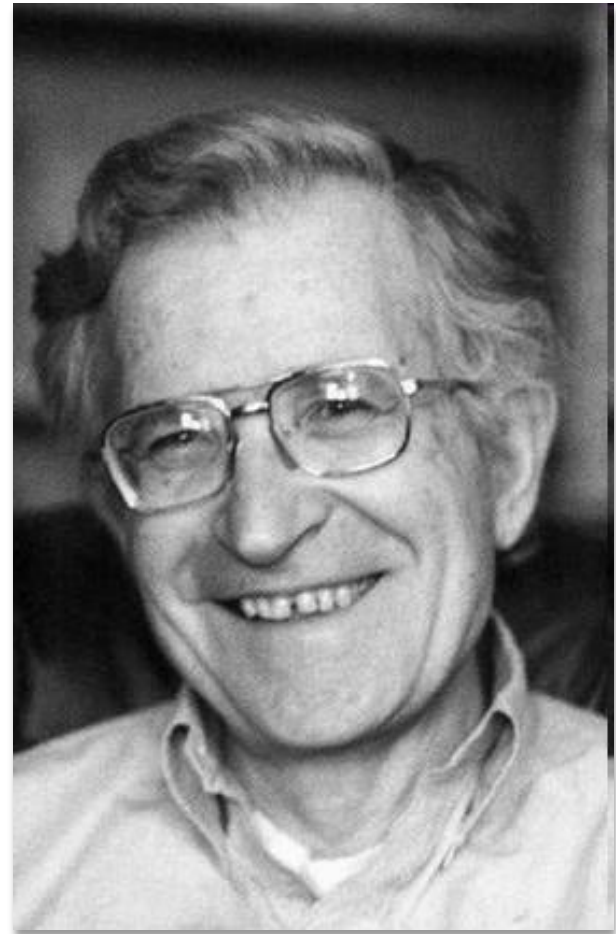
Is behaviourism plausible as a general theory of mind?

- Can behaviourism account for high-level mental functions, such as language, and thought?
- Skinner's (1957) book redefines language as "verbal behaviour"
- like any other behaviour, language is subject to the principles of stimulus-response associations, etc.
 - words – defined as "direction-toward-action" (verbal behaviour is intended to modify someone else's behaviour)
 - sentences – are (very complex) S-R association chains



Paradigm shift – Noam Chomsky (1928-)

- American linguist, philosopher, and political activist
- in 1959, published devastating criticism of Skinner's behaviourist approach to language
- behaviourism will never work as an explanatory framework of language
 - language has *syntax* ("colourless green ideas sleep furiously" – no meaning, but clearly well-formed syntax)
 - language is rapidly learned by all children, with only minor variation ("poverty of stimulus")



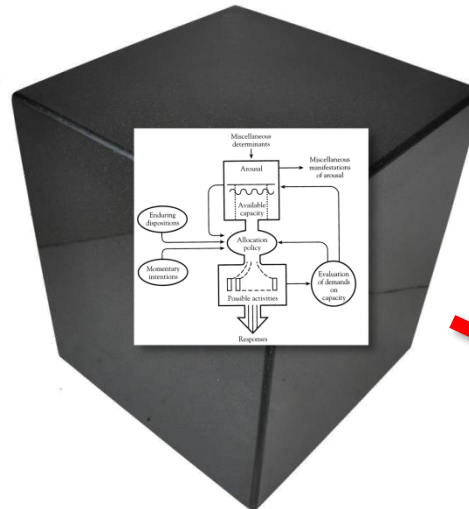
Language according to Chomsky

- S-R associations won't do
- Language has rich internal syntactic structure, rapidly acquired by children – some of it must be *innate*
- to account for language (and part. syntax), need *symbols* and *rules*
 - words stand for some referent (symbolic), have mental representation
 - words are combined into sentences according to syntactic rules
- proper theory of language in mind (and by extension, much of psychology) needs “intervening variables” – mental processes (such as rule-based symbol manipulation in syntax), not just S-R associations

The mind as information processing device

- the mind according to cognitive psychology can be conceptualised as an information processing device:

STIMULUS

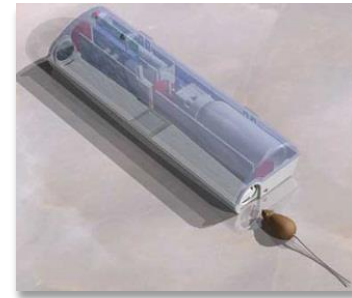


RESPONSE

- note: does not imply that the mind is a computer (only that it performs computational functions)

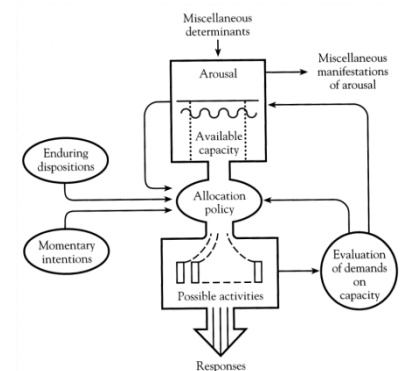
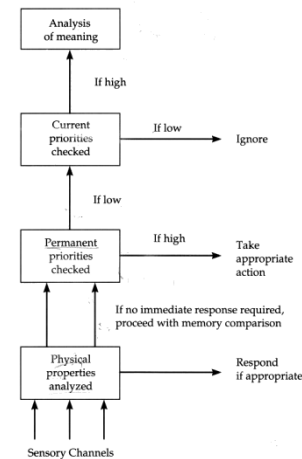
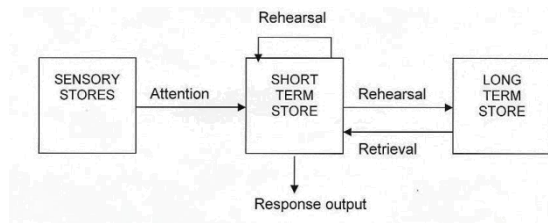
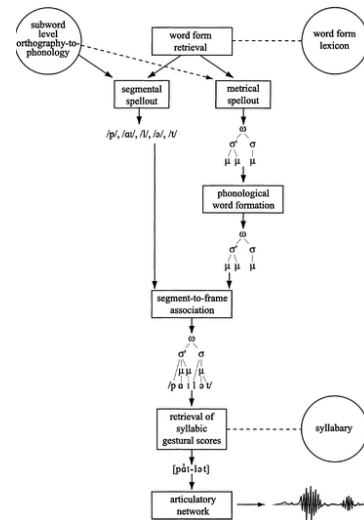
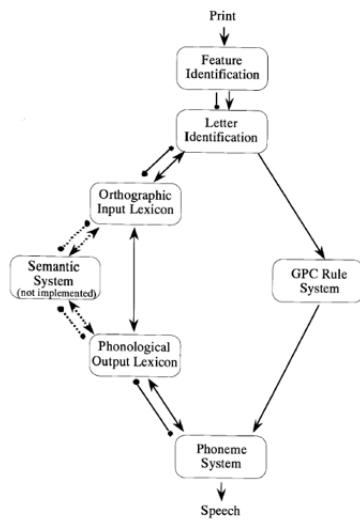
What's important are *functions* of mental states

- many different ways to construct a mouse trap, but all fulfil the same function (catching mice)



Mental processes

- mental states are like mouse traps (what's important is ultimately not what they are but what they do)
- exact implementation (in the brain) is largely irrelevant:

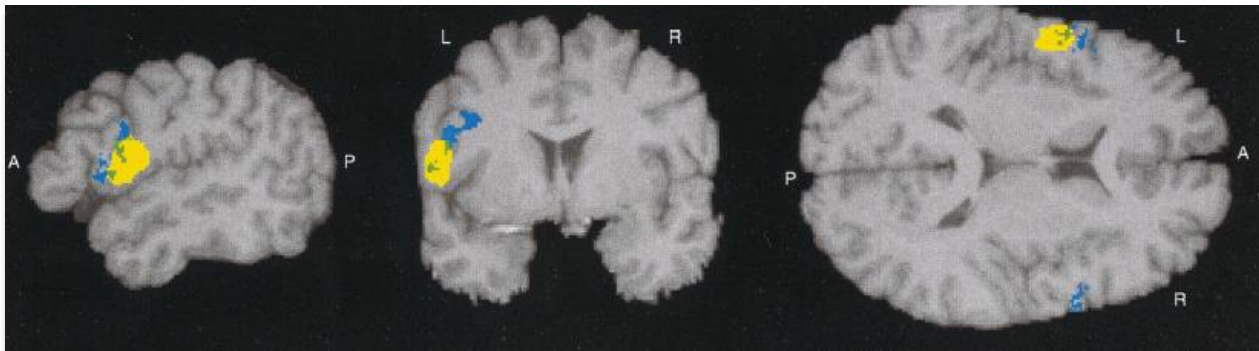
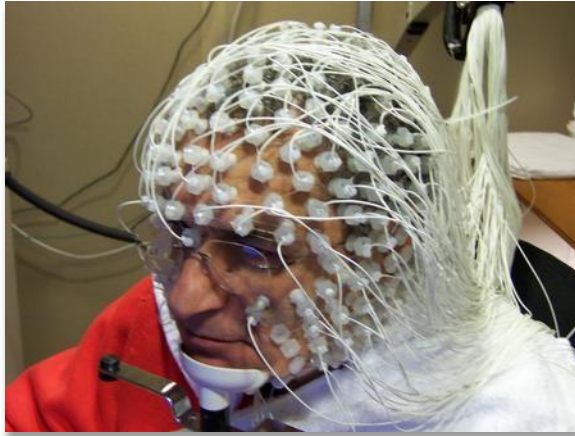


Is functionalism really plausible?

- if so, psychologists could ignore how mental states are implemented in the brain
- “Artificial intelligence” (computer simulation of mental processes) would be fairly plausible...
- more recently: view according to which brains are seen as extremely complex biological structures from which behaviour arises (“mind is what the brain does”)
- wouldn’t be very smart to ignore biological implementation!
- convergence of cognitive psychology and neuroscience – “cognitive neuroscience”

Cognitive neuroscience

- neuroimaging methods allow the tracking of mental processes in the intact brain



Areas in cognitive psychology

- Sensation and Perception - how does the mind decode sensory input (visual, auditory, haptic, etc.) and arrive at coherent perception of the world?
- Attention - how are we able to filter out most of sensory input from the environment, and focus only on what's relevant?
- Memory - how are memory traces stored and lost, both in the short- and long-term? Different types of memory?
- Language - how are words represented in the mind/brain, and how are sentences assembled and processed? Entirely learned, or partly innate?
- Consciousness - how can a few pounds of neural tissue generate feelings, desires, beliefs, and impressions which are about something (“intentional”)?
- Problem solving, decision making

Summary and key points

- advent of Cognitive Psychology (60s onward) constitutes a scientific paradigm shift in the Kuhnian sense
- highly active research field in which scientists (loosely) adopt the information processing metaphor
- more recently: bridging the gap between mental processes and implementation (“wetware”) – cognitive neuroscience

References

- Chomsky, N. (1959). A review of B. F. Skinner's Verbal Behavior. In L. A. Jakobovits and M. S. Miron (Eds.), *Readings in the Psychology of Language*, Prentice-Hall, 1967, pp. 142-143.
- Gardner, H. (1987). *The mind's new science: A history of the cognitive revolution*. Basic books.
- Kuhn, T. (1962). *The structure of scientific revolutions*. The University of Chicago Press.
- Pinker, S. (1997). *How the mind works*. Penguin Books.
- Skinner, B. F. (1957). *Verbal behaviour*. Copley Publishing Group.